Undergraduate Calendar
1996-97
The Undergraduate Calendar

The Undergraduate Calendar is published once a year by the Office of the Registrar. The Calendar provides official information about academic courses and programs and related policies and regulations for students and applicants, as well as general information about the University.

The Calendar is arranged in chapters which fall into five divisions. The first division describes the various services offered by the University. The second division outlines the undergraduate programs and the third division describes the courses offered in these programs. The fourth division of the Calendar lists the University faculty and the fifth division lists the membership of the governing bodies of the University and the officers of the various administrative units.

Course description information in the Undergraduate calendar is accurate as to intention at the time of publication. However, actual course content, the hours/type of instruction and terms offered may vary somewhat from that listed.

The course listings and academic programs described in the Calendar represent Senate-approved requirements and electives for completion of degree requirements. Circumstances beyond the control of the University, such as severe budget shortfalls, may result in restrictions in the number and range of course and program choices available to students as compared with those listed herein or in other University publications. The University reserves the right to limit access to courses or programs, and, at its discretion, to withdraw particular programs, options, or courses altogether. In such circumstances the University undertakes to the best of its ability to enable students registered in affected programs to complete their degree requirements in a satisfactory manner. Prospective students or new registrants are advised to consult the University Course Offerings List and the most current information available from the University and its various Faculties in printed or electronic form, as well as the academic advisor(s) for the programs concerned, before making registration decisions or course/program choices.

Information on tuition and other fees applies, except as may otherwise be indicated, to the 1996-1997 fiscal year of the University which commences May 1, 1996. Information relating to academic course and program regulations is that for the Fall/Winter/Spring academic cycle which commences in September 1996. Detailed information is provided in the relevant chapters of the Calendar.

Academic regulations listed in this Calendar apply to those students admitted or re-admitted to the University from September 1996 onward. Under normal circumstances students are governed by the academic regulations in place for their program at the time they commence studies until graduation or withdrawal.

Inquiries as to the interpretation of the contents of the Calendar may be directed to the Registrar.

The University of Waterloo also publishes the following calendars and brochures:
- Undergraduate Admissions Handbook
- Graduate Studies Calendar
- Distance Education Calendar
- Part-Time Studies Calendar
- Financing Your University Education

and booklets on the following:
- Faculty of Applied Health Sciences
- Faculty of Arts and the Colleges of Waterloo
- Faculty of Engineering

*Faculty of Environmental Studies
*Faculty of Mathematics
*Faculty of Science
*Independent Studies Program

*These appear in the WATBOX, which is distributed to Ontario secondary school guidance offices.

The University reserves the right to require a student to withdraw from a course or courses for academic or other reasons.

The Senate and Board of Governors of the University of Waterloo reserve the right to invoke changes in this Calendar, in either its printed or electronic forms, at any time without prior notice.

Students with Disabilities

The University has developed a number of services to assist students with disabilities. More information is on page 1:17 of this Calendar.

Inquiries

Inquiries as to the interpretation of the contents of the Calendar may be directed to:

The Registrar
University of Waterloo
Waterloo, Ontario, Canada N2L 3G1
Telephone (519) 888-4567, ext. 5378
Fax (519) 746-2882
E-mail: registrar@nh1adm.uwaterloo.ca

The University of Waterloo is on the World Wide Web at: http://www.uwaterloo.ca/home.html

The Registrar's Office is located on the second floor of Ira G. Needles Hall. Working hours run from 8:30 a.m. to 4:30 p.m., Monday through Friday. The Office is open to serve the public from 10:00 a.m. to 4:00 p.m., Monday through Friday.

Federated and Affiliated Colleges:

Conrad Grebel College
Westmount Road North
Waterloo, Ontario N2L 3G6
(519) 885-0220

Renison College
Westmount Road North
Waterloo, Ontario N2L 3G4
(519) 884-4404

University of St. Jerome's College
Westmount Road North
Waterloo, Ontario N2L 3G3
(519) 884-8110

St. Paul's College
Westmount Road North
Waterloo, Ontario N2L 3G5
(519) 885-1460
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Many disciplines are also available as Minors and Joint Honours programs.

* These programs normally fulfill the academic requirements for registration in the related professions. See the Undergraduate Program section of this Calendar.

† Refer to page 2 of this Calendar for statements of University of Waterloo position in respect of possible course and program changes.
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Many disciplines are also available as Minors and Joint Honours programs.

* These programs normally fulfill the academic requirements for registration in the related professions. See the Undergraduate Program section of this Calendar.

† Refer to page 2 of this Calendar for statements of University of Waterloo position in respect of possible course and program changes.

‡ No new students are being admitted to the Dance Program. Current Dance students must complete their degree requirements by the end of Winter term 1997.
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Many disciplines are also available as Minors and Joint/Honours programs.

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<td><em>Statistics</em></td>
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<td><em>Systems Design Engineering</em></td>
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<td><em>Women's Studies</em></td>
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</tbody>
</table>

Many disciplines are also available as Minors and Joint Honours programs.

* These programs normally fulfill the academic requirements for registration in the related professions. See the Undergraduate Program section of this Calendar.

† Refer to page 2 of this Calendar for statements of University of Waterloo position in respect of possible course and program changes.
Glossary of Terms

Academic Program
A series of courses, a number of which may be mandatory and of a specialized nature, leading toward a particular degree. Details of the several types of programs offered such as Honours, General, Preprofessional, Professional are given in the Calendar.

Antirequisites
Courses with significant overlap. Degree credit cannot be obtained for both the antirequisite and the course(s) naming it as such.

Corequisite
A course required to be taken concurrently with, or passed prior to registration in, another course which lists it as a corequisite.

Prerequisite
A course required to be passed prior to registration in another course which lists it as a prerequisite. (“Consent of instructor” is sometimes listed as an alternative to or in addition to a prerequisite.)

Course
A unit of study relating to a specific academic discipline, and identified by a course name and number.

Credit
A unit of an academic program earned toward a degree by successful completion of a course. A credit weight of 0.5 is normally assigned to a one-term course. Credit weights are used in the calculation of averages for academic standing. Most courses have credit weights of 0.5, but some have weights such as 0.25, 1.0, 2.0. Further explanation is on page 10.

Cross-Listed Courses
Courses which are listed under two departments and which can be taken for credit from either department, but not both.

Cross-Registration
An arrangement between the University of Waterloo and Wilfrid Laurier University which enables students of either University to take courses at the other institution; the purpose is to provide access to courses which are not offered at a student’s home institution.

Elective
A course not specifically required for a degree but counting towards it, to be chosen freely by the student either from within a specified group of courses or more broadly from courses offered anywhere across the University.

Letter of Permission
A document permitting a student to take specified courses at another university to be considered for credit toward a particular University of Waterloo degree.

Major
The area(s) of academic emphasis selected in either an Honours or a General program. Details of course and average requirements are given in academic program sections of the Calendar.

Minor
A group of approved courses taken by a student in an Honours or a four-year General program in a subject outside the “major” area. Details of course and average requirements are given in academic program sections of the Calendar.

Option
A specified combination or grouping of courses which provides a secondary emphasis in certain programs. The emphasis may be in another academic subject, as in Honours Chemistry (Environmental Studies Option), or in a career-oriented area, such as Honours Mathematics (Business Administration Option), or Honours French (Teaching Option).

Practicum
Supervised placement time in a work setting exercising practical routines and techniques related to a particular academic program or option.

Preregistration
The process of selecting courses prior to registration, having them approved by a faculty advisor and recorded with the Registrar’s Office.

Priority Enrolment
For courses designated as “priority enrolment;” preference in scheduling is given to students who require such courses to satisfy specific degree requirements.

Registered Student
A student is considered to be registered if the student’s selection of courses has been approved by a Faculty Advisor and the student has made the appropriate arrangements with the University to pay the required fees.

Term
A particular four-month period of academic registration: Fall term – September to December; Winter term – January to April; Spring term – May to August. Also used with reference to work terms for students in the Co-operative system of study.

Full-Time Student
A student is considered a full-time student when her/his course load reaches or exceeds 1.50 credits in a four-month term. Full-time students are assessed applicable co-operative and incidental fees if their on-campus course load reaches or exceeds 1.50 credits in a four-month term.

Part-Time Student
A student is considered a part-time student when her/his course load is less than 1.50 credits in a four-month term.
## Academic Calendar – 1996

<table>
<thead>
<tr>
<th>Event</th>
<th>Date</th>
<th>Day</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Arts Full-Time Application Deadline – On Campus – Spring Admission</strong></td>
<td>March 1</td>
<td>Friday</td>
</tr>
<tr>
<td><strong>Last Day to File “Intent to Graduate” – Spring Convocation</strong></td>
<td>March 1</td>
<td>Friday</td>
</tr>
<tr>
<td><strong>Meeting – Senate Executive Committee</strong></td>
<td>March 4</td>
<td>Monday</td>
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<tr>
<td><strong>Preregistration Begins – Undergraduate Programs – Fall Term</strong></td>
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<td>Monday</td>
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<tr>
<td><strong>Preregistration Ends – Undergraduate Programs – Fall Term</strong></td>
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<td>Friday</td>
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<tr>
<td><strong>Campus Day</strong></td>
<td>March 12</td>
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<tr>
<td><strong>Meeting – University Senate, 7:30 p.m.</strong></td>
<td>March 18</td>
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<tr>
<td><strong>Meeting – Board of Governors Executive Committee</strong></td>
<td>March 19</td>
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</tr>
<tr>
<td><strong>Lectures End – Engineering and Mathematics – Winter Term</strong></td>
<td>March 29</td>
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<tr>
<td><strong>Arts Part-Time Application Deadline – On Campus – Spring Admission</strong></td>
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<tr>
<td><strong>Last Day for Arts Students to Preregister – Spring Term</strong></td>
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<td><strong>Meeting – Senate Executive Committee</strong></td>
<td>April 1</td>
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<tr>
<td><strong>Lectures End – Other Faculties – Winter Term</strong></td>
<td>April 2</td>
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<tr>
<td><strong>Meeting – Board of Governors, 3:30 p.m.</strong></td>
<td>April 2</td>
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<td><strong>English Language Proficiency Examination, PAC</strong></td>
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<td><strong>Good Friday – University Holiday</strong></td>
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<tr>
<td><strong>Examinations Begin – Winter Term</strong></td>
<td>April 8</td>
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<tr>
<td><strong>Meeting – University Senate, 7:30 p.m.</strong></td>
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<tr>
<td><strong>Course Drop/Withdrawal Deadline – Distance Education – Winter Term</strong></td>
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<tr>
<td><strong>Examinations End – Winter Term</strong></td>
<td>April 20</td>
<td>Saturday</td>
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<tr>
<td><strong>Final Examination Results Due – Winter Term</strong></td>
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<tr>
<td><strong>Winter Work Term Ends – Co-operative Programs</strong></td>
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<tr>
<td><strong>Spring Work Term Begins – Co-operative Programs</strong></td>
<td>April 29</td>
<td>Monday</td>
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<tr>
<td><strong>Registration Begins – Undergraduate Programs – Spring Term</strong></td>
<td>May 1</td>
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<tr>
<td><strong>Lectures Begin – Spring Term</strong></td>
<td>May 1</td>
<td>Wednesday</td>
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<tr>
<td><strong>Registration – Graduate Studies – Spring Term</strong></td>
<td>May 1</td>
<td>Wednesday</td>
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<tr>
<td><strong>Registration Ends – Undergraduate Programs – Spring Term</strong></td>
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<tr>
<td><strong>Examinations – Distance Education – Winter Term</strong></td>
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<tr>
<td><strong>Meeting – Senate Executive Committee</strong></td>
<td>May 6</td>
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<tr>
<td><strong>Start of Late Fees – Spring Term – See Chapter 3 for Details</strong></td>
<td>May 6</td>
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<tr>
<td><strong>Victoria Day – University Holiday</strong></td>
<td>May 20</td>
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<tr>
<td><strong>Meeting – University Senate, 7:30 p.m.</strong></td>
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<td>Tuesday</td>
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<tr>
<td><strong>Meeting – Board of Governors Executive Committee</strong></td>
<td>May 21</td>
<td>Tuesday</td>
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<tr>
<td><strong>Deadline to Drop or Withdraw from On-Campus Courses</strong></td>
<td>May 22</td>
<td>Wednesday</td>
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<td><strong>with 100% Tuition Refund</strong></td>
<td>June 3</td>
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<tr>
<td><strong>End of Course Change Period – Spring Term – See Individual Faculty Chapters</strong></td>
<td>June 3</td>
<td>Monday</td>
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<tr>
<td><strong>Spring Convocation (Applied Health Sciences, Environmental Studies, Independent Studies) – 2:00 p.m.</strong></td>
<td>May 22</td>
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<tr>
<td><strong>Spring Convocation (Arts) – 2:00 p.m.</strong></td>
<td>May 23</td>
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<tr>
<td><strong>Spring Convocation (Science) – 2:00 p.m.</strong></td>
<td>May 24</td>
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<td><strong>Spring Convocation (Mathematics – 10:00 a.m.; Engineering – 2:00 p.m.)</strong></td>
<td>May 25</td>
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<td><strong>Final Examination Results Due – Distance Education – Winter Term</strong></td>
<td>May 30</td>
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<tr>
<td><strong>Distance Education – Fall Term</strong></td>
<td>June 3</td>
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<tr>
<td><strong>Meeting – Senate Executive Committee</strong></td>
<td>June 3</td>
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<tr>
<td><strong>Meeting – Board of Governors, 3:30 p.m.</strong></td>
<td>June 4</td>
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<tr>
<td><strong>Preregistration Begins – Co-operative Programs – Winter Term</strong></td>
<td>June 5</td>
<td>Wednesday</td>
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<tr>
<td><strong>Preregistration Ends – Co-operative Programs – Winter Term</strong></td>
<td>June 7</td>
<td>Friday</td>
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<tr>
<td><strong>Meeting – University Senate, 7:30 p.m.</strong></td>
<td>June 17</td>
<td>Monday</td>
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<tr>
<td><strong>Deadline to Drop or Withdraw from On-Campus Courses</strong></td>
<td>June 19</td>
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<td><strong>with 50% Tuition Refund</strong></td>
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*Some University Departments may be open for limited service on these days.*
### 1996 Continued

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<tr>
<th>Event</th>
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<tbody>
<tr>
<td>Canada Day – University Holiday*</td>
<td>July 1</td>
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<td>Arts Full-Time Application Deadline – On Campus – Fall Admission</td>
<td>July 2</td>
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<td>Application and Course Change Deadlines for Returning Students – Distance Education – Fall Term</td>
<td>July 2</td>
<td>Tuesday</td>
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<tr>
<td>Registration – Summer Session</td>
<td>July 2</td>
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<tr>
<td>Lectures Begin – Summer Session</td>
<td>July 2</td>
<td>Tuesday</td>
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<tr>
<td>Start of Late Fees – Summer Session – See Chapter 3 for Details</td>
<td>July 3</td>
<td>Wednesday</td>
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<tr>
<td>Course Drop/Withdrawal Deadline – Distance Education – Spring Term</td>
<td>July 24</td>
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<td>Lectures End – Spring Term</td>
<td>July 26</td>
<td>Friday</td>
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<tr>
<td>Examinations Begin – Spring Term</td>
<td>July 31</td>
<td>Wednesday</td>
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<tr>
<td>Last Day to File “Intent to Graduate” – Fall Convocation</td>
<td>August 1</td>
<td>Thursday</td>
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<tr>
<td>Arts Part-Time Application Deadline – On Campus – Fall Admission</td>
<td>August 1</td>
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<td>Last Day for Arts Students to Preregister – Fall Term</td>
<td>August 1</td>
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<tr>
<td>Civic Holiday – University Holiday*</td>
<td>August 5</td>
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<tr>
<td>Lectures End – Summer Session</td>
<td>August 9</td>
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<td>Examinations – Distance Education – Spring Term</td>
<td>August 10</td>
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<td>Examinations – Summer Session</td>
<td>August 10</td>
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<tr>
<td>Examinations End – Spring Term</td>
<td>August 13</td>
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<tr>
<td>Final Examination Results Due – Spring and Summer</td>
<td>August 20</td>
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<tr>
<td>Spring Work Term Ends – Co-operative Programs</td>
<td>August 30</td>
<td>Friday</td>
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<tr>
<td>Labour Day – University Holiday*</td>
<td>September 2</td>
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<tr>
<td>Fall Work Term Begins – Co-operative Programs</td>
<td>September 3</td>
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<tr>
<td>Registration Begins – Undergraduate Programs – Fall Term</td>
<td>September 3</td>
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<tr>
<td>Meeting – Senate Executive Committee</td>
<td>September 3</td>
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<tr>
<td>Registration – Graduate Studies – Fall Term</td>
<td>September 4</td>
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<tr>
<td>English Language Proficiency Examination, PAC</td>
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<td>Final Examination Results Due – Distance Education – Spring Term</td>
<td>September 6</td>
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<tr>
<td>Registration Ends – Undergraduate Programs – Fall Term</td>
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<td>Lectures Begin – Fall Term</td>
<td>September 9</td>
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<tr>
<td>Start of Late Fees – Fall Term – See Chapter 3 for Details</td>
<td>September 10</td>
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<tr>
<td>Application and Course Change Deadlines for New Students – Distance Education – Winter Term</td>
<td>September 16</td>
<td>Monday</td>
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<tr>
<td>Meeting – University Senate, 7:30 p.m.</td>
<td>September 16</td>
<td>Monday</td>
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<tr>
<td>Deadline to Drop or Withdraw from On-Campus Courses with 100% Tuition Refund</td>
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<tr>
<td>Meeting – Senate Executive Committee</td>
<td>October 14</td>
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<td>Application and Course Change Deadlines for Returning Students – Distance Education – Winter Term</td>
<td>October 15</td>
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<td>Thanksgiving Day – University Holiday*</td>
<td>October 15</td>
<td>Monday</td>
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<tr>
<td>Meeting – Board of Governors Executive Committee</td>
<td>October 21</td>
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<tr>
<td>Meeting – University Senate, 7:30 p.m.</td>
<td>October 26</td>
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<tr>
<td>Fall Convocation (Applied Health Sciences, Arts – 10:00 a.m.; Engineering, Environmental Studies, Independent Studies, Mathematics, Science – 2:00 p.m.)</td>
<td>October 28</td>
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<tr>
<td>Deadline to Drop or Withdraw from On-Campus Courses with 50% Tuition Refund</td>
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<tr>
<td>Arts Full-Time Application Deadline – On Campus – Winter Admission</td>
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<tr>
<td>Preregistration Begins – Co-operative Programs – Spring Term</td>
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<tr>
<td>Preregistration Ends – Co-operative Programs – Spring Term</td>
<td>November 8</td>
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<tr>
<td>Meeting – University Senate, 7:30 p.m.</td>
<td>November 18</td>
<td>Monday</td>
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</table>

*Some University Departments may be open for limited service on these days.*
### 1996 Continued

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<tr>
<th>Event</th>
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<tbody>
<tr>
<td>Arts Part-Time Application Deadline – On Campus – Winter Admission</td>
<td>December 2</td>
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<tr>
<td>Last Day for Arts Students to Preregister – On Campus – Winter Admission</td>
<td>December 2</td>
<td>Monday</td>
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<tr>
<td>Meeting – Senate Executive Committee</td>
<td>December 2</td>
<td>Monday</td>
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<tr>
<td>Lectures End – Fall Term</td>
<td>December 3</td>
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<tr>
<td>English Language Proficiency Examination, PAC</td>
<td>December 5</td>
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<tr>
<td>Examinations Begin – Fall Term</td>
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<tr>
<td>Meeting – University Senate, 7:30 p.m.</td>
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<tr>
<td>Examinations End – Fall Term</td>
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<tr>
<td>Fall Work Term Ends – Co-operative Programs**</td>
<td>December 24</td>
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<tr>
<td>Christmas Holidays*</td>
<td>December 31</td>
<td>Tuesday</td>
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### 1997

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<tbody>
<tr>
<td>New Year’s Day – University Holiday*</td>
<td>January 1</td>
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<tr>
<td>Winter Work Term Begins – Co-operative Programs</td>
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<td>Registration Begins – Undergraduate Programs – Winter Term</td>
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<tr>
<td>Registration – Graduate Studies – Winter Term</td>
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<tr>
<td>Meeting – Senate Executive Committee</td>
<td>January 6</td>
<td>Monday</td>
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<tr>
<td>Lectures Begin – Winter Term</td>
<td>January 6</td>
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<tr>
<td>Registration Ends – Undergraduate Programs – Winter Term</td>
<td>January 8</td>
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<tr>
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<tr>
<td>Examinations – Distance Education – Fall Term</td>
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<tr>
<td>Meeting – University Senate, 7:30 p.m.</td>
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<td>Application and Course Change Deadlines for New Students –</td>
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<tr>
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<tr>
<td>Meeting – Senate Executive Committee</td>
<td>February 3</td>
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<tr>
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<tr>
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<tr>
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<tr>
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<tr>
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<tr>
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<td>Deadline to Drop or Withdraw from On-Campus Courses with 50% Tuition Refund</td>
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<tr>
<td>Arts Full-Time Application Deadline – On Campus – Spring Admission</td>
<td>February 28</td>
<td>Friday</td>
</tr>
<tr>
<td>Last Day to File &quot;Intent to Graduate&quot; – Spring Convocation</td>
<td>February 28</td>
<td>Friday</td>
</tr>
<tr>
<td>Meeting – Senate Executive Committee</td>
<td>March 3</td>
<td>Monday</td>
</tr>
<tr>
<td>Preregistration Begins – Undergraduate Programs – Fall Term</td>
<td>March 3</td>
<td>Monday</td>
</tr>
<tr>
<td>Preregistration Ends – Undergraduate Programs – Fall Term</td>
<td>March 7</td>
<td>Friday</td>
</tr>
<tr>
<td>Campus Day</td>
<td>March 11</td>
<td>Tuesday</td>
</tr>
<tr>
<td>Meeting – University Senate, 7:30 p.m.</td>
<td>March 17</td>
<td>Monday</td>
</tr>
<tr>
<td>Meeting – Board of Governors Executive Committee</td>
<td>March 18</td>
<td>Tuesday</td>
</tr>
<tr>
<td>Good Friday – University Holiday*</td>
<td>March 28</td>
<td>Friday</td>
</tr>
<tr>
<td>Arts Part-Time Application Deadline – On Campus – Spring Admission</td>
<td>April 1</td>
<td>Tuesday</td>
</tr>
<tr>
<td>Last Day for Arts Students to Preregister – Spring Term</td>
<td>April 1</td>
<td>Tuesday</td>
</tr>
</tbody>
</table>

* Some University Departments may be open for limited service on these days.
* Some employers may extend the Fall Work Term to December 31.
† Co-operative employment interviews will continue as scheduled in this period.
§ Please note that the Faculty of Mathematics has moved to a two-day study period.
### 1997 Continued

<table>
<thead>
<tr>
<th>Event</th>
<th>Dates</th>
</tr>
</thead>
<tbody>
<tr>
<td>Meeting - Board of Governors, 3:30 p.m.</td>
<td>April 1, Tuesday</td>
</tr>
<tr>
<td>Lectures End - Engineering and Mathematics - Winter Term</td>
<td>April 4, Friday</td>
</tr>
<tr>
<td>Meeting - Senate Executive Committee</td>
<td>April 7, Monday</td>
</tr>
<tr>
<td>Lectures End - Other Faculties - Winter Term</td>
<td>April 8, Tuesday</td>
</tr>
<tr>
<td>English Language Proficiency Examination, PAC</td>
<td>April 10, Thursday</td>
</tr>
<tr>
<td>Examinations Begin - Winter Term</td>
<td>April 11, Friday</td>
</tr>
<tr>
<td>Course Drop/Withdrawal Deadline - Distance Education - Winter Term</td>
<td>April 16, Wednesday</td>
</tr>
<tr>
<td>Meeting - University Senate, 7:30 p.m.</td>
<td>April 21, Monday</td>
</tr>
<tr>
<td>Examinations End - Winter Term</td>
<td>April 24, Thursday</td>
</tr>
<tr>
<td>Winter Work Term Ends - Co-operative Programs</td>
<td>April 25, Friday</td>
</tr>
<tr>
<td>Spring Work Term Begins - Co-operative Programs</td>
<td>April 28, Monday</td>
</tr>
<tr>
<td>Final Examination Results Due - Winter Term</td>
<td>May 2, Friday</td>
</tr>
<tr>
<td>Examinations - Distance Education - Winter Term</td>
<td>May 3, Saturday</td>
</tr>
<tr>
<td>Meeting - Senate Executive Committee</td>
<td>May 5, Monday</td>
</tr>
<tr>
<td>Registration Begins - Undergraduate Programs - Spring Term</td>
<td>May 5, Monday</td>
</tr>
<tr>
<td>Lectures Begin - Spring Term</td>
<td>May 5, Monday</td>
</tr>
<tr>
<td>Registration - Graduate Studies - Spring Term</td>
<td>May 5, Monday</td>
</tr>
<tr>
<td>Registration Ends - Undergraduate Programs - Spring Term</td>
<td>May 7, Wednesday</td>
</tr>
<tr>
<td>Start of Late Fees - Spring Term - See Chapter 3 for Details</td>
<td>May 8, Thursday</td>
</tr>
<tr>
<td>Victoria Day - University Holiday</td>
<td>May 19, Monday</td>
</tr>
<tr>
<td>Meeting - University Senate, 7:30 p.m.</td>
<td>May 20, Tuesday</td>
</tr>
<tr>
<td>Meeting - Board of Governors Executive Committee</td>
<td>May 20, Tuesday</td>
</tr>
<tr>
<td>Deadline to Drop or Withdraw from On-Campus Courses with 100% Tuition Refund</td>
<td>May 22, Thursday</td>
</tr>
<tr>
<td>End of Course Change Period - Spring Term - See Individual Faculty Chapters</td>
<td></td>
</tr>
<tr>
<td>Spring Convocation (Applied Health Sciences, Environmental Studies, Independent Studies) - 2:00 p.m.</td>
<td>May 28, Wednesday</td>
</tr>
<tr>
<td>Final Examination Results Due - Distance Education - Winter Term</td>
<td>May 29, Thursday</td>
</tr>
<tr>
<td>Spring Convocation (Arts) - 2:00 p.m.</td>
<td>May 29, Thursday</td>
</tr>
<tr>
<td>Spring Convocation (Science) - 2:00 p.m.</td>
<td>May 30, Friday</td>
</tr>
<tr>
<td>Spring Convocation (Mathematics - 10:00 a.m.; Engineering - 2:00 p.m.)</td>
<td>May 31, Saturday</td>
</tr>
<tr>
<td>Arts Application Deadline - Summer Session</td>
<td>June 2, Monday</td>
</tr>
<tr>
<td>Meeting - Senate Executive Committee</td>
<td>June 2, Monday</td>
</tr>
<tr>
<td>Meeting - Board of Governors, 3:30 p.m.</td>
<td>June 3, Tuesday</td>
</tr>
<tr>
<td>Preregistration Begins - Co-operative Programs - Winter Term</td>
<td>June 4, Wednesday</td>
</tr>
<tr>
<td>Preregistration Ends - Co-operative Programs - Winter Term</td>
<td>June 6, Friday</td>
</tr>
<tr>
<td>Meeting - University Senate, 7:30 p.m.</td>
<td>June 16, Monday</td>
</tr>
<tr>
<td>Deadline to Drop or Withdraw from On-Campus Courses with 50% Tuition Refund</td>
<td>June 19, Thursday</td>
</tr>
<tr>
<td>University Holiday</td>
<td>June 30, Monday</td>
</tr>
<tr>
<td>Canada Day - University Holiday*</td>
<td>July 1, Tuesday</td>
</tr>
<tr>
<td>Arts Full-Time Application Deadline - On Campus - Fall Admission</td>
<td>July 2, Wednesday</td>
</tr>
<tr>
<td>Registration - Summer Session</td>
<td>July 2, Wednesday</td>
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<tr>
<td>Lectures Begin - Summer Session</td>
<td>July 2, Wednesday</td>
</tr>
<tr>
<td>Start of Late Fees - Summer Session - See Chapter 3 for Details</td>
<td>July 3, Thursday</td>
</tr>
<tr>
<td>Course Drop/Withdrawal Deadline - Distance Education - Spring Term</td>
<td>July 23, Wednesday</td>
</tr>
<tr>
<td>Lectures End - Spring Term</td>
<td>July 31, Thursday</td>
</tr>
<tr>
<td>Last Day to File &quot;Intent to Graduate&quot; - Fall Convocation</td>
<td>August 1, Friday</td>
</tr>
<tr>
<td>Arts Part-Time Application Deadline - On Campus - Fall Admission</td>
<td>August 1, Friday</td>
</tr>
<tr>
<td>Last Day for Arts Students to Preregister - Fall Term</td>
<td>August 1, Friday</td>
</tr>
<tr>
<td>Civic Holiday - University Holiday*</td>
<td>August 4, Monday</td>
</tr>
<tr>
<td>Examinations Begin - Spring Term</td>
<td>August 5, Tuesday</td>
</tr>
<tr>
<td>Examinations - Distance Education - Spring Term</td>
<td>August 9, Saturday</td>
</tr>
<tr>
<td>Lectures End - Summer Session</td>
<td>August 15, Friday</td>
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<tr>
<td>Examinations - Summer Session</td>
<td>August 16, Saturday</td>
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<tr>
<td>Examinations End - Spring Term</td>
<td>August 16, Saturday</td>
</tr>
<tr>
<td>Final Examination Results Due - Spring and Summer</td>
<td>August 22, Friday</td>
</tr>
<tr>
<td>Spring Work Term Ends - Co-operative Programs</td>
<td>August 29, Friday</td>
</tr>
</tbody>
</table>

* Some University Departments may be open for limited service on these days.
<table>
<thead>
<tr>
<th>Year</th>
<th>January</th>
<th>April</th>
<th>July</th>
<th>October</th>
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<td>1996</td>
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<tr>
<th>Year</th>
<th>February</th>
<th>March</th>
<th>April</th>
<th>May</th>
<th>June</th>
<th>July</th>
<th>August</th>
<th>September</th>
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<tr>
<th>Year</th>
<th>November</th>
<th>December</th>
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<tbody>
<tr>
<td>1996</td>
<td>1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31</td>
<td>1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31</td>
</tr>
</tbody>
</table>
Ontario highways to Kitchener-Waterloo

Three Ontario highways enter Kitchener-Waterloo: highway 8 from the south, highway 7 from the east and west and highway 86 from the north. Just to the south of Kitchener is Ontario’s main east-west expressway, highway 401. It is linked to Kitchener-Waterloo, by highway 8 west. In Kitchener-Waterloo, highways 7, 8 and 86 are linked by the Conestoga Parkway, a local expressway.

There are two routes to the UW campus from Hwy. 401. The first route is to take exit 278 to Hwy. 8 west to Kitchener; enter the Conestoga Pkwy. by following Hwy. 7 East signs; then follow the Pkwy. and exit at University Ave. West; drive in a westerly direction on University Ave. to the University of Waterloo. The second route follows the first route to the Conestoga Pkwy.; enter the Pkwy. following Hwy. 7 & 8 West Stratford; continue on the Pkwy. and exit at Fischer-Hallman Rd. Turn left at the Fischer-Hallman Rd. traffic lights and continue north west until you reach University Ave. Turn right on to University Ave. and drive easterly until you reach the University of Waterloo.
The University of Waterloo

UW welcomes first-year students, Orientation '96.
The Arms and Motto for the University of Waterloo, as first creative intellectual process that strives to bring forth a
idiom of the life process: from the seeds at the base of the
new individual.

"CONCORDIA CUM VERITATE" - in Harmony with Truth.

The symbolic theme may be described as follows: The fundamental concept is unity amid diversity and tension in the
creative intellectual process that strives to bring forth a
new individual.

The design of the mace interprets this theme in the
idiom of the life process: from the seeds at the base of the
stave the mace grows in unity and strength until it differentiates by a four-fold separation into diverse elements.

The four-fold diversity is significant because of the four Faculties existing at the time the Mace was presented to
the University and as well, of the four Federated and
Affiliated Colleges. These diverse elements together form
a crown, and the points of the crown, while tending toward
a union do not quite touch but remain as individuals sus-
pended in tension and yet engaged in a deep harmony.

This creative process is focused not on the traditional
spherical orb of static perfection but rather on an elliptical
silver ovum - the egg-shaped symbol of creativity - the
marvellous potential of a new individual life.

The official colours of the University of Waterloo are gold,
black and white.

University Academic Regalia
The academic regalia chosen for the University of
Waterloo is patterned after that of the University of Oxford
(except where noted).

Degree Hoods
1. For the Bachelor's degree, hoods are black silk in the
Oxford Bachelor shape, with a border in a colour which
indicates the faculty or degree. Degree colours or
colours of a specific discipline are:

- Bachelor of Applied Science (BASc) - scarlet (Engineering)
- Bachelor of Architecture (BArch) - scarlet (Engineering)
- Bachelor of Arts (BA) - green (Applied Health
Sciences, Arts)
- Bachelor of Environmental Studies (BES) - orange
(Environmental Studies)
- Bachelor of Independent Studies (BIS) - white
- Bachelor of Mathematics (BMath) - wine
(Mathematics)
- Bachelor of Science (BSc) - blue (Applied Health
Sciences, Science)
- Bachelor of Accounting (MAcc) - lining and narrow
border in green with gold soutache braid trim
- Bachelor of Applied Environmental Studies (MAES) -
orange (Environmental Studies - Local Economic
Development)
- Master of Science (MSc) - scarlet (Arts - Applied Psychology, Engineering)
- Master of Arts (MA) - green (Applied Health
Sciences, Arts, Environmental Studies - Geography,
Planning and Resource Development)
- Master of Environmental Studies (MES) - orange
with green soutache braid trim (Environment and
Resource Studies, Geography)
• Master of Fine Arts (MFA) – green with terra cotta soutache braid trim (Arts)
• Master of Mathematics (MMath) – wine (Mathematics)
• Master of Science (MSc) – blue (Applied Health Sciences, Science).

3. The Master of Philosophy (MPhil) hood has a white silk lining, banded ½” inside and outside edges in green silk, trimmed with white soutache braid.

4. The Doctor of Philosophy (PhD) hood has a green shell with off-white taffeta lining patterned after the University of Cambridge hood. The Doctoral hat is black velvet in the Oxford style with gold cord trim and tassel.

5. Honorary Degrees

- Doctor of Divinity (DD) – purple silk with mauve lining
- Doctor of Engineering (DEng) – scarlet silk with pink lining
- Doctor of Environmental Studies (DES) – orange silk with ivory lining
- Doctor of Laws (LLD) – pink silk with magenta lining
- Doctor of Letters (DLitt) – green silk with green silk lining
- Doctor of Mathematics (DMath) – wine silk with buff silk lining
- Doctor of Science (DSc) – blue silk with blue silk lining

Gowns

1. Bachelor and Master degree gowns are black with the Oxford cut and trim.

2. Doctor of Philosophy degree gowns are of the Oxford cut and trim and are red, with facings and lower third of sleeves green.

3. Honorary degree gowns are of the Oxford cut and trim, each with its own distinctive colour (following the configuration of the honorary degree colours above). The facings and lower third of the sleeves are black.

University Jurisdiction

The University exercises its statutory jurisdiction and authority with respect to the operation, protection and control of its property and plant and the regulation of persons on campus insofar as is necessary to ensure the orderly performance of the University’s functions. In certain situations, the authority of the University may be exercised with respect to the behaviour of members of the University community while off campus if such behaviour is found to be in conflict with the policies, procedures and practices of the University. The University reserves the right to refuse admission or re-admission to any candidate or to require a student to withdraw when, in the opinion of University officials, a student poses a danger to the University community.

In addition it should be recognized that all members of the University community, as members of society at-large, are subject to the law (federal, provincial and municipal) with respect to their actions, whether those actions occur on or off campus.

An extension of these provisions concerns student conduct while participating in University-sponsored off-campus activities. In this regard, students are expected: to abide by the policies, procedures and practices of the University; and, to abide by reasonable instructions, given orally or in writing, by any official of the University authorized to secure compliance with policies, procedures and practices, provided that the official is identified and is acting in an official capacity.

Academic Organization

The University of Waterloo is organized under a number of academic units which offer a variety of academic programs leading to degrees and diplomas at undergraduate and graduate levels. These units include: The Faculty of Applied Health Sciences, The Faculty of Arts, The Faculty of Engineering, The Faculty of Environmental Studies, The Faculty of Mathematics, The Faculty of Science and the Independent Studies Program.

Within the Faculty framework are various academic departments and schools. The broader University includes four federated and affiliated Colleges which share in the delivery and administration of academic programs and offer student residence facilities. The Colleges are described in more detail below.

Enrolment for each Faculty including federated and affiliated Colleges as of November 1, 1995 was as follows:

| Faculty of Applied Health Sciences | 111 | 232 |
| Faculty of Arts | 4011 | 4105 |
| Faculty of Engineering | 3367 | 252 |
| Faculty of Environmental Studies | 1295 | 387 |
| Independent Studies Program | 22 | 7 |
| Faculty of Mathematics | 2831 | 311 |
| Faculty of Science | 2440 | 1084 |
| Total Undergraduate Enrolment | 15077 | 6378 |
| Graduate Student Enrolment (all faculties) | 1618 | 347 |

THE FEDERATED AND AFFILIATED COLLEGES

The University of St. Jerome's College

In 1865, two years before Canada achieved nationhood, St. Jerome's College was founded by the Congregation of the Resurrection to meet the demand for higher education in Waterloo County.

Over the years, the College grew in size and occupied various locations in the Kitchener-Waterloo area. In 1959, through an Act of the Ontario Legislature, St. Jerome's College was granted independent university status. The name was changed to the University of St. Jerome's College to reflect new university powers and the authority to grant degrees.
As an independent University, St. Jerome's College entered into federation with the newly-established University of Waterloo, and a series of College buildings were constructed in the heart of the UW campus. In the federation agreement, St. Jerome's waived its degree-granting rights so that, now, students of the College earn Bachelor of Arts or Bachelor of Mathematics degrees of the University of Waterloo.

Today, St. Jerome's College provides students with a contemporary Catholic context in which the Christian tradition serves as the basis for a rich academic, liturgical, and community life. With over 900 full- and part-time students, two residences—a men's and a women's—accommodating 250 students, and a faculty and staff of over 40 men and women, St. Jerome's College is a dynamic community.

The College teaches courses in English, History, Religious Studies, Psychology, French, Italian, Mathematics, Sociology, and Philosophy, and offers special summer programs in Sexuality, Marriage and the Family, and Theological Renewal.

From its local roots in Waterloo County, St. Jerome's has grown and today serves a much wider constituency. The College teaches undergraduate students from high schools throughout the province of Ontario and beyond. Educators, health care professionals, pastoral care workers and others take advantage of special programs for professional upgrading and development.

The College brings its campus to the community in many ways, most notably through lectures and mini-courses sponsored by the St. Jerome's Centre for Catholic Experience. The Centre works to heighten public awareness and understanding of the major social and religious issues of the day.

Renison College

Renison is the Anglican college on the University of Waterloo campus. Affiliated with the University, it registers students in programs of the Faculty of Arts, including its own Social Development Studies program. Two Certificate programs are also available; one focusing on General Social Work and the other on Child Abuse issues.

The College offers courses in Social Work, Psychology, Sociology and Interdisciplinary Social Science for its Social Development Studies program. This multidisciplinary Major is designed for students interested in such helping professions as social work, teaching, the ministry and law. Students who complete the requirements receive the BA of the University. The program may be supplemented with the Diploma in Social Work to give students some supervised practical experience in local social service agencies.

To serve students who will have business and cultural contacts with the nations of the Far East and those who will be travelling to the area, Renison offers a collection of courses in East Asian Studies, including East Asian Culture and the Chinese (Mandarin), Japanese and Korean languages.

In addition to those offered for Social Development Studies and East Asian Studies, the College offers courses in English, Fine Arts, History and Religious Studies. Renison College faculty members and courses are indicated by an "R" in this Calendar.

Renison residences accommodate 75 men and 95 women. Its students enjoy the sense of community and support that a small college can provide as well as all of the advantages of a major university.

Conrad Grebel College

Conrad Grebel College provides, under the sponsorship of the Mennonite Conference of Eastern Canada, residential, teaching, research and community education programs from a Christian perspective. Conrad Grebel College offers first-rate courses in History, Philosophy, Religious Studies, Sociology, Interdisciplinary Arts, Peace and Conflict Studies, and Music. A great number of Grebel residents also take courses on the main campus. All undergraduate courses offered at Conrad Grebel are University of Waterloo courses. Hence, students may take as many Grebel courses as their programs of study permit, along with their selection from the hundreds of other courses listed in the University of Waterloo Calendar. Every year some 3,000 UW and Grebel students elect to take one or more Conrad Grebel College courses as they work towards their degrees in any of UW's six faculties.

Conrad Grebel is also a residence for 113 young women and men. When students choose to study and live at Conrad Grebel their interest in a small, person-oriented setting is assumed. Residence life at the College offers students an uncommon opportunity to make connections and forge lifelong friendships. Students from many different denominations and cultural backgrounds share a lively, ecumenical environment where a commitment to living responsibly and respectfully with others transforms what could otherwise be just another dormitory into a colourful community that has purpose and character. Worship services, music recitals, hockey games, Peace Society meetings, coffee houses and involvement in service projects, along with courses in dozens of different subjects, are only a few of the many educational experiences available at the College.

St. Paul's United College

St. Paul's United College is a teaching and residential community of 149 men and women.

The College is the site for two UW Interdisciplinary Options. The Canadian Studies Option allows students to gain expertise in the social, cultural, economic, geographic, and political aspects of Canadian life. Studies in Personality and Religion enables students to understand the relationship between religion and personal growth as they relate to the dynamics of human development.

The College also sponsors the University's Department of Religious Studies with the other colleges on the campus and the Faculty of Arts. Religious Studies courses are available for academic credit to any student enrolled in the University.

St. Paul's seeks to integrate its academic life with life in the residence. One section of the residence is designated "The French Residence", and offers English-speaking
Degrees Offered

The University of Waterloo offers the following undergraduate degrees:

- Bachelor of Applied Science (BASc)
- Bachelor of Architecture (BArch)
- Bachelor of Arts (BA)
- Bachelor of Environmental Studies (BES)
- Bachelor of Independent Studies (BIS)
- Bachelor of Mathematics (BMath)
- Bachelor of Science (BSc)
- Doctor of Optometry (OD)

Further information concerning these degrees and their related programs is available in the Faculty sections of this Calendar.

The University of Waterloo offers the following graduate degrees:

- Master of Accounting (MAcc)
- Master of Applied Environmental Studies (MAES)
- Master of Applied Science (MAsc)
- Master of Arts (MA)
- Master of Environmental Studies (MES)
- Master of Fine Arts (MFA)
- Master of Mathematics (MMath)
- Master of Science (MSc)
- Master of Philosophy (MPhil)
- Doctor of Philosophy (PhD)

Further information concerning these degrees and their related programs is available in the Graduate Calendar.

Honorary Degrees

The following honorary degrees are conferred by the Senate of the University:

- Doctor of Divinity (DD)
- Doctor of Engineering (DEng)
- Doctor of Environmental Studies (DES)
- Doctor of Laws (LLD)
- Doctor of Letters (DLitt)
- Doctor of Mathematics (DMath)
- Doctor of Science (DSc)

Convocation/Application for Degree

All undergraduate students who expect to receive degrees or diplomas at either the Spring or Fall Convocations must complete an "Intention to Graduate" form obtainable from the Registrar's Office or faculty offices. The deadlines for these forms are March 1 for Spring Convocation and August 1 for Fall Convocation. Students who apply for their degree at a specific convocation but do not qualify must subsequently submit another "Intention to Graduate" form.

It should be noted that the name printed on the degree diploma will be that which is indicated on the "Intention to Graduate" form. Graduands who are unable to attend convocation will have their diplomas mailed to them by the Registrar's Office.

Systems of Study

The University offers students two different systems of study, the Regular System and the Co-operative System. Some programs are offered under one system only, while others are offered under either system. Each of the program sections in this Calendar contains information concerning the System(s) of Study that can be followed for the program described.

Regular System

Under the Regular System of Study the student follows the conventional eight-month academic year from September to April.

Co-operative System

Students studying under the Co-operative System alternate academic terms on campus with work terms off campus in business, industry, or government. Further information about the Co-operative System is provided in "Department of Cooperative Education and Career Services".

Courses are given in four-month term units regardless of the system of study.

Distance and Continuing Education

The University of Waterloo provides a number of learning opportunities to accommodate the interests and needs of people in the local community as well as those at a distance from the University. Credit courses are offered at both on and off-campus locations as well as through an extensive Distance Education program. Non-credit courses geared to personal and professional development are offered throughout the year.

No academic distinction is made between part-time and full-time students in admission standards, grading practices or promotion policies. The great majority of part-time students are adults and many are considered for admission under UW's Mature Student Admission Policy (for
more information refer to "Admission – Other Applicants"). 
Tuition fees are assessed on a per course basis.
Information on all part-time study opportunities and 
assistance with registration can be obtained from one 
central office:
Distance and Continuing Education
University of Waterloo
Waterloo, Ontario N2L 3G1
Telephone: (519) 884-4002
Fax: (519) 746-6393
E-mail: distance@corr1.uwaterloo.ca

Detailed information about distance and continuing 
education courses is available via the Internet as follows:
• if you are using a WWW browser the URL is
  http://www.adm.uwaterloo.ca:80/inforeg/dec/ce.html
• if you are using a gopher the address is
  uwinfo.uwaterloo.ca

Regular business hours are from 8:30 a.m. to 4:30 p.m.
The office is located at 156 Columbia St., Waterloo. During 
the first week of classes each term the office remains open 
until 7:00 p.m. in order to assist on-campus students with 
registration.

CREDIT COURSES

On-Campus
Part-time students often enrol in classes scheduled in the 
evening or in late afternoon. However, part-time students 
are welcome to enrol in daytime classes as well. Students 
can earn most degrees entirely through part-time studies 
or by a combination of part-time and full-time attendance.
For some programs in Applied Health Sciences, 
Mathematics, and Science, required courses are available 
only during the day. Students may pursue their studies in 
the Fall, Winter, or Spring terms or during the Summer 
sessions.
The Part-Time Studies Calendar lists all courses offered 
in the late afternoon and evening and provides complete 
details of admission requirements, registration procedures, 
and general services for part-time students.

Off-Campus
Renison College offers courses in locations such as 
Brantford, Milton, Oakville, and Palmerston. The courses 
typically offered are from Renison’s Social Development 
Studies and Social Work certificate programs.
For further information contact:
The Registrar
Renison College
University of Waterloo
Waterloo, Ontario N2L 3G4
Telephone: (519) 884-4400
Fax: (519) 884-5135

Distance Education
The University of Waterloo operates one of the largest 
university-level distance education programs in Canada. 
Approximately 300 university credit courses are offered 
over the Fall, Winter, and Spring terms. Students should 
obtain a Distance Education Calendar to acquaint them-

selfs with the offerings, the methods of operation and 
fees. For application deadlines see “Admission”.

Degrees in Arts, Environmental Studies, and Science 
can be earned entirely through distance study. In working 
towards a degree, students may combine on-campus and 
off-campus courses with distance education courses. Fees 
for distance education courses are the same as for cours-
es offered on and off campus, except that refundable 
deposits are required on course materials (such as audio 
and video tapes) that are loaned to students for the 
duration of the course.

Application forms and complete details about UW’s dis-
tance education courses and are provided in the Distance 
Education Calendar. Copies can be obtained from:
Distance and Continuing Education Office
University of Waterloo
Waterloo, Ontario N2L 3G1
(519) 884-4050
Fax: (519) 746-6393
E-mail: distance@corr1.uwaterloo.ca

SPECIAL PROGRAMS

BScn Program for Registered Nurses
Under formal arrangements with a number of universities, 
nurses may take on campus or distance education cours-
es at the University of Waterloo and have them credited 
toward nursing degrees at Western, McMaster, Ottawa 
and Ryerson. Up to 40% of the nursing degree can be 
completed through some of these arrangements. To obtain 
a list of the requirements for a particular institution, call the 
Distance Education Office at (519) 888-4050, or e-mail 
distance@corr1.uwaterloo.ca.

Certified Employee Benefit Specialist Program
The University offers a number of courses in the CEBS 
program. CEBS is a ten-course curriculum that provides 
an opportunity for those who have responsibilities in the 
employee benefits field to enhance their capabilities and 
gain a professional designation. For further information call 
the Part-Time Studies Office at (519) 888-4002, or e-mail 
distance@corr1.uwaterloo.ca.

Diploma In Land Management for Land Surveyors
The University, in conjunction with the Association of 
Ontario Land Surveyors, has assembled a series of 
degree credit courses leading to a Diploma in Land 
Management. These courses provide university-level 
instruction in a broad range of subjects pertinent to the 
needs and interests of practicing surveyors. Sufficient 
courses to complete the requirements for the Diploma are 
available by distance education. To be admitted an appli-
cant must hold the Commission as an Ontario Land 
Surveyor (or its equivalent from another jurisdiction). 
A brochure outlining the details is available from the 
Distance Education Office, (519) 888-4002, or e-mail 
distance@corr1.uwaterloo.ca.
Continuing Professional Education for Kinesiologists
Each Spring Term, the Department of Kinesiology offers a variety of short courses intended to contribute to the professional development of graduate kinesiologists. For details on the offerings, call 888-4002, or e-mail conted@cor11.uwaterloo.ca.

Other Continuing Professional Education Opportunities
The University also co-operates with a number of outside organizations regarding their programs and designations. Certain UW courses offered by distance education and on campus count for credit for designations offered by the following organizations:
- Appraisal Institute of Canada
- Credit Union Institute of Canada
- Canadian Hospital Association Course in Health Services Management
- Canadian Institute of Certified Administration Managers Program (CAM)
- Canadian Institute of Management
- Canadian Institute of Traffic and Transportation
- Certified General Accountants Association of Ontario (CGA)
- Human Resources Professional Association of Ontario
- Institute of Canadian Bankers
- Institute for Certified Professional Secretaries
- Institute of Chartered Accountants of Ontario (CA)
- Insurance Institute of Canada Fellowship Program
- Ontario Municipal Management Development Program
- Purchasing Management Association of Canada
- Real Estate Institute of Canada (FRI)
- Society of Management Accountants of Ontario (CMA)

Further information can be obtained from the organization listed or from the Distance and Continuing Education Office, (519) 888-4002, or e-mail distance@cor11.uwaterloo.ca.

Non-Credit Courses
The University of Waterloo offers a variety of courses on campus for personal and professional development. The courses cover business, computer, writing, and general interest topics. Some of the courses offered:
- Critical Thinking and Problem Solving
- Introductory Japanese
- Introduction to the Apple Macintosh
- Introduction to the IBM PC
- Management Effectiveness and Personality Types
- Personal Growth and Personality Types
- Proposal Writing
- Marketing Your Small Business
- Beginners' Guide to the Internet
- ISO 9000/Quality 9000
- Visual Basic
- Writing Popular Fiction
- Fund Raising for Non-Profit Organizations

Courses are offered in the Fall, Winter, and Spring Terms and run anywhere from one to ten sessions. Organizations with special needs are encouraged to contact Continuing Education to discuss customizing courses for in-house training.

The University of Waterloo
Distance and Continuing Education
Cross-registration with Wilfrid Laurier University
Grading System

For information on our extensive Continuing Education offerings call: (519) 888-4002, or e-mail conted@cor11.uwaterloo.ca.

Cross-Registration with Wilfrid Laurier University

Cross-registration procedures have been developed to enable full-time students to take advantage of courses available at both the University of Waterloo and Wilfrid Laurier University.

Both universities conduct pre-registration as part of the timetabling process for their own students who plan to return in the next academic year or term. Courses given at the other university as integral parts of specified academic programs or options may be chosen routinely during pre-registration. Requests to cross-register in other courses must be submitted on a special form. All cross-registration requests are subject to approval of the student's academic advisor and availability of space in the course. Normally approval will not be given to requests where the equivalent course is available at the home university.

Students must pay all fees at their home university regardless of the number of courses taken by Cross-registration. The basic academic regulations, prerequisites for courses, and grading systems of the host university will be applicable. Grades are reported to the student's home university based on the grading system of the host university and are combined with the results of the student's other courses to complete the examination report. A student's overall academic standing is determined solely by the home university.

Regulations concerning the dates for adding or dropping a course as well as petitions for cross-registered courses are governed by the student's home institution. Students should be careful to note the examination schedules of each university as they may not coincide.

For further details, contact the Registrar's Office.

Grading System

Grades for all courses appear on grade reports and transcripts either as one of 15 letter grades from A-plus through F-minus or as numeric marks on a percentage scale depending upon the faculty of registration.

Overall standings are reported in all faculties as numeric averages. Common weighting factors are used for calculating overall averages for students on the letter grade system, and for converting assigned letter grades, where required, for students whose faculty is on the numeric system.

Please refer to the individual Faculty chapters for a complete explanation of the appropriate grading system.
The University of Waterloo
Grading System
Examination Regulations

Non-Graded Standings

<table>
<thead>
<tr>
<th>Assigned Letter</th>
<th>Common Grade</th>
<th>Assigned Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>A+</td>
<td>96</td>
<td>90-100</td>
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<tr>
<td>A</td>
<td>89</td>
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<td>A-</td>
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<td>38</td>
<td>35-41</td>
</tr>
<tr>
<td>F-</td>
<td>32</td>
<td>0-34</td>
</tr>
</tbody>
</table>

* Actual assigned numeric grades are used in calculating averages for students in faculties on the numeric scale.

Credit Weights and Degree Requirements

Courses offered at the University of Waterloo are given credit weights which vary from 0.25 to 1.00 credits or more. Most courses have a 0.50 credit weight and are of a one-term duration. However, the systems used to specify the number of courses that a student must take to satisfy minimum degree requirements may differ from faculty to faculty and program to program. The main systems used are: a credit-weight system, a term-course system, and a term system.

Programs using a credit-weight system designate the total number of course credits required for the degree. In this system, the credit weights for passed courses are added together to determine total credits earned.

In the term-course system, degree requirements are specified in numbers of term courses. A term-course system may be defined to eliminate 0.25 credit courses from consideration, or may consider 0.50 and 0.75 credit courses as equivalent for degree-requirement purposes.

In the term system, a student is promoted on the basis of satisfactory completion of an entire term's work, and degree requirements are met by successful completion of the appropriate number of terms.

Course credit weights are used in all programs to calculate weighted averages for overall standing and promotion purposes. Credit weights are also used in calculating tuition fee amounts for individual courses. Part-time students especially should consider this fact in choosing courses.

Students should read the faculty and program regulations carefully to be sure that degree requirements are understood and met in the manner required by their program.

Examination Regulations

The following are excerpts from the Senate Regulations governing Examination Procedures. A booklet containing a more complete version of these regulations may be obtained from the Registrar's Office or from the office of the Dean in each Faculty. Specific regulations pertaining to each Faculty may be found in the individual Faculty program sections of this Calendar.

Standard Practices with Respect to Illness

Illness may constitute an acceptable reason for not writing an examination. Students who miss examinations because of illness should so inform their instructors and provide a medical certificate documenting the precise period of absence and the nature of the illness. Where circumstances warrant special consideration, instructors may submit an AEG grade or a passing mark based solely on term work, or arrange for a deferred examination.

A student who becomes ill during the writing of an examination and is unable to continue should ensure, before leaving the site of the examination, that the officer in charge is notified of the situation. In addition, the student should notify the course instructor and supply proper medical documentation as soon as possible thereafter.

If a student completes an examination, even though he/she is ill, the subsequent grade obtained in the course must normally stand. Subsequent petitions on the grounds of illness may be considered if accompanied by proper medical documentation and submitted as soon as possible after the examination to the course instructor or to the Registrar's Office as required by Faculty regulations. The student's Department or Faculty may take the illness into consideration, and possibly alter academic decisions regarding eligibility to continue in the student's program of study, but the mark may not normally be altered on the student's official record.

Study Breaks

Each term the formal lecture period, as defined by the dates shown in the Academic Calendar, normally ends two or three days before final examinations begin. The periods between the end of the formal lecture period and the beginning of final examinations shall be ones in which no instructor shall be permitted to administer, and no student shall be required to sit for, examinations, tests or lectures.
Final Examinations
No instructor shall be permitted to administer, and no student shall be required to sit for, final examinations during the formal lecture period. Final examinations shall be interpreted in the ordinary sense of the word, usually covering all, or a very substantial portion of, the material dealt with in one academic term or year.

Any unresolved disputes between an instructor and student concerning an interpretation of whether an exam should be regarded as a "final examination" will be decided by the appropriate Associate Dean(s).

If an instructor schedules a final examination during the formal examination period outside the time period 8:30 a.m. - 10:00 p.m., Monday through Saturday inclusive, suitable alternative time arrangements must be provided by the instructor, within the same Monday-Saturday time period, for any students who request such an alternative time. In the event of a general or major emergency, explicit University procedures will be available to allow for rescheduling of final examinations.

Other Tests and Examinations
Instructors are encouraged to hold other tests or examinations during the regularly scheduled class times for their courses. An instructor who chooses to schedule a test or examination other than final examinations to be held outside of, or to extend beyond, the regularly scheduled class time will be required to provide suitable alternative time arrangements for any students with legitimate conflicts.

 Normally instructors may not hold major term tests in the last five teaching days of the lecture schedule in any term. Major term tests are those which account for more than 25% of the final course grade. Exceptions to the above must be approved in advance by the instructor's Department Chair and the Associate Dean (Undergraduate) of the Faculty concerned.

Requests for an Alternative Final Examination Time
A student requesting an alternative time for a final examination will be granted that request only in exceptional circumstances. Such circumstances include illness (with medical certificate) or other mitigating circumstances outside the control of the student. Elective arrangements (such as travel plans) are not considered acceptable grounds for granting an alternative examination time.

The decision whether to grant a student's request for an alternative examination time lies with the instructor of the course concerned as does the responsibility for making the alternative arrangements.

This policy may also be applied at the discretion of the instructor to tests and examinations other than final examinations.

Religious Holidays/Examination Schedule
The University acknowledges that, due to the pluralistic nature of the University community, some students may on religious grounds require alternative times to write examinations and tests. Accordingly, a student who requires an alternative examination or test time on religious grounds should consult with the Associate Dean of the Faculty offering the course regarding alternative arrangements. Such a request should be made within one week of the announcement of the test or examination date. For students in courses taught at the Federated or Affiliated Colleges, the responsibilities of the Associate Dean in these procedures are exercised by the Dean of the College (or Head in cases where there is no Dean).

Student Access to Final Examination Papers
For many courses final examinations are a major component of student assessment and often contribute substantially to the final grade awarded. In addition, final examinations may serve an important educational purpose in indicating to students what, and how well, they have learned in the course. A course instructor may choose to use a final examination for one or both of these objectives.

The instructor may informally review the final examination paper and the paper with a student who requests it but not before the term grade reports are issued. Although this is not mandatory, instructors are encouraged to follow this practice. Where such an informal review process cannot be arranged, the following procedure is available to any student who wishes to obtain access to his or her final examination papers:

1. Every student may formally appeal a final grade in accordance with established Faculty appeal procedures.

2. Every student, as part of the process of appealing a grade, will be able on request to obtain supervised access to a copy of his or her final examination paper, to read only.

3. The student may provide written comments which will be forwarded along with the examination paper, to the faculty member for consideration in responding to the appeal.

4. Faculties may broaden the privileges provided above but may not be more restrictive in their implementation of this proposal.

In this policy statement "final examination paper" means the final examination question paper and the paper submitted by the student.

Retention of Examination Answer Papers
Students' answer papers related to mid-term examinations and final examinations are to be retained by the faculty member or instructor for the period of one year. After one year, they are routinely destroyed by shredding or other acceptable disposal methods.
Student Academic Discipline (Policy #71)

Student offences punishable by disciplinary action are described in Policy 71*. The Ombudsperson (Student Life Centre, Room 2128, ext. 2402) is available to advise students of their rights under this Policy and to advise on the procedures to be followed.

Academic offences shall include, but shall not be limited to, the following:
- Infringing unreasonably on the work of other members of the University community (e.g. disrupting classes or examinations; harassing, intimidating or threatening others).
- Violation of safety regulations in a laboratory or other academic setting.
- Cheating on examinations, assignments, work term reports, or any other work used to judge student performance.
- Impersonating another student or entering into an arrangement with another person to be impersonated for purposes of taking examinations or tests, or carrying out assignments.
- Plagiarism, which is the act of presenting the ideas, words or other intellectual property of another as one's own.
- Obtaining by improper means examination papers, tests, or similar materials, or using or distributing such materials to others.
- Falsifying academic records, including tests and examinations, or submitting false credentials.
- Oral or written misrepresentations (e.g., fraudulent health claims) which may have an effect on academic evaluations.
- Submitting an essay, report, or assignment when a major portion has been previously submitted or is being submitted for another course without the express permission of all instructors involved.

Disciplinary Penalties. One or more of the following disciplinary penalties may be imposed:
- A reprimand or warning to the student that her/his behaviour has been unacceptable.
- Submission of a failing grade in an examination, test, assignment, or course, or in a term.
- Disciplinary probation for the balance of the period of registration at the University in the degree program in which the student was registered at the time of the offence.
- Restraining orders in the case of threats to individuals or restitution for property or other damages.
- Expunging grades or revoking degrees.
- Suspension of a student from the University, which shall not exceed three years.
- Expulsion, which shall be permanent.

Refer to the section (**) at the end of Policy 33 for a list of on-campus individuals, services/facilities available to advise and assist students.

Student Grievance Policy (Policy #70)

Policy 70* sets out the principles on which UW's Student Grievance Policy is based and describes the procedural steps a student may take to seek remedies for grievances. The Ombudsperson (Student Life Centre, Room 2128, ext. 2402) is available to advise students of their rights under this Policy and to advise on the procedures to be followed.

The fundamental criterion for initiating a grievance is that a student believes that a decision of a University authority or the action of a University member affecting some aspect of her/his University life has not been reasonable, just or fair.

There are two types of student grievances:
- Academic grievances (Type 1) allege errors in academic judgement and are normally decided at the Faculty level to ensure that individuals knowledgeable in the field assess the matter.
- Procedural/other grievances (Type 2) are much broader, covering such matters as alleged procedural error or instances of bias or prejudice other than sexual harassment, discrimination or abuse of supervisory authority, which are covered by Policy #33 on Ethical Behaviour.

Petitions are distinguished from grievances. Petitions are requests from students seeking exceptions to or relief from normal Faculty or University rules and regulations because of special circumstances, such as illness or bereavement, unlike grievances which are typically based on alleged errors in academic judgment or in procedure.

The grievance process is divided into the following three stages, with each successive stage becoming increasingly formal.
- An informal inquiry is the first stage and is initiated by a student going directly to the individual (or Chair of the committee) whose decision or action is being questioned. This communication can be either in writing or in person. This step must be taken before a review under formal procedures is sought; experience has shown informal communication to be an effective resolution mechanism.
- A student who is not satisfied with the outcome of an informal inquiry may initiate a formal review by submitting a written request to the appropriate authority, indicating the grounds on which the request is being made.
- A student who is not satisfied with the outcome of a formal review may initiate an appeal, the third and final stage in the process, by requesting a hearing before a tribunal established at the Faculty or University level.

At each stage in the process, parties to a grievance are entitled to be accompanied by a colleague for advice and support.

Students are expected to seek remedies for their grievances promptly, and normally must lodge a grievance...
within two months either of being notified of an adverse
decision or from the end of the term in which the alleged
event or series of events occurred. Six months after
graduation, a student's right to initiate a grievance ceases
unless substantive new evidence is obtained. Students are
entitled to timely responses to their queries, including the
reasons for which decisions are made.

Refer to the section (**) at the end of Policy 33 for a list
of on-campus individuals, services/facilities available to
advise and assist students.

* The full text of Policy 70 is available electronically on the Web.
Copies can also be obtained from the Secretariat (Needles Hall,
Room 3060); the Co-ordinator, Ethical Behaviour and Human
Rights (Mathematics and Computer Building, Room 4049); and
the Ombudsperson (Student Life Centre, Room 2128).

Ethical Behaviour (Policy #33)

Policy 33* articulates the principles underlying UW's policy
on ethical behaviour, and sets out the framework within
which individual complaints are to be addressed. Five gen-
eral principles (equality and respect; academic freedom;
interference; equal access to services and facilities; abuse
of authority), and three specific principles (sexual harass-
ment; discrimination based on behaviour/action or commu-
nication; abuse of supervisory authority) are cited. Any UW
student** who believes that principles expressed in Policy
33 have been violated is encouraged to consult — informally
and in confidence — a member of the Ethics Committee
for advice.*** A list of members may be obtained from the
University Secretariat (Needles Hall, Room 3060, or ext.
6125).

As noted in the Policy, Every person in the University
community has a right to institute and participate in pro-
ceedings under Policy 33 without reprisal or threat of
reprisal for so doing.

* The full text of Policy 33 is available electronically on the Web.
Copies can also be obtained from: the Secretariat (Needles
Hall, Room 3060); the Co-ordinator, Ethical Behaviour &
Human Rights (Mathematics and Computer Building, Room
4049); the Ombudsperson (Student Life Centre, Room 2128).
** Students in courses taught at, or in programs administered by,
the Federated and Affiliated Colleges, should consult the
individual designated by the College.
*** There are other on-campus individuals, services/facilities
available to advise and assist students: these include: the
Co-ordinator, Ethical Behaviour and Human Rights
(Mathematics and Computer Building, Room 4049, ext. 3765);
the Sexual Harassment Counsellor (Counselling Services,
Needles Hall, ext. 5483); the Ombudsperson (Student Life
Centre, Room 2128, ext. 2402); the Co-ordinator for Persons
with Disabilities (Needles Hall, ext. 4635); the Undergraduate
Associate Dean in each Faculty: Counselling Services, Health
Services and the Safety Office, and the UW Police all provide
comfort and support for students in distress.

Ownership of Student Work

1. When a student submits work which is eligible for
copyright to the University as a requirement of an
academic program, the University acknowledges the
student's sole copyright/ownership with the following
conditions:

* The physical document (thesis, research paper,
work term report, examination answer paper and
such) submitted to the University by a student
becomes the property of the University.

* With the exception of examination answer papers,
the University receives a non-exclusive royalty-free
licence to:
  o circulate the work as part of the University Library
collection;
  o make copies or representations of the work for
academic purposes within the University;
  o make copies of a thesis deposited in the
University Library at the request of other
universities or bona fide individuals or institutions;
  o microfilm the work and submit the microfilm to the
National Library of Canada;
  o publish the abstract of any work which is a
student thesis.

2. Computer programs written or partially written by a
student in support of a project, thesis, or other original
work, may have potential value as a marketable
intellectual property. The University acknowledges the
student's ownership rights in the same manner as for
other copyright material, with the following exceptions:

* Students may be participating in software develop-
ment as part of a process of research and develop-
ment within a research group or department. In such
circumstances, students may be asked to sign a
waiver or assignment of software rights to the
University, or to the supervising faculty member or
research group. Students who sign waivers should
first have a clear understanding of the nature of the
agreement.

* The University assumes a non-exclusive, paid-up,
royalty-free licence to use, for the University's
administration, education and research activities, all
software written using University facilities or written
in support of academic work at the University. This
license does not include the right to sublicense the
software to third parties for commercial purposes,
but may be extended in this sense by means of a
written agreement between the student and the
University.

* Students acquire no rights to software written under
supervision in the course of employment by the
University, for example as a research assistant or
during a co-op work term. In cases where students
are employed by faculty, or by recognized research
groups, they should inquire into the software policy
of that particular professor or group involved before
undertaking extensive software development.
Student Academic Records

Student academic records shall be the property of the University; access to those records, and release of information concerning them, shall be governed by the general law and by the University's policies with respect thereto.

Use of Computing Facilities

Computing facilities at the University of Waterloo, and the on-campus and off-campus electronic communication systems by which they are interconnected and accessed, exist to support the research, instructional and administrative needs of the University. Deliberate misuse of these facilities may lead to disciplinary action within the University. It could also lead to civil and/or criminal action. Deliberate misuse includes but is not limited to: interference with or intrusion upon any user or facility; unauthorized access to information and any use of it for any purpose; use of a facility in support of private purposes, without making prior arrangements with the University.

Guidelines on Research with Human Participants

The University of Waterloo requires that all research conducted by its faculty, staff and students which involves humans as research participants must undergo prior review and approval through the Office of Human Research and Animal Care (OHRAC). Included in this are projects which use any of: surveys, questionnaires, interviews, physiological procedures. The ethics review process is intended to ensure that the projects comply with the Office's ethics guidelines (Guidelines for Research Involving Human Participants) as well as provincial and federal agency guidelines. These Guidelines provide information to UW researchers about ethical issues and procedures which should be of concern when planning research with human participants (e.g. risks and benefits to participants, informed consent, confidentiality of data, etc.). Complete information and advice about the application procedure and review and approval processes is available from the OHRAC (Ext. 6005, NH 3015).

University Services

The University provides a number of services designed to enhance and enrich student campus life. These are described briefly below. More detailed information is available from each of the departments or organizations providing the service. Separate chapters of the Calendar are devoted to the Department of Co-operative Education and Career Services, the University Library, Computing Services and Student Awards and Financial Aid.

Federation of Students

The Federation of Students' role is to provide services and representation for undergraduate students at the University of Waterloo. All full-time undergraduate students are members of the Federation and may seek positions within its structure. The Charter of the Federation of Students, which guarantees certain rights and privileges to students, was approved by the Board of Governors of the University and then by the Provincial Secretary on April 27, 1967.

Objectives

The principal "Objectives" of the Federation are:
To promote the welfare and common interests of the students of the University of Waterloo.
To act as the representative of the students.
To promote and maintain responsible student government.
To promote and co-ordinate student participation in athletics, cultural and social activities.
To promote and maintain communications between the student body and the duly elected and appointed authorities of the University of Waterloo.

The Students' Council is the governing body of the Federation and includes 32 elected students from all Faculties, St. Jerome's and Renison Colleges plus all Executive members. The functions of Council include upholding the above objectives, administration and control of finances and control of all Offices, Commissions and Standing Committees of Council. All activities are overseen by Council so make sure that your Faculty representatives attend Council meetings.

The Executive is composed of the principal officers including the President, Vice-President Administration and Finance, the Vice-President Internal, and the Vice-President Education. The Executive controls day-to-day administration, and recommends policy to the Students' Council.

The President is the Chief Executive Officer and spokesperson of the Corporation and as such oversees all of the Federation's activities. The President is also the Federation's representative on the University Senate and the University Board of Governors.

The Vice-President Administration and Finance is the Treasurer of the Corporation and works with the General Manager to oversee and formulate the Federation Budget and the Federation's businesses. This Vice-President
supervises all purchasing, updates by-laws and policies, and is responsible for the Publicity Commission.

The Vice-President Internal Affairs is the Secretary of the Corporation and provides an informational link between Students' Council and Faculty Student Societies, Residence Councils, Federated and Affiliated Colleges, liaise with the Federation of Students clubs, services and societies. Responsible for the Arts Commission, Liaison Commission and the Committee of Presidents.

The Vice-President Education works with people and organizations both internal and external to the University to keep post-secondary education financially accessible and bettering the quality of education, work with Provincial and/or National lobbying organizations, encourage the evaluation of academic policies and procedures, and grading practices and to encourage the formulation and implementation of policies and procedures that promote and reflect academic excellence and standards essential to the integrity of the University of Waterloo's scholastic activities. Responsible for the Academic Access and Quality Commission, Academic Transition Awareness Commission and the Students Advising Co-op.

The Student Issues Resource Centre's responsibilities include addressing important issues outside of the responsibilities of the Vice-President Education with the purpose of educating the university community. The centre promotes dialogue about gender issues, human rights issues and public issues; ensures that the University of Waterloo provides an environment wherein its members can pursue personal and social growth as well as academic excellence; enriches the learning environment through extracurricular programs and the provision of alternative learning situations; and establishes contacts and co-ordinates activities between related University services and groups.

The Office of the Ombudsperson provides an impartial, independent and objective service to members of the University community. The primary objective of the Office is to ensure that a client's problem is dealt with in an equitable manner and that his or her rights are maintained.

The Ombudsperson deals with situations both academic and non-academic in nature. Appointments can be made by calling ext. 2402 or by dropping by their Office. All letters and interviews are treated confidentially. This is a service provided by the Federation of Students, the Graduate Student Association and the University.

Other Federation Services include BACCHUS (Boosting Alcohol Counsciousness Concerning the Health of University Students), Food Bank, GLLOW (The Gay and Lesbian Liberation of Waterloo), Legal Resource Office/Landlord Tenant Information Office, PALS Phoneline, Peer Advising, Peer Tutoring, Peer Health, Peer Mediation, PALS Off-Campus Dons, Safety Van, Student Volunteer and Part-Time Employment Centre, and the Women's Centre.

The University of Waterloo Bookstore and UW Shop
The University Bookstore in South Campus Hall not only provides students with all required textbooks but carries over 25,000 titles in general books including Computer

the Bombshelter Pub and Patio, Federation Hall, SCOOPS, and access to a non-pay phone (for local calls only).

Persons wishing information on any aspect of Federation activities are advised to write to the Federation of Students, Student Life Centre or telephone 888-4042.

Student Life Centre
The Student Life Centre offers a place for the University community to meet, relax and take advantage of the many facilities in the building. Open 24 hours every day of the year, the SLC offers information, games, food and drink, meeting spaces, retail areas and much more. Please come and see our new and improved facility and services.

IMPRINT
IMPRINT is the student newspaper of the University of Waterloo. It is dedicated to the intellectual analysis and coverage of news, arts, sports, and issues of the day. It is a non-profit corporation with share capital, and is both student-owned and student-operated. Located in the Student Life Centre, Room 1116, IMPRINT publishes weekly in the Fall and Winter terms, and bi-weekly over the Summer.

Student volunteers are needed to research and write articles, review everything from books to concerts, take photos, develop and print photos, lay out pages and run sections. Experience for any position is not necessary because training is provided in all areas.

IMPRINT can be reached from 9:00 a.m. to 5:00 p.m. (or often later) at 888-4048 or University ext. 2331 Monday through Friday. Inquiries should be directed to the Editor.

Athletics and Recreational Services
The University of Waterloo offers a broad and complete range of athletic programs for men and women. The University holds membership in the Ontario Universities Athletic Association (men) and the Ontario Women's Interuniversity Athletic Association (women). Both of these interuniversity Associations compete with the 17 other Ontario universities in over 30 activities.

Campus Recreation provides an extensive program at competitive, recreational, club, and instructional levels. The program provides activities such as aquatics, fitness, racquets, special interest programs such as C.P.R. and skating, and competitive and co-recreational leagues, as well as numerous others.

The Physical Activities Building, a golf course, numerous outdoor fields, Columbia Icefield, and a new facility on North Campus provide excellent accommodation for these programs.

More information on any aspect of the University of Waterloo athletic program may be obtained by contacting the Athletic Department, in the Physical Activities Building.

Bookstore and UW Shop
The University Bookstore in South Campus Hall not only provides students with all required textbooks but carries over 25,000 titles in general books including Computer
books, Humour, Science Fiction, etc. Special order service for books not generally stocked is provided at no charge. If a title is in print, we can almost always order it. The Stationery Department carries computer supplies, electronic supplies, engineering and art supplies and general stationery supplies.

Located across from the Bookstore, the UW Shop's distinct crested merchandise is designed to reflect the spirit and tradition of UW. All visitors are welcome to the store and we encourage browsing in each of the specialty areas such as backpacks, jackets, graduation gifts, casual wear, greeting cards, calendars, and the new UW Kids corner. Ask for a copy of the Graduation Ring brochure and UW Shop gift brochure.

Pricing Policy
The Bookstore sells required textbooks at discounted prices.

Refund Policy
TEXTBOOKS AND CUSTOM PUBLISHED MATERIALS: Price will be refunded in full during the first two weeks of each term if the book and custom published material is in mint condition and a sales receipt is presented. After the last official Drop/Add Date, custom published materials cannot be returned.

GENERAL BOOKS AND STATIONERY: Price will be refunded in full up to 72 hours from date of sale. The item must be in mint condition and a sales receipt presented.

UW SHOP: Regular priced merchandise accepted for exchange or refund if the item is in mint condition and a sales receipt presented. Special orders and reduced sale priced merchandise are not accepted for returns.

Bookstore and UW Shop Hours
Monday to Friday: 8:30 a.m. - 5:00 p.m.
Saturday: 12:00 p.m. - 4:00 p.m.
(Open Saturdays, September 2 to June 1, except Easter and Victoria Day weekends)

Extended hours will be posted at the beginning of each term.
General Inquiries, ext. 2902
Textbook Information, ext. 5440
UW Shop, ext. 3914

Art Galleries
Art Galleries at UW are located in three buildings. The UW Gallery is located in the foyer of the Theatre of the Arts in the Modern Languages Building, while East Campus Hall houses two galleries: The Fine Arts Studio Gallery in room 1207, and “ArtSpace” in room 1235. In addition, a small gallery in Needles Hall, room 1351, offers a changing series of exhibitions.

The Art gallery in the Modern Languages Building presents a varied program of national, regional and local artists’ work, encompassing a broad spectrum of art-making sensibilities. Its hours are from 11:00 a.m. to 4:00 p.m. Monday through Friday and from 2:00 p.m. to 5:00 p.m. on Sundays. The gallery is not open during the summer months or on statutory holidays. The Fine Arts Studio Gallery and “ArtSpace” generally show works by current students, as well as additional programming involving contemporary artists from across Canada, and are accessible during the hours of 9:00 a.m. to 12:00 p.m., and 1:00 p.m. to 4:30 p.m. Monday through Friday. There is no admission charge for any of these galleries. For gallery information, call ext. 2442.

The University’s permanent collection of works in a variety of media is displayed in many offices and public spaces, campus wide.

UW Theatre Centre
Room 161, Hagey Hall of the Humanities
Entertainment is available on campus throughout the Fall and Winter terms in UW’s two attractive theatres.

The Theatre Centre operates the Humanities Theatre in Hagey Hall, and operates the Box Office for both on-campus theatres. In co-operation with the Federation of Students and other on-campus organizations, the Centre presents many University-based theatrical and entertaining events.

Both theatres are rented out to community organizations such as local dance schools, the Kiwanis Club, the Gilbert and Sullivan Society and others, for their special events. The City of Waterloo uses the theatres as venues for their professional theatre season which includes dramas, comedies, musical performances and a children’s series.

The UW Theatre Centre Box Office is open Monday to Friday, 10:30 a.m. to 4:30 p.m., Saturdays from 1:00 p.m. to 5:00 p.m. The phone number is 888-4908. Visa and Mastercard are accepted for most events. Most shows have special discount prices for students.

Counselling Services
Room 2080, Needles Hall
Professionally trained counsellors are available to help students with career decisions as well as personal and social concerns. Individual interviews, workshops and study skills classes are some of the services which Counselling offers to students. Appointments can be made by calling extension 2655 or by dropping into the offices on the second floor of Needles Hall. Hours are 9:00 a.m. to 5:00 p.m., Monday through Thursday and Friday, 9:00 a.m. to 4:30 p.m.

Career Services
Career Services facilities and services are available to all UW students. Further information can be found in the “Co-operative Education and Career Services” section.

Health Services
Health and Safety Building
Health Services is the medical clinic centrally located across from the Student Life Centre. The clinic provides comprehensive care to all students and emergency care to others on campus. Physicians, nurses and counsellors are on staff at the clinic which is open Monday to Friday from 8:30 a.m. to 5:00 p.m. during Fall and Winter terms; 8:30 a.m. to 4:30 p.m. in Spring and Summer terms. For emergencies, there is a doctor on call who can be reached 24 hours a day by dialing 888-4096. Physicians’ fees at
Health Services, as well as laboratory work, x-rays, and most referrals are paid by the Ontario Health Insurance Plan (OHIP), other provincial health plans or UHIP. More details are available at Health Services.

All full-time students are also covered by a Student Supplementary Health Insurance Plan sponsored by the Federation of Students which provides partial payment for prescriptions and other services.

International students are not eligible for OHIP. Enrolment in the University Health Insurance Plan (UHIP) is mandatory upon registration and will appear on the fee statement. UHIP provides identical coverage to that of OHIP. Dependant coverage must be purchased within ten days of registration.

Safety Office
The UW Safety Office provides many resources for your personal safety, some of which are:
- Safety van
- Safety alarms and whistles
- Student security WALKSAFE
- Library patrol
- UW Police Service

The Office also offers information and advice on all aspects of safety, fire prevention, environmental health and hazardous waste.

For details, call (519) 888-4567, ext. 3587.

Harassment, Discrimination, Ethical Behaviour, Human Rights
The University of Waterloo desires to create an environment which supports, nurtures, and rewards its members on the basis of such relevant factors as work performance and achievement. Discrimination, harassment, and the abuse of supervisory authority are not conduces to this environment and will not be tolerated.

Additional information and a list of on-campus individuals, services/facilities available to advise and assist students, can be found in the section on Ethical Behaviour (Policy 33).

Mature Student Services
The Mature Student Services office provides both academic counselling and support services for students who have been away from formal education for some years. Help with application for admission, pre-registration, course selection and course changes is available, as well as up-to-date information on university services and regulations.

Services include a networking file, a learning skills package, a library of cassette tapes, and a monthly Newsletter. Throughout the year, the office organizes a variety of events that are geared to the needs of older students.

Appointments for individual advice and counselling can be made by phone (ext. 2429) or by visiting the office in the Modern Languages Building, Rooms 224 and 225. Office hours are 8:00 a.m. to 4:00 p.m., Monday through Friday.

Child Care
There are four licensed child care facilities located on the University of Waterloo campus. On the north campus, just off Columbia Street, are the Hildegard Marsden Co-operative Day Nursery and the Klemmer Farmhouse Co-operative Nursery.

The Marsden centre offers professional services for infants (from 3-18 months), toddlers (from 18-33 months), pre-schoolers (two to five years), and for children at summer Day Camp and on PD days. Eighteen fully qualified staff members operate this year-round facility. Fees vary according to the child’s age. For more information, call ext. 5437.

The Klemmer Farmhouse offers professional full and half-day programs for five children from 18 to 30 months and 23 children from two to six years of age. Four Early Childhood Education staff members and a full-time cook operate this year-round nursery. Fees vary depending upon age and the time a child spends at Klemmer. For more information, call 885-5181.

On the south campus, just off University Avenue, is a child care facility known as the Paintin’ Place Co-operative Day Care in the Married Students’ Apartments complex. It too offers full- and half-day programs for children two- to five-years-old developed and taught by Early Childhood Education specialists. Fees vary according to the amount of time a child spends at Paintin’ Place. For more information, call ext. 4030.

The Early Childhood Education Centre is located on campus on the ground floor of the PAS Building. The Centre offers Preschool, Junior and Senior Kindergarten programs for children 2½ to 6 years of age. Children attend either morning or afternoon sessions. The Centre is operated by the Psychology Department as a research facility for students and faculty. Fees vary according to the number of days a child is in attendance (2, 3, 4 or 5 half day programs are offered). Teachers hold university undergraduate degrees plus ECE certification. Note: This is not a day care facility and does not meet the needs of families requiring daily child care. For further information, call ext. 3167.

Office of the Registrar
Needles Hall
Student Admissions, Secondary School Liaison, Registration, Records and Financial Aid for undergraduate students are administered by the Registrar’s Office.

Visitors Centre
Prospective students, parents and counsellors are invited to visit the Visitors Centre in South Campus Hall at the University Avenue entrance. A visit could include the following:
- Each weekday, year-round, tours are offered at 10:00 a.m. and 1:00 p.m.
- Day visits are offered on Wednesdays and Fridays in October and November and on each Friday from October to April.
Welcome to the University of Waterloo. This guide is designed to help you navigate our facilities and services. If you have any questions, please contact us at 519-746-8088 or E-mail: gruetz@adh.uwaterloo.ca.

**Research Contracts**

The Research Contracts Section administers all grant proposals, applications and University grant programs; develops and disseminates information on sources of funding for a wide variety of research-related activities by newsletters, bulletins and workshops; maintains active liaison between faculty and appropriate personnel in government, industry and other sectors of society to open up opportunities for University researchers; aids faculty in the preparation of research proposals and identification of appropriate funding sources; and assures that applications and grant agreements adhere to University policies and sponsor requirements; assists with coordination of collaborative research initiatives; administers University-sponsored grant programs, including exchange agreements; research centers and groups; and technology transfer including commercialization of University research through licensing and spin-off companies. Specific responsibilities of the Office include the following:

- **Research Grants**: The Research Grants Section administers all grant proposals, applications and University grant programs; develops and disseminates information on sources of funding for a wide variety of research-related activities by newsletters, bulletins and workshops; maintains active liaison between faculty and appropriate personnel in government, industry and other sectors of society to open up opportunities for University researchers; aids faculty in the preparation of research proposals and identification of appropriate funding sources for their activities; ensures that applications and grant agreements adhere to University policies and sponsor requirements; assists with coordination of collaborative research initiatives; administers University-sponsored grant programs, including exchange agreements; research centers and groups; and technology transfer including commercialization of University research through licensing and spin-off companies. Specific responsibilities of the Office include the following:

- **Research Contracts**: The Research Contracts Section (Waterloo Research Institute (WRI)) provides assistance to researchers and to industry, government and other sectors of society in negotiating research contracts; it also provides liaison with the industrial and public sectors and communicates contract research opportunities to University researchers. The Section is also responsible for monitoring the progress of contracts.

- **Technology Transfer and Licensing Office**: The Technology Transfer and Licensing Office (TTLO) facilitates the identification and protection of commercially significant technologies arising from the academic research activities at the University. The Office also assists the University research community in transferring technologies to industry for full commercialization. This assistance includes insuring that adequate intellectual property protection is put in place and appropriate license terms are negotiated on behalf of the University and the researcher. In addition, cooperation and international academic relations, to encourage and facilitate international research and education projects. It assists with identification of opportunities and funding sources, and with development of project proposals; and provides financial administration and reporting for international projects. In addition, the Office is responsible for the establishment and monitoring of international collaboration and exchange agreements involving undergraduate and graduate students and faculty. An International Exchange Committee, chaired by the Vice-President, University Research, oversees approximately 50 current exchanges.

- **Office of Human Research and Animal Care**: The Office of Human Research and Animal Care (Office) is responsible for the review of all research proposals involving human participants conducted by University of Waterloo faculty, students and staff. This process is intended to ensure compliance of projects with the Office's ethical guidelines (Guidelines for Research with Human Participants) as well as those of provincial and federal agencies. The Office develops and distributes ethics guidelines and procedures, and provides consultation, assistance and support to researchers at all stages of the application and review processes. In addition, through a series of educational activities and materials, the Office provides researchers with information relevant to conducting human research. The Office coordinates University research within local and secondary schools, and liaises with government agencies on matters pertaining to research with humans. Further, the Office provides ongoing monitoring of human research projects, maintains a database and collaborates with the University of Waterloo Human Research Ethics Committee on human research issues.

In association with the University of Waterloo Animal Care Committee, the Office also oversees the ethics review of research and teaching projects involving non-human vertebrate animals to ensure that the proposals conform with provincial regulations and federal and University guidelines. The Office develops and distributes procedural information and educational materials associated with the ethics review process and monitors animal housing facilities. Through its liaison function with government agencies, the Office is responsible for maintaining a database and for...
providing annual reports on animal utilization in research and teaching at Waterloo.

- Research Financial Services: The Research Financial Services Section provides financial administration, monitoring and reporting to researchers, University administration and external sponsors; provides the necessary audit function to ensure adherence to University policies and to financial conditions imposed by governments, agencies and clients; maintains liaison with sponsors on procedural matters and communicates requirements to researchers; and assists with the development and administration of research centres, institutes and groups.

- National Research Council Field Advisory Service: The National Research Council (NRC) has made arrangements with the University to locate a Field Advisory Service Representative as an adjunct to the Office of Research. The Representative, who is a technology advisor of the Industrial Research Assistance Program (IRAP), is able to draw upon the technical resources of the University to assist small and medium-sized companies and thus also acts to further Waterloo's working relationship with Canadian industry.

Residence Accommodation
Accommodation is available at the University for approximately 4,500 students. There are two large undergraduate residences, Village I and Village II; a townhouse complex; five smaller Federated and Affiliated College residences, St. Jerome's, Conrad Grebel, Renison, and St. Paul's; the Minota Hagey residence for graduate students; and the University Married Students' Apartments which contain 240 one-bedroom and 360 two-bedroom apartments. An off-campus housing information service is provided for students seeking accommodation in the Kitchener-Waterloo community.

Inquiries should be made as follows:

For Village I, Village II, Townhouses, and Minota Hagey write:

Housing Office
Village I
University of Waterloo
Waterloo, Ontario N2L 3G1
or phone (519) 888-4567, ext. 3704/3705

For off-campus information write:
Off-Campus Housing Office
Village I
University of Waterloo
Waterloo, Ontario N2L 3G1
or phone (519) 888-4567, ext. 5725

For Federated and Affiliated Colleges, and Married Students' Apartments, write:
Conrad Grebel College
Westmount Rd. N.
Waterloo, Ontario N2L 3G6
or phone (519) 885-0220

Services for Students with Disabilities
The office of Services for Disabilities provides information, resources and assistance to campus users with disabilities:

- Alternate examination arrangements
- Specialized technical equipment
- Campus transportation service
- Volunteer assistance program
- Library Access Centres and Library services
- Health and Disabilities Resource Room
- Counselling and learning assistance
- Advocacy
- Campus wheelchair accessibility maps

Room 2051, Needles Hall. For further information or assistance, call 888-4635. Off-campus TDD users call 888-4044. Fax (519) 746-2401.

International Student Office
The International Student Office (ISO), located on the second floor of Needles Hall (within Counselling Services), aids international students through its special programs. Information is provided on many aspects of living in Canada – immigration regulations, community services, legal problems and cultural adjustment. Programs include Host Families, English conversation class, English tutors, TOEFL preparation courses, temporary housing, emergency loans and help with U.S. visas.

All students from outside Canada are invited to visit the International Student Office, Needles Hall, Room 2080, ext. 2814. Office hours are 8:30 a.m. to 4:30 p.m., Monday to Friday.

Teaching Resources Office
The Teaching Resources Office (TRO) of the University of Waterloo was established in 1976, following the recommendation to the Undergraduate Council of Senate by the Vice-President Academic "that the University appoint a person to act as a teaching consultant to the Faculties." Terms of reference for the Teaching Resource Person include providing assistance to individual faculty members in improving their teaching performance, offering assistance to departments on teaching methods and evaluation of learning (including advice on the training of teaching
assistants), and keeping the University community informed about developments and innovations relevant to teaching and learning in higher education. The Office also co-ordinates the University's Distinguished Teacher Award Program (information about this program is presented below). In 1985 the TRO became part of the Teaching Resources and Continuing Education Office (TRACE) which also has advisory responsibility for the University's continuing education offerings, part-time studies, and the distance education program. The Office is located in the Math and Computer building, Room 4055 (ext. 3132). A library of computer-catalogued resource materials on teaching is maintained by the TRACE Office.

Distinguished Teacher Awards
The Distinguished Teacher Awards were established in 1975 by the University of Waterloo Senate to recognize excellence in teaching at all levels in the University. The award is open to everyone who teaches students at the University of Waterloo and its federated and affiliated colleges. Recipients are chosen from among nominees by a Selection Committee of faculty and students.

Four Distinguished Teachers are honoured each year. Three of the awards are designated for teachers who hold full-time faculty appointments. One award is for part-time faculty, teaching assistants, distance education tutorial markers, lab instructors, or those in similar teaching roles.

For further information on the awards contact TRACE at ext. 3132.

Planner-in-Residence
The program was developed in 1990 by the Planning Alumni Association, Pragma Council and members of the School of Planning. A prominent planner or planning-related professional is appointed to spend one term each year emphasizing the practical partnership of theory and practice in undergraduate and graduate classes. The Planner-in-Residence also participates in field trips, research activity of faculty and students and acts as a resource person for all members of the Planning School.

Past Planners-in-Residence have included a senior city manager, Provincial Minister of Municipal Affairs, Chairman of the Ontario Municipal Board, and Provincial Deputy Minister. During the last two years students have benefited from the expertise of an Ontario lawyer/activist and a metropolitan commissioner of planning and development. Please contact the School of Urban and Regional Planning for a complete listing of participating Planners-in-Residence.
First-year students competing in the chariot race during orientation.
General Information

Applicants seeking admission to undergraduate programs are required to have suitable and adequate preparation to enable them to undertake degree studies at the University. Before submitting an application, prospective students should read carefully the description of the program they wish to study and then review the admission requirements to determine whether their background qualifies them for consideration. The admission requirements apply to all applicants who wish to pursue degree studies on a full-time or part-time basis, including studies by distance education.

Candidates may apply for admission to the programs listed in the various faculty sections of this Calendar.

All applicants will be considered for admission to the University unless St. Jerome's College or Renison College is specified.

All correspondence should be directed to the Assistant Registrar for the Faculty to which the candidate is applying.

Detailed information regarding admission requirements is available from the Assistant Registrar for each Faculty.

Applicants are advised to outline thoroughly their educational background in order to facilitate the admission process. The admission information and requirements set forth in the Calendar are applicable for admission beginning in May, 1996.

Authority to Admit

All applicants for admission to the University will be considered by the Admissions Committee for the Faculty to which admission is sought. No final decision regarding the acceptability of an applicant will be made by an individual or group without the authority of the appropriate Admissions Committee.

The University reserves the right to refuse admission to any candidate and to refuse re-admission if, in the opinion of University officials, a student will not profit from University studies or poses a danger to the University community.

The University reserves the right to withdraw the Offer of Admission if the applicant fails to meet the minimum requirements for admission or any other condition stated on the Offer of Admission.

St. Jerome's College

St. Jerome's registers students in the Regular or Co-operative system of study in the Faculties of Arts and Mathematics including Honours Arts Applied Studies Co-op, and excluding Arts Accountancy Studies Co-op. All transcripts and documents should be sent directly to the College.

Inquiries and correspondence should be directed to: The Registrar, St. Jerome's College.

Renison College

Applicants may apply for the Social Development Studies Program and for Honour Arts Regular Program through Renison College. Renison College applicants should indicate "Renison College" clearly on the application form. All transcripts and documents should be sent directly to the College.

Inquiries and correspondence regarding admissions should be directed to: The Registrar, Renison College

General Admission Requirements

The minimum admission requirements are expressed in terms of the Ontario Secondary School curriculum.

In many programs the number of qualified applicants may exceed the number of places available. Presentation of the minimum requirements guarantees only that the application will be considered seriously. The admission process is actually a competition for the places available, and the majority of the students admitted usually have averages well above the minimum.

Applicants educated outside of Ontario must meet admission average requirements and present course work equivalent to required Ontario Academic Courses (see “Specific Admission Requirements and Recommendations for Year One Programs 1996-1997”).

Ontario Secondary School applicants who are refused admission to a particular program may be considered for admission to other programs for which they satisfy the specific subject and marks requirements. Applicants who are not currently in Ontario Secondary School and who are refused admission to the program to which they applied may be considered for other programs of their choice.

English Language Requirement for Applicants Whose Mother Tongue is Not English

Given that the official language of instruction at the University of Waterloo is English it is incumbent upon the University to have in place policies and procedures to ensure that its undergraduate students have sufficient language skills to cope with the rigors of the academic curriculum as well as, for many, the communication skills to be successful in co-operative education programs.

Applicants Who Have Lived in Canada for a Period of Less Than Five Years

Applicants whose mother tongue is not English and who have lived in Canada less than five years as of the first day of the month of the term in which studies are to begin must provide the following tests and scores as indicated below:

- Test of English as a Foreign Language (TOEFL): 600
- Test of Written English (TWE): 5.0
- Test of Spoken English (TSE): 60

These requirements are distinct from and additional to the requirement to present OAC English, or equivalent, where it is stated as an admission requirement.

Those who have lived in Canada for a period of less than five years but have pursued formal education for five years or more in a country or jurisdiction where the language of instruction is English may be considered for an exemption. Also, in very exceptional cases the University is willing to consider an exemption for those who have been in Canada for less than five years and who can demonstrate clearly that they have acquired the necessary language skills. The appropriate admissions committee will
consider requests on a case-by-case basis. Such applicants should contact the University in writing and make a strong case for exemption.

Applicants Who Have Lived in Canada for Five Years or Longer
Applicants whose mother tongue is not English and who have lived in Canada for five years or longer will also be required to meet the above requirements if they have not pursued formal education where English is the language of instruction. The appropriate admissions committee will apply those requirements on a case-by-case basis and notify the applicant promptly after a careful review of the documentation presented. Bilingual francophone Canadians educated in Canada are not required to meet these requirements.

Permanent Resident Status
Normally, applicants must be Canadian citizens or Permanent Residents (Landed Immigrants) in order to be considered for admission to a Co-operative program.

New residents of Canada who are in the process of having their immigration status clarified (e.g. refugee claimants, applicants for Permanent Resident status and those holding Minister's Permits) will be considered on an individual basis. If such an applicant is admitted, continued registration in a co-operative program will be contingent upon providing proof of a valid work permit. Those in Canada on Student Authorizations (Student Visas) are not eligible for admission to Co-operative programs.

Notice of Nondiscriminatory Policy as to Students
The University of Waterloo admits students of any race, colour, and national or ethnic origin to all the rights, privileges, programs and activities generally accorded or made available to students at the University. It does not discriminate on the basis of race, colour, national and ethnic origin in administration of its educational policies, admission policies, scholarship and loan programs, and athletic and other university-administered programs.

Applicants to Year One

Applicants from Other Canadian Provinces

| Province                  | Grade  
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<td>First Year CEGEP program or equivalent</td>
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Applicants from other Countries

Countries following a "British" System of Education

General Certificate of Secondary Education or equivalent with Passes in at least five subjects, two of which must be at the Advanced Level.

International Baccalauréat
Passes in at least six subjects, three Higher Level and three Subsidiary Level with a grade total not less than 28.

Hong Kong
Hong Kong Certificate of Education (English) and University of Hong Kong Matriculation (Advanced Level) with Passes in at least five subjects, two of which must be at the Advanced Level. Applicants with three or more University of Hong Kong Advanced Level subjects will also be considered. Chinese University of Hong Kong First Year standing with courses appropriate to program.

Europe
Maturity or Matriculation Certificate.

India
Bachelor's degree (with first division standing).

Central and South America
First-year university with a standing of at least B-.

Countries Using French System
Baccalauréat Passable.

United States of America
High School Diploma with exceptionally high standing, and Advanced Placement Examinations in prerequisite subjects or first-year university standing in acceptable subjects from an accredited institution.

Applicants to the Faculty of Arts are required to submit SAT1 and SAT2 scores and/or results of the ACT test. The verbal SAT and the results of the English Achievement test and other Arts related achievement tests are of particular interest.

Other Countries
Normally the Secondary School program which allows applicants to be admitted for first-year university studies in their home country is acceptable provided that the educational system is at a similar level to the educational system in Ontario.

Candidates should contact the Registrar's Office well in advance of the desired session for an assessment of eligibility. As much information as possible should be provided in the initial inquiry. Official documents submitted in

Equivalent Certificates
All applicants are required to hold the specific subject requirements indicated in “Specific Admission Requirements and Recommendations for Year One 1996-97” in addition to the equivalent level of education.

Applicants are required to submit official transcripts for all years spent in secondary and post secondary education. Transcripts must indicate subjects studied, the grades received and an interpretation of the grading systems used.
a language other than English must be accompanied by a notarized English translation.

**Other Applicants**

Applicants who are not considered for admission on the basis of Ontario Secondary School standing or equivalent are considered under the following broad categories. These categories serve to identify general areas of academic preparation.

**Mature Student Admission**

Individuals who do not meet the normal requirements for admission but who can offer clear evidence of their ability to undertake and manage university studies and who have been away from formal education for some time, in no case less than two years, may be considered for admission as a mature student. In the case of the Faculty of Arts, those who have been away from formal education for some time, normally five years or more, but in no case less than two years, and do not meet the normal requirements for admission, may be considered for admission as a mature student.

Although the University of Waterloo does not automatically offer admission to mature applicants, the Faculty Admissions committees carefully consider previous academic records, resumes and other biographical material before determining admissibility. For example, Admissions Committees for faculties where there are specific subject requirements in the areas of Mathematics and Science will expect confirmation that the applicant has up to date background equivalent to that provided by OAC Mathematics and Science courses. Admissions Committees for less technical programs will review the applicant's personal and professional development, formal training, work experience and community service before making a decision.

Applicants who do not qualify for full-time degree studies may be considered for admission to a part-time non-degree program in any faculty but the Faculty of Engineering.

Applicants applying as mature students are advised to contact the Assistant Registrar of the desired faculty to discuss admissibility and appropriate qualifying work.

**Non-Degree Status**

Mature students or others who are not interested in pursuing a degree may apply for admission on a non-degree basis. Credit courses successfully completed by students in this category will normally count toward a degree if the student is admitted later as a degree candidate.

**Post-Degree Status**

Students who hold a degree recognized as equivalent to a Canadian university bachelor's degree, or a graduate degree, and wish to register in one or more undergraduate courses, but are not proceeding to an undergraduate degree at this university, may be considered for admission as post-degree students. Normally courses taken this way are not credited towards a graduate degree at the University of Waterloo.

**Advanced Standing**

Applicants to advanced years must specify the Faculty to which they are seeking admission, the program they wish to study, and the level of admission sought. All programs, with the exception of Architecture, Engineering, Independent Studies and Optometry, operate on a course credit system where a student's progress is measured by courses completed rather than by years completed.

Applicants to faculties which operate under the course credit system will have previous work evaluated on an individual course basis. For other applicants advanced standing will be determined to the appropriate year or term. Applicants are expected to submit course descriptions, in addition to an official academic transcript from the institution(s) they have previously attended or are presently attending. The provision of such information will greatly facilitate the evaluation of previous work and the consideration of possible transfer credits.

**Transfer Credit**

The University of Waterloo subscribes to the following General Policy on the Transfer of Course Credits, as adopted by the Council of Ontario Universities:

Acceptance of transfer credits among Ontario universities shall be based on the recognition that, while learning experiences may differ in a variety of ways, their substance may be essentially equivalent in terms of their content and rigour. Insofar as possible, acceptance of transfer should allow for maximum recognition of previous learning experience in university-level courses.

Subject to degree, grade and program requirements, any course offered for credit by one Ontario university shall be accepted for credit by another Ontario university when there is an essential equivalency in course content.

At the University of Waterloo, the assignment of transfer credits to a specific degree program will be at the discretion of the admitting authority for the Faculty or other academic unit concerned.

Students are advised to refer to the Faculty sections in this Calendar for detailed regulations on advanced standing or transfer credit.

**Applicants from Ontario Colleges of Applied Arts and Technology**

As a general policy, applicants who have achieved a cumulative average of B (75%) in each of the three years of a program at an Ontario College of Applied Arts and Technology (CAAT) are considered for admission with advanced credit for as much as one year of a degree program. Applicants who have completed two years with a cumulative average of B (75%) are considered for admission to Year One.

The Faculty of Engineering welcomes applications from strong students with CAAT backgrounds who also present recent strong grades in OAC (or equivalent) Calculus, Algebra and Geometry, Physics, Chemistry and English courses. Applicants are considered for admission for Year 1 only unless they have honours level university background in Mathematics and Science. No advanced standing is granted for College courses. Similarly, the Faculty of Mathematics will consider applications from those who
Admissions
Specific Admission Requirements
and Recommendations

Present recent strong grades in OAC (or equivalent) Calculus, Algebra and Geometry and English courses. A maximum of 10 elective half-credits may be granted to those who present a three year diploma. Normally, no transfer credit is granted for CAAT mathematics courses.

Letters of Permission
In addition to completing the appropriate application form, applicants wishing to take a course on a “Letter of Permission” must obtain a Letter of Permission from their “home” university specifying the courses to be taken. In some cases an official transcript from the “home” university will also be required.

General Admission Requirements for Ontario Secondary School Applicants
Ontario secondary school students seeking admission must present the Ontario Secondary School Diploma (OSSD) including a minimum of six Ontario Academic Courses (OAC). While an overall average of 70% on six Ontario Academic Courses is the minimum required for consideration, higher averages normally are required for admission to individual programs in which the demand for places by qualified applicants exceeds the number of places available. The actual averages required for admission to particular programs are determined each year on the basis of the number of applicants and the qualifications of those applicants. The admission average is calculated using the best six marks which include marks for courses required for admission. The length of time taken by an applicant to complete the secondary school program will not of itself be a determining factor in the admission decision providing the student has proceeded normally through the program without repeating any courses or credits.

The University reserves the right to withdraw the Offer of Admission made to an applicant on the basis of interim marks or incomplete standing. The offer may be withdrawn if the applicant fails to complete diploma requirements with a minimum final admission average of 70% in six Ontario Academic Courses, or equivalent, or any specific final average or condition stated on the Offer of Admission.

Specific Admission Requirements and Recommendations for Year One Programs 1996-97

<table>
<thead>
<tr>
<th>Faculty/Program</th>
<th>Requirements</th>
<th>Recommendations</th>
<th>Comments</th>
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<tr>
<td></td>
<td>Required courses are included in the calculation of the admission average.</td>
<td>The following recommendations are intended to provide additional academic advice which applicants should consider when planning their university preparation programs. Courses listed here are not required for admission but are recommended because applicants may find this preparation beneficial during their university studies.</td>
<td>Since factors other than marks are often considered in the admissions decision, students who are interested in particular programs are encouraged to apply regardless of their expected average.</td>
</tr>
<tr>
<td></td>
<td>Required courses are included in the calculation of the admission average.</td>
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<td>Required courses are included in the calculation of the admission average.</td>
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<td>Since factors other than marks are often considered in the admissions decision, students who are interested in particular programs are encouraged to apply regardless of their expected average.</td>
</tr>
</tbody>
</table>

Applied Health Sciences

Honours Co-op Health Studies
Honours Regular Health Studies

Six Ontario Academic Courses including:
Biology
Chemistry

OAC Physics and Calculus are strongly recommended for applicants considering the Pre-Health Professions Option.

Applicants planning to enter the Joint Honours program in Health Studies/Kinesiology must fulfill the Kinesiology admission requirements. Applicants are encouraged to complete an "Admission Information Form".

Special consideration will be given to applicants on the basis of strength in OAC Calculus, Chemistry and Biology or Physics. The Kinesiology program includes required university courses in Biology, Calculus, Chemistry, Computer Science, Physics, Psychology and Sociology. Applicants are encouraged to complete an "Admission Information Form".

Honours Co-op Recreation and Leisure Studies
Honours Regular Recreation and Leisure Studies

Six Ontario Academic Courses.

Applicants are encouraged to include OAC English and one OAC Mathematics in their program.

Applicants should be aware that, although this is a social science program, courses in Computer Science and Statistics are included in the program. Applicants are encouraged to complete an "Admission Information Form".

Applicants are encouraged to include OAC English and one OAC Mathematics in their program.

Applicants are encouraged to include OAC English and one OAC Mathematics in their program.
## Admissions
### Specific Admission Requirements and Recommendations

<table>
<thead>
<tr>
<th>Faculty/Program</th>
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<tbody>
<tr>
<td><strong>Arts (All programs)</strong></td>
<td></td>
<td>All applicants are expected to complete and submit the Arts &quot;Admission Information Form&quot; which will be sent when receipt of an application is acknowledged.</td>
<td>When the admissions committee considers an application individually, it bases its decision on the overall average, the average in arts-related subjects, particularly OAC English, and information provided on the Arts &quot;Admission Information Form&quot;.</td>
</tr>
<tr>
<td><strong>Honours Arts (Regular)</strong></td>
<td>Six Ontario Academic Courses including English and one other Arts-related course.</td>
<td>Applicants are expected to choose their other Arts-related course(s) from OAC courses such as English, History, Languages, Social Sciences, Fine and Performing Arts. Although not required for admission, an OAC Mathematics course is strongly recommended for applicants who are considering social science programs such as Psychology and Geography. OAC Calculus is particularly recommended for those considering an Economics program.</td>
<td>Entry to General, Honours, and major programs, including departmental Co-op, occurs following Year One and is based on academic performance in Year One.</td>
</tr>
<tr>
<td><strong>Renison - Social Development Studies (Regular)</strong></td>
<td>Six Ontario Academic Courses including English and one other Arts-related course.</td>
<td>Applicants are expected to choose their other Arts-related course(s) from OAC courses such as English, History, Languages, Social Sciences, Fine and Performing Arts. Although not required for admission, an OAC Mathematics course is strongly recommended.</td>
<td>Applicants who are not admitted to Social Development Studies are considered for Honours Arts Regular through Renison.</td>
</tr>
<tr>
<td><strong>Honours Accountancy Studies (Co-op)</strong></td>
<td>Six Ontario Academic Courses including English and one other Arts-related course.</td>
<td>Applicants are expected to choose their other Arts-related course(s) from OAC courses such as English, History, Languages, Social Sciences, Fine and Performing Arts, and are also strongly encouraged to include courses from OAC Mathematics and Science.</td>
<td>Applicants not admitted to Arts Accountancy Studies (Co-op) will be considered for admission to Honours Arts Regular only, when interest in this alternative is well-supported on the Arts &quot;Admission Information Form&quot;.</td>
</tr>
<tr>
<td><strong>Honours Applied Studies (Co-op)</strong></td>
<td>Six Ontario Academic Courses including English and one other Arts-related course.</td>
<td>Applicants are expected to choose their other Arts-related course(s) from OAC courses such as English, History, Languages, Social Sciences, Fine and Performing Arts.</td>
<td>Applicants not admitted to Arts Applied Studies, may be considered for the Honours Arts Regular program.</td>
</tr>
<tr>
<td><strong>Engineering</strong></td>
<td>Six Ontario Academic Courses including: Algebra and Geometry, Calculus, Physics, Chemistry, English 1.</td>
<td>Applicants are encouraged to take the OAC in Finite Mathematics although it is not an admission requirement; also, it is strongly recommended that applicants include one or two Computer programming courses in their secondary school background. It is important that applicants complete and return promptly the &quot;Admission Information Form&quot; sent to them with the acknowledgement of their application. The &quot;Admission Information Form&quot; has significant weight in making admission and scholarship decisions.</td>
<td>Applicants are considered on the basis of additional factors such as evidence of a strong aptitude and interest in Engineering, extensive involvement in extra-curricular activities, additional background beyond the minimum six OAC courses, and performance on the Descartes Mathematics Contest. Applicants with high averages who are missing any of the required courses must contact the Director of Admissions for Engineering no later than December (for admission the following September) for advice on the course of action required to meet the admission requirements. Applicants not offered admission to their first choice program will be considered for other Engineering programs that they specify on their Admission Information Form. This form is sent to all applicants when receipt of the application is acknowledged.</td>
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</table>
### Admissions
Specific Admission Requirements
and Recommendations

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<th>Faculty/Program</th>
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<tbody>
<tr>
<td><strong>Environmental Studies</strong></td>
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<tr>
<td>Architecture</td>
<td>Six Ontario Academic Courses including: English or Français, Physics, Calculus, Algebra and Geometry. An interview is also required (see “Comments”).</td>
<td>Independent art studies, secondary school art programs or other creative fields of study are strongly recommended.</td>
<td>Selected applicants are normally required to come to the University for an interview as part of the admission process. Selection for the interview is based on secondary school records including university-entrance courses. Admission is based on the results of the interview, the applicant's portfolio, an English précis-writing exercise and secondary school achievement.</td>
</tr>
<tr>
<td>Honours Regular Environment and Resource Studies</td>
<td>Six Ontario Academic Courses including English.</td>
<td>Applicants are encouraged to include OAC courses in Science, Geography and Mathematics in their program.</td>
<td>It is important that applicants complete the ‘Admission Information Form’ sent to them with the acknowledgement of their application. Admission to Co-op Environment and Resource Studies occurs in Year Two.</td>
</tr>
<tr>
<td>Honours Co-op Geography</td>
<td>Six Ontario Academic Courses including English and Geography.</td>
<td>Applicants are encouraged to include OAC courses in Mathematics in their program.</td>
<td>It is important that applicants complete the ‘Admission Information Form’ sent to them with the acknowledgement of their application. Applicants not admitted to Honours Co-op will considered for the Honours Regular program.</td>
</tr>
<tr>
<td>Honours Regular Geography</td>
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<tr>
<td>Urban and Regional Planning</td>
<td>Six Ontario Academic Courses including English.</td>
<td>It is recommended that applicants include OAC Finite Mathematics and an OAC Science, preferably Biology. Students who do not take these OAC courses will not be disadvantaged when being considered for admission.</td>
<td>Admission is based on letters of reference, an ‘Admission Information Form’, and secondary school achievement. Admission to Co-op Urban and Regional Planning occurs in Year Two.</td>
</tr>
</tbody>
</table>

### Independent Studies

Applicants should be: capable of doing university-level work; strongly motivated to work on their own; planning studies that can be done at the University of Waterloo. Admission is determined by an Admissions Committee which normally interviews applicants.
### Admissions
Specific Admission Requirements and Recommendations

<table>
<thead>
<tr>
<th>Faculty/Program</th>
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<tbody>
<tr>
<td><strong>Mathematics</strong></td>
<td><strong>Honours Co-op Computer Science</strong></td>
<td>Six Ontario Academic Courses including: Algebra and Geometry, Calculus, English with a minimum grade of 80% in each of the required courses.</td>
<td>All applicants are expected to complete and submit the Mathematics 'Admission Information Form' which will be sent when receipt of an application is acknowledged. Applicants are encouraged to develop as much breadth as possible by choosing courses from the arts, humanities, social sciences and physical sciences. It is recommended that all applicants include OAC Finite Mathematics and take at least one Computer Science course at some point in their secondary school studies. Applicants to Mathematics/Accounting presenting OAC Accounting will be excused from taking Introductory Accounting, thereby avoiding the necessity of taking an extra course to satisfy program requirements.</td>
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<tr>
<td><strong>Honours Co-op Mathematics Accounting Options</strong></td>
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<tr>
<td><strong>Honours Co-op Mathematics/Busines</strong></td>
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<tr>
<td><strong>Honours Co-op Mathematics</strong></td>
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<tr>
<td><strong>Honours Regular Computer Science</strong></td>
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<tr>
<td><strong>Honours Regular Mathematics</strong></td>
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<tr>
<td><strong>Honours Regular Mathematics/Business</strong></td>
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<tr>
<th>Science</th>
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<tr>
<td><strong>Honours Regular Science</strong></td>
<td>Six Ontario Academic Courses including: two Science credits from Biology, Chemistry, Physics, two Mathematics credits, one of which must be Calculus, and the second from Algebra and Geometry or Finite Mathematics</td>
<td>Applicants are encouraged to include OAC Biology if they are considering the Pre-Health-Professions Option.</td>
<td>Applicants who choose not to apply to a major program, should include both OAC Chemistry and Physics in order to keep as many options as possible open in the Faculty of Science. Applicants are encouraged to develop strong writing skills. Those not admitted to the program of their choice, are automatically considered for other programs in Science for which they qualify.</td>
</tr>
<tr>
<td><strong>Honours Regular Science and Business</strong></td>
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### Admissions
Specific Admission Requirements
and Recommendations

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<tbody>
<tr>
<td>Honours Co-op Biology</td>
<td>Six Ontario Academic Courses including: Chemistry</td>
<td>Applicants are encouraged to include OAC Biology if they are considering the Pre-Health-Professions Option.</td>
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<tr>
<td>Honours Regular Biology</td>
<td>one additional Science credit from Biology or Physics</td>
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<tr>
<td>Honours Co-op Environmental Science</td>
<td>two Mathematics credits, one of which must be Calculus, and the second from Algebra and Geometry or Finite Mathematics.</td>
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<tr>
<td>Honours Regular Environmental Science</td>
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<tr>
<td>Honours Co-op Biochemistry</td>
<td>Six Ontario Academic Courses including: Chemistry</td>
<td>Those considering the Geophysics Option within Honours Co-op Applied Earth Sciences are encouraged to include Algebra and Geometry.</td>
<td>Minimum marks required for Honours Co-op Biochemistry – 70% in Chemistry and 70% in Mathematics.</td>
</tr>
<tr>
<td>Honours Regular Biochemistry</td>
<td>Physics</td>
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<tr>
<td>Honours Co-op Applied Earth Sciences</td>
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<tr>
<td>Honours Regular Earth Sciences</td>
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<tr>
<td>Honours Co-op Applied Chemistry</td>
<td>Six Ontario Academic Courses including: Chemistry</td>
<td>Applicants are encouraged to include Finite Mathematics if they are considering Honours Co-op Applied Chemistry.</td>
<td>Minimum marks required for Honours Co-op Applied Chemistry – 70% in Chemistry and 70% in Mathematics courses.</td>
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<tr>
<td>Honours Regular Chemistry</td>
<td>Physics</td>
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<tr>
<td></td>
<td>Algebra and Geometry Calculus</td>
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<tr>
<td>Honours Co-op Applied Physics</td>
<td>Six Ontario Academic Courses including: Physics</td>
<td>Applicants are encouraged to include both Algebra and Geometry and Finite Mathematics.</td>
<td>Minimum marks required for Honours Co-op Applied Physics – 75% overall in Physics and Mathematics with at least 70% in each of Physics and Calculus.</td>
</tr>
<tr>
<td>Honours Regular Physics</td>
<td>one additional Science credit from Biology or Chemistry</td>
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<tr>
<td></td>
<td>two Mathematics credits, one of which must be Calculus, and the second from Algebra and Geometry or Finite Mathematics.</td>
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<tr>
<td>Optometry</td>
<td>Application is made after completion of at least one year of university Science.</td>
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</table>
Application Procedures

Applicants who have never enrolled at Waterloo for full-time studies, part-time studies or distance education studies and who wish to pursue degree studies on a full-time basis must submit their applications through the Ontario Universities’ Application Centre (OUAC).

- Applicants planning on completing the Ontario Secondary School Diploma (OSSD) who are presently enrolled in an Ontario Secondary School as a full-time day student must complete OUAC Form 101 available from the secondary school guidance departments.
- All other applicants must complete OUAC Form 105. These forms may be obtained from the Registrar's Office.
- Those considering full-time attendance who have attended Waterloo previously do not apply using an OUAC form. Contact the Registrar’s Office to obtain an appropriate form.
- Applicants who wish to pursue degree studies on a part-time basis or non-degree or post-degree studies should contact the Registrar’s Office for the appropriate application forms.
- Applicants who wish to take courses by distance education should write to the Distance Education Program, University of Waterloo, Waterloo, Ontario N2L 3G1 or call (519) 888-4050.

When requesting an application form from the University, candidates should outline their academic background and indicate the exact program and level of admission they are seeking. This will help to determine the appropriate application form as well as enable us to send additional information which an applicant may find helpful.

Further instructions on application procedures and documents required will be sent with the application form.

Application Dates
On campus, full or part-time study.
Because of the number of applications received each year, the University has established certain dates after which consideration of an application cannot be guaranteed.

<table>
<thead>
<tr>
<th>Term starting</th>
<th>Last date for application</th>
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<tbody>
<tr>
<td>May 1996</td>
<td>March 1, 1996</td>
</tr>
<tr>
<td>July 1996</td>
<td>June 1, 1996</td>
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<tr>
<td>September 1996</td>
<td>May 1, 1996</td>
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<tr>
<td>January 1997</td>
<td>November 1, 1996</td>
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</tbody>
</table>

Architecture requires that applications must be dated as received at the OUAC no later than March 15. Supporting documents must be received at the University no later than March 15.

Arts Accountancy Studies requires that applications must be dated as received at the OUAC no later than March 31. Supporting documents must be received at the University no later than May 1.

Arts, Honours Regular applicants applying for admission to Fall term 1996 and using the OUAC form 105 must apply by July 1. Supporting documentation must be received by the Registrar's Office by August 1.

Engineering requires that applications be dated as received at the OUAC no later than March 15. Supporting documents must be received at the University of Waterloo no later than April 15.

Optometry requires that applications must be dated as received at the University of Waterloo no later than February 28.

Normally no application will be accepted after the first day of lectures in any specific term.

Distance Education
Students not previously registered at UW

Fall Term
June 3, 1996

Winter Term
September 16, 1996

Spring Term
January 20, 1997

Students previously registered at UW

Fall Term
July 2, 1996

Winter Term
October 14, 1996

Spring Term
February 17, 1997

Processing Applications

Only complete files containing all required documents (transcripts, letters of reference, etc.) will be presented to the Admissions Committees for consideration.

All Ontario Secondary School applicants will be notified on or after June 12, 1996 of the status of their application for admission. Ontario Secondary School applicants who complete their studies in the Fall semester may be considered when final grades are received.

Ontario Secondary School applicants who receive an offer of admission dated on or before June 12, 1996 are required to confirm acceptance by June 26, 1996.

Applicants who are not currently enrolled in an Ontario Secondary School program can expect to wait several weeks before receiving a decision on their application after all required documentation has been received. Some programs require applicants to come to the University for an admission interview and a decision cannot be made in such programs until after the interview has been taken and the Admissions Committee has had ample opportunity to consider all of the information that has been presented to it. Applicants who feel there has been an undue delay in the consideration of their application should check to ensure that all required documents have been received by the appropriate Faculty area in the Registrar's Office.

Release of Academic Information

The University may, on request from a Secondary School in Ontario or a CEGEP in Quebec, release certain academic data regarding performance about the student. The data will be released only if the student has authorized the release on the application form (OUAC Form 101 or 105). Students not wishing to have this information released may indicate their wishes on the application form.
Registration and Fees

Following admission, students will be required to preregister for courses and then make final arrangement for registration. See "Fees and Registration" for an explanation of these procedures.
Fees and Registration

Students checking out what's ahead for the new term.
Preregistration, Registration, Fees

**Preregistration**

Once admitted to the University, students are advised to preregister for their courses well in advance of the beginning of lectures. Preregistration is the process of choosing courses, having them approved by the appropriate advisor and recorded with the Registrar's Office before the start of classes. First-year students should preregister for courses and programs in consultation with an advisor in their faculty's Undergraduate Office; advanced-year students should select their courses on the advice of the Undergraduate Advisor for their major department. Students registering through Renison College or St. Jerome's College should select their courses with the appropriate advisor at their college. All students must preregister for courses as follows:

1. Newly Admitted Students:
   As soon as possible after academic admission. Information regarding preregistration is forwarded when the student is admitted.

2. Returning Students:
   - Co-operative Programs
     During the preceding on-campus term.
   - Regular Programs
     During March of the preceding academic year.

The above action will produce the "Student Schedule and Fee Statement" which will be mailed to the student prior to the start of classes.

**Registration**

Students are encouraged, where possible, to preregister and pay their fees by mail (send a cheque or money order payable to the institution of intended registration, i.e., University of Waterloo, Renison College, or St. Jerome's College). For those students who do not register by mail, a registration period is held on campus immediately prior to the beginning of lectures each term.

Registration is completed when fees have been paid or arranged, the "Fee Statement" has been received by Financial Services, and any course changes have been approved and successfully processed.

The following policy has been approved for use at the discretion of the department/instructor in exceptional cases where there is excessive demand for a particular course: Students who are not in attendance during the first week of classes may be removed from the class list and replaced by students from a waiting list unless they have justified their absence through the following procedures.

Students who know that they cannot be present during the first week of class for a legitimate reason: family problem, personal or health matter, unavoidable work situation, must inform the professor directly or through the departmental secretary by telephone during regular business hours before the meeting of the first class.

**Assessment**

Fees are assessed as follows: (Foreign Students – see Note 5 “Student Authorization”).

1. Co-operative Programs:
   - All Terms
     - Engineering and Architecture
       Students are assessed on a per term basis for the Total Tuition and Incidental Fees shown on the Schedule of Fees. Students taking one or two term courses only in a term are assessed by course at the Unit Course Fee shown.
     - Other Co-operative Programs
       Students are assessed by course at the Unit Course Fee shown to a maximum of the Basic Fee. Students taking more than two term courses in a term are also assessed Co-operative and Incidental Fees.

2. Regular Programs:
   - All Terms
     - Architecture Year One, Independent Studies and Optometry
       Students are assessed on a per term basis for the Total Tuition and Incidental Fees shown on the Schedule of Fees.
     - Other Regular Programs
       Students are assessed by course at the Unit Course Fee shown to a maximum of the Basic Fee. Students taking more than two term courses are also assessed Incidental Fees.
     - Summer Session (July-August)
       Students are assessed by course at the Unit Course Fee shown.

**Payment**

1. Timing and Amounts Due

All fees are due and payable by the end of the registration period. See pages 8 to 11 for appropriate dates. Students must pay or arrange fees by these dates, whether or not a final class schedule has been received.

For Total Tuition Fees and Unit Course Fee see Schedule of Fees.

2. Methods
   - By Mail
     The University encourages students to register by mail. Detailed instructions outlining the payment procedure will be included with the Fee Statement.

In a few cases, legitimate emergencies may make the above impossible. The student must inform the professor as soon as possible, and before the beginning of the first class of the second week in any case, if the student wishes to retain his or her place.

Students should be prepared to present documentation of the above problems, if the professor requires it.

The University reserves the right to require a student to withdraw from a course or courses for academic or other reasons.
In Person

For students who cannot register by mail, a registration period is held on campus at the beginning of each term. See "Academic Calendar" for dates.

3. General Information

○ Fees should be paid with cash, money order or cheque payable to the "University of Waterloo".

○ Fee payments by scholarships or bursaries not administered by the University or by methods other than those outlined must be authorized in writing by Student Accounts, Financial Services.

○ Students who have received a "Notice of Assessment" under the Ontario Student Assistance Program (OSAP) may arrange payment of fees using this source of funds.

   Apply for OSAP early (allow 80 days processing time). OSAP funds not received by the start of term cannot be used as a means to register.

○ The University will accept post-dated cheques as an arrangement for the payment of fees. Post-dated cheques can be dated up to May 1 for May term, September 1 for September term and January 1 for January term.

   The following dates are currently under review. Please check the Registration Newsletter for any changes.

<table>
<thead>
<tr>
<th>Term</th>
<th>First Day of Registration</th>
</tr>
</thead>
<tbody>
<tr>
<td>May 1996</td>
<td>May 1, 1996</td>
</tr>
<tr>
<td>September 1996</td>
<td>September 3, 1996</td>
</tr>
<tr>
<td>January 1997</td>
<td>January 6, 1997</td>
</tr>
<tr>
<td>May 1997</td>
<td>May 5, 1997</td>
</tr>
</tbody>
</table>

○ Students who are not able to pay or arrange fees as shown above must visit the "Fees Arranged" section of Financial Services during the on-campus registration period to discuss fee arrangements.

○ Tuition Assistance for Senior Citizens: All students 65 years and over who register for degree credit courses will receive a bursary equivalent to the cost of tuition. This bursary will be awarded at the time of registration. Students will be responsible for all other fees connected with their course or registration.

○ Students whose cheques are returned by the bank for any reason will be assessed a handling charge of $15.00 plus late registration penalty as applicable.

○ Students who fail to fulfill fee payment arrangements will be assessed a 5% surcharge on the total fees outstanding plus 1 1/2% per month service charge applied to the balance outstanding and calculated from the due date.

○ Failure to pay all outstanding fees, accounts or other assessments such as library fines before the conclusion of lectures may bar a student from writing examinations and will result in withholding of credit and transcripts for previous work. In such cases, exam reports for Co-op students would not be available to the Department of Co-operative Education and Career Services for prospective employers.

BANKING INFORMATION

Most major banks are near campus but it is suggested that students bring a certified cheque, draft or money order as their initial deposit. Fund transfers can take up to two weeks to complete, during which time the student does not have access to the funds.

It is the student's responsibility to ensure that funds are available at registration; late fees will not be waived for students who have failed to make timely transfer arrangements.

LATE REGISTRATION (FULL-TIME STUDENTS)

Students who register late will be assessed a late fee penalty as follows:

First Day: $10.00*  
Thereafter: $3.00 per day*  
(No Limit)

* Subject to change

See Registration Newsletter for dates when late fees start.

FINAL REGISTRATION DATES

Students will not be allowed to register after the dates shown below.

The following dates are currently under review. Please check the Registration Newsletter for any changes.

<table>
<thead>
<tr>
<th>Term Starting</th>
<th>Last Date to Register</th>
</tr>
</thead>
<tbody>
<tr>
<td>May 1996</td>
<td>June 28, 1996</td>
</tr>
<tr>
<td>July 1996</td>
<td>July 31, 1996</td>
</tr>
<tr>
<td>September 1996</td>
<td>October 31, 1996</td>
</tr>
<tr>
<td>May 1997</td>
<td>June 30, 1997</td>
</tr>
</tbody>
</table>

WITHDRAWALS

(Individual Faculty sections should be consulted for academic penalties for late withdrawal.) See Academic Calendar for specific dates.

A student who finds it necessary to withdraw from attendance is required to obtain a "Notice of Withdrawal" from the Registrar. This Notice, when signed by both the Dean and the Registrar, or their delegates, may entitle the student to a refund of tuition fees calculated as follows:

1. Students withdrawing before the start of classes will receive a full refund (tuition only).

2. Students withdrawing in the first three weeks of a term (first week for Summer Session) will receive a full refund (tuition only) less a $25 registration charge. Part-time students will be charged $10.

3. Students withdrawing during weeks four to seven of a term (second week of Summer Session) will receive a refund of 50% (tuition only).

4. Refunds are not provided to students after week seven of a term (week two of Summer Session).

The specific withdrawal dates are included in the registration information package sent to students each term.
5. Requests for refunds of refundable incidental fees must be addressed to the organization concerned. Such refunds are available for only three weeks, after the start of classes.

6. The Intercollegiate Athletic Fee, the Co-op Fee, and the Internship Fee are refundable upon withdrawal on the same basis as tuition fees.

7. The Health Insurance Fee is refundable on a pro rata basis and the benefits associated with it will be cancelled. The Health Insurance card must be returned at the time of withdrawal.

8. The Federation Hall and Co-ordinated Plan Fees are not refundable.

9. Certain scholarships and bursaries are given on the condition of completion of the term involved. Any withdrawal refunds will be credited to the agency as required.

10. Students who voluntarily withdraw prior to or during the full refund period will not have the term recorded on their academic record. Students who voluntarily withdraw from their studies after the first three weeks of classes and before any deadlines set by their faculty, will have this noted on their transcripts with the statement “Voluntary Withdrawal From Term (effective date) – No Academic Penalty.”

Note
The University reserves the right to require a student to withdraw when, in the opinion of University officials, a student poses a danger to the University community or is not profiting from University studies.
SCHEDULE OF FEES
The Board of Governors reserves the right to make changes in the published schedule of fees without notice. The University does not undertake or accept responsibility to notify all recipients of this Calendar of fee changes made subsequent to printing deadlines.

Undergraduate Programs – Tuition and Incidental for All Years – Canadian Citizens and Permanent Residents
These are the fees in effect for the 1995/96 academic year. The fees for the 1996/97 academic year, beginning May 1, 1996, have not been determined at the time of printing. A schedule of fees approved by the Board of Governors will be included with student registration information.

Foreign students on Student Authorizations should refer to “Fees for Foreign Students with Student Authorizations” for fee information.

<table>
<thead>
<tr>
<th>Faculty</th>
<th>Basic Term Fee (Note 1, 3)</th>
<th>Co-op Fee (Note 2)</th>
<th>Total Tuition Fees</th>
<th>Total Incidental Fees</th>
<th>Total Fees per Term</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Applied Health Sciences</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>– Regular</td>
<td>1226.00</td>
<td></td>
<td>1226.00</td>
<td>208.71</td>
<td>1434.71</td>
</tr>
<tr>
<td>– Co-op</td>
<td>1240.00*</td>
<td>411.00</td>
<td>1651.00</td>
<td>235.36</td>
<td>1886.36</td>
</tr>
<tr>
<td><strong>Architecture</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>– Year 1</td>
<td>1331.00</td>
<td></td>
<td>1331.00</td>
<td>183.27</td>
<td>1514.27</td>
</tr>
<tr>
<td>– Upper Year, Co-op</td>
<td>1331.00</td>
<td>411.00</td>
<td>1742.00</td>
<td>210.22</td>
<td>1952.22</td>
</tr>
<tr>
<td><strong>Arts</strong></td>
<td></td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>– Regular</td>
<td>1226.00</td>
<td></td>
<td>1226.00</td>
<td>165.27</td>
<td>1411.27</td>
</tr>
<tr>
<td>– Co-op</td>
<td>1240.00*</td>
<td>411.00</td>
<td>1651.00</td>
<td>212.22</td>
<td>1863.22</td>
</tr>
<tr>
<td>– Accountancy Studies Co-op</td>
<td>1240.00*</td>
<td>411.00</td>
<td>1651.00</td>
<td>287.22</td>
<td>1938.22</td>
</tr>
<tr>
<td><strong>Engineering</strong></td>
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<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>– Co-op</td>
<td>1345.00*</td>
<td>411.00</td>
<td>1756.00</td>
<td>297.22</td>
<td>2053.22</td>
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<tr>
<td><strong>Environmental Studies</strong></td>
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</tr>
<tr>
<td>– Regular</td>
<td>1226.00</td>
<td></td>
<td>1226.00</td>
<td>183.27</td>
<td>1409.27</td>
</tr>
<tr>
<td>– Co-op</td>
<td>1240.00*</td>
<td>411.00</td>
<td>1651.00</td>
<td>210.22</td>
<td>1861.22</td>
</tr>
<tr>
<td><strong>Independent Studies</strong></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>– Regular</td>
<td>1226.00</td>
<td></td>
<td>1226.00</td>
<td>185.27</td>
<td>1411.27</td>
</tr>
<tr>
<td><strong>Mathematics</strong></td>
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<td></td>
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</tr>
<tr>
<td>– Regular</td>
<td>1226.00</td>
<td></td>
<td>1226.00</td>
<td>217.19</td>
<td>1443.19</td>
</tr>
<tr>
<td>– Co-op</td>
<td>1240.00*</td>
<td>411.00</td>
<td>1651.00</td>
<td>244.14</td>
<td>1895.14</td>
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<tr>
<td>– Co-op Accounting</td>
<td>1240.00*</td>
<td>411.00</td>
<td>1651.00</td>
<td>319.14</td>
<td>1970.14</td>
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<td><strong>Optometry</strong></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>– Regular</td>
<td>1331.00</td>
<td></td>
<td>1331.00</td>
<td>240.27</td>
<td>1571.27</td>
</tr>
<tr>
<td><strong>Science</strong></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>– Regular</td>
<td>1226.00</td>
<td></td>
<td>1226.00</td>
<td>240.27</td>
<td>1466.27</td>
</tr>
<tr>
<td>– Co-op</td>
<td>1240.00*</td>
<td>411.00</td>
<td>1651.00</td>
<td>267.22</td>
<td>1918.22</td>
</tr>
<tr>
<td><strong>Summer Session</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>– Half Course (0.5 credits)</td>
<td>276.00</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>– Full Course (1.0 credits)</td>
<td>552.00</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Unit Course Fee (Note 4)</strong></td>
<td>276.00</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* Includes $14.00 work report marking fee (see Note 3).
FEES FOR FOREIGN STUDENTS WITH STUDENT AUTHORIZATIONS (see also Note 5)
These are the fees in effect for the 1995/96 academic year. The fees for the 1996/97 academic year, beginning May 1, 1996, have not been determined at the time of printing. A schedule of fees approved by the Board of Governors will be included with student registration information.

For an undergraduate student on Student Authorization:

1. Registration in an undergraduate program in Architecture, Engineering, or Optometry: Basic tuition fees are $7535.00 per term plus incidental fees as shown below. The Unit Course Fee is $1507.00 per term course.

2. Registration in any other undergraduate program: Basic tuition fees are $4622 per term plus incidental fees as shown below. The Unit Course Fee is $924.40 per term course.

Note
Foreign students are no longer eligible for coverage in the Ontario Health Insurance Plan (O.H.I.P.). A Non Resident Health charge (U.H.I.P) will be added to all foreign student assessments.

Dependent (family) Non Resident Health coverage is compulsory and available on request within ten days of registration (or arrival in Ontario if coming later) and by payment of an additional fee in the Cashier's Office, Needles Hall.

Current rates per term are: (retail sales tax included)

<table>
<thead>
<tr>
<th></th>
<th>Term</th>
</tr>
</thead>
<tbody>
<tr>
<td>One person</td>
<td>$196.41</td>
</tr>
<tr>
<td>Two persons</td>
<td>$392.82</td>
</tr>
<tr>
<td>Three persons (or more)</td>
<td>$621.72</td>
</tr>
</tbody>
</table>

INCIDENTIAL FEES
1. The following incidental fees are compulsory:

   - Student Services Fee (see Note 17) | Term |
   - Full-time                          | $45.04 |
   - Part-time                          | $13.51 |

   - CanCopy Fee (see Note 18)          |     |
   - Full-time                          | $ .94  |
   - Part-time                          | $ .28  |

   - Federation of Students (see Note 8) | Term  |
   - $23.55                             |

   - Interuniversity Athletics          | $33.50 |

   - Health Insurance (see Note 6)      |     |
   - Regular                             | $30.86 |
   - Co-op                               | $57.81 |

   - Federation Hall (see Note 7)        |     |
   - $7.50                               |

   - Student Co-ordinated Plan (see Note 18) | Term |
   - $25.00                             |

2. The following incidental fees must be paid on registration but are refundable on request from the organization listed below within three (3) weeks after the start of lectures for the term:

   - Imprint – including GST (see Note 13) | Term |
   - $4.10                                 |

Note 1 – Term
Term refers to a particular four-month period of registration: Fall Term – September to December; Winter Term – January to April; Spring Term – May to August.

Note 2 – Co-operative Fee
Additional fee assessed to all Co-operative program students registered in more than two term course equivalents per term.

In offering Co-operative programs, the University incurs significant extraordinary costs in the academic departments, as well as in the Department of Co-operative Education and Career Services, the Registrar’s Office, and other departments which serve the students. These costs are not provided for in the operating grants received from the Government. The University recovers a portion of the extra costs of Co-operative programs by collecting a special Co-op service fee from students registering in these programs. The Co-op fee is set in accordance with the methodology approved by the Ministry of Colleges and Universities and distributes the cost recovery over all terms of the Co-operative programs in which students pay fees.

Note 3 – Tuition Rates for Co-op Students
Tuition for Co-op students is set at a rate of $14.00 per term higher than the corresponding rate for non-Co-op...
students. This additional fee will recover the academic-related costs of marking work reports and is calculated in accordance with guidelines approved by the Ministry of Colleges and Universities.

Students who have registered for the normally scheduled number of academic terms, but are required to register for additional terms in order to complete their academic degree requirements are exempted from the Co-op and Work Report Marking portion of their fees for such terms. Please contact the Assistant Registrar for your Faculty to request a fee adjustment if this situation applies to you.

Note 4 - Unit Course Fee
The fee assessed at $276.00 for each term course at a weight of 0.5, and at a prorated value for other course weights. Amount charged over a course load of 2.00 is the difference between that value and the maximum – $122.00. The Unit Course Fee for Foreign Students with Student Authorization is shown above.

Note 5 - Student Authorizations
The Ontario Government has established a policy of higher tuition fees for foreign students studying in Ontario on Student Authorizations. The policy came into effect as of January 1, 1977. The higher fees apply to all students beginning a program on or after January 1, 1977, except for those who qualify for exemption under one of the following categories.

1. A citizen of Canada within the meaning of the Citizenship Act or a person registered as an Indian within the meaning of the Indian Act;
2. A Permanent Resident within the meaning of the Immigration Act, 1976;
3. A visitor admitted to and remaining in Canada under clause 10(c) of the Immigration Act, 1976 who has entered Canada or is in Canada to carry out her/his official duties as a diplomatic or consular officer or representative or official properly accredited of a country other than Canada, or of the United Nations or any of its agencies or of any intergovernmental organizations in which Canada participates or as a dependent member of the staff of any such diplomat, consular officer, representative or official; or a member of a foreign military force or of a civilian component thereof admitted to Canada under the Visiting Forces Act, and any dependents of such personnel;
4. A dependent* of a visitor who is admitted to and remaining in Canada under clause 10(c) of the Immigration Act, 1976 for the purpose of engaging in employment;
5. Visitors, and their dependents, who are admitted to, and remain in, Canada (under clause 10(c) of the Immigration Act, 1976), for the purpose of employment. (This exemption is not applicable to visitors who are graduate teaching and research assistants.)
6. A person admitted to and remaining in Canada who is officially recognized by the Employment and Immigration Commission of Canada as a Convention refugee within the meaning of the Immigration Act, 1976;
7. A person admitted to and remaining in Canada under clauses 10(a) and 10(b) of the Immigration Act, 1976 who is sponsored and financially assisted by one of the following: the Canadian International Development Agency, the International Development Research Centre, the World Bank, and any program of financial assistance to students under an aid program of the United Nations or its agencies provided such a program is recognized and directly or indirectly assisted by the Government of Canada;
8. A person admitted to and remaining in Canada under clause 10(a) or 10(b) of the Immigration Act, 1976, who is sponsored by a foundation: which is a recognized international charitable foundation; and which is registered as a charitable organization either in Canada or another industrialized country; and whose particular aid program is international in scope and aimed at low-income developing countries; and which provides full support to the student including travel, living expenses, tuition fees, etc.; and where prior approval of the Minister has been secured;
9. A person admitted to and remaining in Canada under clause 10(a) or 10(b) of the Immigration Act, 1976 who is the holder of an Ontario graduate Scholarship.

* In clause 4, "dependent" means the spouse of that person and any unmarried son or daughter of that person or of the spouse of that person who is in full-time attendance at an Ontario university or related institution.

The foregoing is a condensed version of the “Foreign Student Fee Differentials and Exemptions." For further details, contact the Office of the Registrar.

Note 6 — Health Insurance
Effective September 1, 1978, a revised supplementary Student Health Insurance Plan was put into effect at the request of the student body. Student premiums are shown in the Schedule of Fees. The premium and coverage may be waived if proof of equivalent or better insurance coverage is provided. Exemption is available during first three (3) weeks of term only. Exemption Forms are available in the Cashier’s Office, Needles Hall. Dependent (family) coverage may be obtained on request and by payment of a further $41.26 for a Regular student per term and $77.41 for a Co-operative student at each registration.

This plan does not include the benefits of the Ontario Health Coverage. It is the student's own responsibility to ensure that such personal coverage is obtained. The supplementary student Health Insurance plan allows for a maximum Out of Canada coverage of 120 days only. Additional Out of Canada coverage is available, for an extra fee, at the Cashiers Office in Needles Hall.

Further details are available from Health Services.
Note 7 – Federation Hall
This non-refundable fee being assessed starting Fall term 1984 was approved by student referendum in 1983.

Note 8 – Federation of Students
Payment of the Federation of Students fee is required at registration. This fee became compulsory starting May term 1992.

Note 9 – Society Fees
Payment of the Society Fee is required at registration, but a student who does not wish to participate may obtain a refund by applying to the respective society within three (3) weeks after the start of lectures as indicated on the Academic Calendar.

Note 10 – WPIRG (Waterloo Public Interest Research Group)
A student funded environmental and social research group.

This fee is voluntary, refundable, and not a requirement for registration. Requests for refunds or questions concerning WPIRG should be directed to the on-campus WPIRG office within three (3) weeks after the start of lectures as indicated on the Academic Calendar.

Note 11 – Sandford Fleming Foundation (S.F.F.)
An organization dedicated to the development of co-operative engineering education.

This fee applies to Engineering students only and is voluntary, refundable, and not a requirement for registration. Requests for refunds should be directed to the on-campus Engineering Society office, within three (3) weeks after the start of lectures for the term as indicated on the Academic Calendar.

Note 12 – Radio Waterloo
The on-campus student radio station.

This fee is voluntary, refundable, and not a requirement for registration. Requests for refunds should be directed to the Radio Waterloo office within three (3) weeks after the start of lectures for the term involved as indicated on the Academic Calendar.

Note 13 – Imprint
The student newspaper.

Payment of the Imprint fee is required at registration. Requests for refunds should be directed to the Imprint office within three (3) weeks after the start of lectures for the term involved as indicated on the Academic Calendar.

Note 14 – Faculty of Science Foundation Fee
This fee applies to Science students including Optometry and is voluntary, refundable, and not a requirement for registration. Requests for refunds should be directed to the Faculty of Science Foundation, within three (3) weeks after the start of lectures for the term as indicated on the Academic Calendar.

Note 15 – Voluntary Student Contribution (Accounting, Applied Health Sciences, Engineering, Math, Science)
These voluntary contributions have been established by foundations or associations controlled by students in the programs concerned. Proceeds will be used to update laboratory facilities, teaching equipment, or provide course enrichment not otherwise possible. Further details are available from the relevant organizations. Payment of the contribution is required at registration, but a student who does not wish to participate may obtain a refund by applying to the organizations concerned within three (3) weeks after the start of lectures as indicated on the Academic Calendar.

Note 16 – Student Co-ordinated Plan
This non-refundable fee being assessed starting Spring term 1992 was approved by student referendum in January 1992.

Note 17 – Student Services Fee
This non-refundable Student Services Fee was assessed starting in the Fall Term 1994 to all full-time and part-time students in accordance with the Student Services Fee Protocol signed in March 1994 and approved by the Board of Governors in April 1994.

Note 18 – CanCopy Fee
This non-refundable fee being assessed starting Spring Term 1995 was approved by the Board of Governors in February 1995. This fee is assessed to all full-time and part-time students to recover the student-related share of the CanCopy licence fee. The CanCopy licence provides for indemnity from civil claims related to copyright laws so long as the members covered comply with the provisions of the licence. Details of the CanCopy licence are available in the Libraries, campus copy centres and academic departments.

Note 19 – Other Costs
The fees shown do not include the costs of text books, class notes, Distance Education Program tape or kit deposits, mandatory supplies, certain accommodation or other costs associated with field trips, or other miscellaneous expenses, some of which are noted below:

Miscellaneous Fees (at time of printing)
- Re-examination fee (Engineering only) $50.00
- Returned Cheques – Handling charge (plus late registration penalty as applicable) $15.00
- Duplicate Tax Receipt $ 5.00
- Letter of Verification of Registration Status $ 5.00
- Replacement of lost or stolen student Photo Identification Card (WATCARD) $20.00
- Replacement of lost or stolen Health Insurance Card $ 5.00
- Transcript of Record
  - $5.00 for first copy
  - $3.00 for each additional copy ordered at the same time as the first copy
Letter of Permission $25.00
Request for Copy of Academic Record
(Student Examination Report) $3.00

RESIDENCE
Residence fees are payable by term and are due in full on or before the day of residence registration. Students who have received a Notice of Assistance under any awards program may apply to residence fees only those funds which are received during the term in question.

INCOME TAX RECEIPTS
• Receipts for income tax purposes for fees paid covering the calendar year 1995 will be available by March 1, 1997.
• Receipts to part-time students and Co-operative program students on work term will be mailed to the home address on record.
• Receipts to on-campus students will be available for pick-up at specified location(s) on campus. (Notification of pick-up location(s) will be published in the University of Waterloo Gazette, prior to March 1, 1997.)
Awards and Financial Aid

UW student honoured at the annual Math Awards Banquet.
Awards and Financial Aid

The Student Awards Office is responsible for the administration of all forms of financial assistance for undergraduate students. This includes the Ontario Student Assistance Program (OSAP) and other forms of government aid to students. As well, the Office administers the University's Undergraduate Scholarship and Bursary Program and an Emergency Loan Fund.

Students requiring information and/or applications regarding the awards listed below or any other information regarding financial aid are invited to contact the Student Awards Office, Needles Hall, University of Waterloo.

Unless otherwise stated, no application is required for the awards listed below.

Definitions

The term “Award” is a general designation applied to any scholarship, prize, medal, fellowship or grant of money assigned to a student. Within this designation, awards are further defined as follows:

Scholarship: A monetary award, based solely on outstanding overall academic performance or excellence in a specific subject or group of subjects.

Prizes and Medals: A monetary award of small value or a non-monetary award (e.g., book prize or medal) given in recognition of academic performance or excellence in the area to which the award pertains.

Work-Term Report Award: A monetary award based on writing skills demonstrated in work-term reports.

Bursary: A monetary grant based primarily on financial need.

Provincial and Federal Loan policies, under discussion at the time of printing, indicate that Awards/Bursaries provided to students receiving Provincial and/or Federal Student Loans, could reduce the loan entitlements. Please contact the Student Awards Office.

The awards are organized in the following order: Entrance Awards, Upper-Year Awards, Work-Term Report Awards, Bursaries, University Loan Funds and Government Assistance Programs. Each area is sorted by Faculty and the awards are then listed alphabetically for your convenience.

University of Waterloo Entrance Awards

Provincial and Federal Loan policies, under discussion at the time of printing, indicate that Awards/Bursaries provided to students receiving Provincial and/or Federal Student Loans, could reduce the loan entitlements. Please contact the Student Awards Office.

The University administers a substantial number of entrance awards to entering students. With the exception of special awards for students from the Region of Waterloo secondary schools and the Canadian Merit Scholarship Foundation award series, these awards are presented by the faculty to which the student is seeking admission.

In addition to secondary school achievement, performance on the various UW special competitions are important considerations in administering entrance scholarships in Engineering, Mathematics and Physics as follows:

Mathematics

Students must write the Descartes Mathematics Competition.

Physics

Students must write the Sir Isaac Newton Physics Competition.
Engineering
Students must write the Descartes Mathematics Competition.

Note
An application for admission to the University will suffice as an application for any entrance award for which the student is eligible in most cases.

FACULTY OF APPLIED HEALTH SCIENCES
SCHOLARSHIPS
Awards are available in varying amounts for one year. All students with an Ontario Secondary School average of 80% or better are considered.

FACULTY OF ARTS SCHOLARSHIPS
Arts Faculty Entrance Scholarships
The Faculty of Arts offers several entrance scholarships funded by the Senate Scholarship Fund. These scholarships, valued at $1,000, are awarded on the basis of secondary school performance. Renewal beyond Year One requires that the student maintain an 89% overall average. No application is necessary.

Arts Alumni Entrance Scholarships
A number of scholarships funded by donations made by alumni of the Faculty of Arts are available each year to outstanding students entering the Honours Arts Regular and Applied Studies Co-op programs in the Faculty. These scholarships, currently valued at $3,000 over Years 1 and 2, are awarded on the basis of performance in secondary school. Renewal beyond Year Two requires that the student maintain an 89% overall average. No application is necessary.

Federal-Provincial Conference Simulation Entrance Award
One award, valued at $100, is given annually by the Political Science Department to a student entering the first year of full-time studies at the University of Waterloo and who has been a participant in the annual Federal-Provincial Conference Simulation sponsored by the Department and the History Heads Council of the Waterloo County Board of Education. Interested students should apply to the Department in September.

Catherine E.B. Hanna Accounting Entrance Scholarship
The Catherine E.B. Hanna Accounting Entrance Scholarship, valued at $2,000, is named in recognition of Mrs. Hanna's support of, and interest in, accounting education. The award is made annually to a student entering an Accounting Program within the Faculty of Arts at the first-year level. In addition to overall academic excellence the student will have attained high levels of success in humanities subjects at the high school level.

*Bill Harvie Scholarship/Fellowship
This award, valued at $4,500 over four years, is provided to a student entering Year One of an Arts or Mathematics Accounting program. Selection will be based on academic achievement and leadership qualities. In Years One and Two students will receive scholarship payments of $750. In Years Three and Four students will receive fellowship payments of $1,500 in exchange for teaching/research assistance. Continuance in Years Two, Three and Four will be dependent on the student maintaining a B+ overall average.

Richard L. Knight Entrance Scholarship
A $100 scholarship will be presented to a student entering Year One of an Honours Arts (Regular) program. The scholarship has been established to recognize the contribution of Richard L. Knight to the Faculty of Arts and the University of Waterloo community. The scholarship will be presented in conjunction with the Faculty of Arts Entrance Scholarships.

*RJR MacDonald Accounting Entrance Scholarship
This scholarship, valued at $4,000 over four years, is awarded annually to an outstanding student entering the first year of the Honours Accountancy Studies program in the Faculty of Arts. Continuance of the award beyond Year One is dependent on the student maintaining an 80% overall average in the Honours Accountancy Studies program.

*J. Sayer Minas Entrance Scholarship
The award, valued at $2,000 in the first year and renewable at $1,000 for three years if the student maintains an A average, to a possible total value of $5,000, is given to the most outstanding student entering Year One in the Faculty of Arts.

National Trust Accounting Entrance Scholarship
The National Trust Accounting Entrance Scholarship valued at $1,000 is awarded annually to an outstanding student entering the first year of the Accounting Studies program in the Faculty of Arts.

Robin K. Banks/Pacioli Awards
One award, valued at $1,000, is provided annually to an Arts Accountancy Studies student entering Year One. Selection of the recipient is based on academic merit combined with contributions and involvement in extracurricular activities. Applicants must complete the Faculty of Arts Admission Information Form.

Mary Rosenthal Entrance Scholarship
One scholarship, valued at $400, is presented to a top student from Wellington County entering the Faculty of Arts.
W.J. Schlatter Scholarship
This $500 scholarship is awarded annually to an outstanding high school student entering an Accounting Program in the Faculty of Arts. This scholarship is in honour of Dr. William Schlatter who, during his long career, instilled a search for knowledge and a broad interest in life in students and colleagues, many of whom now teach at Waterloo. The recipient will have demonstrated the breadth of interests beyond accounting that Dr. Schlatter values so highly. The scholarship is awarded on the basis of academic performance and information provided by the applicant on the Arts Admission Information Form.

Muriel Shepherd Scholarship
A $1,000 scholarship will be awarded to an outstanding student entering Year One of the Honours Co-op Applied Studies program. The scholarship has been established to recognize the contribution of Muriel Shepherd to the Faculty of Arts in general and the Applied Studies program in particular.

FACULTY OF ENGINEERING SCHOLARSHIPS
The Faculty of Engineering offers three types of scholarships: (1) a large number of one-term tuition awards; (2) a small number of one-year awards each with a total value from $2,000 to $3,000; (3) one or two awards valued at $3,400 for Year One and renewable for Years Two, Three and Four each having a total value of $5,600. A term average of 80% is required for renewal of entrance scholarships. Scholarships are awarded on the basis of Secondary School average, the results of the Descartes Mathematics Competition, information supplied on the Admission Information Form for Applicants and letters of reference. To be eligible for scholarship consideration, students must write the Descartes Mathematics Competition.

Alfred Armbrust Memorial Scholarship
This scholarship is awarded annually to an outstanding student entering the Faculty of Engineering. It is awarded in conjunction with Engineering Faculty Entrance Scholarships.

Ontario Professional Engineers Foundation Entrance Award
The Ontario Professional Engineers Foundation provides two entrance awards valued at $1,200 each to outstanding students who are entering an accredited Engineering Program at the University of Waterloo. It is intended that one of these awards be made to an eligible female.

*Dr. Sidney Blair Scholarship in Geological Engineering
Dr. Sidney Blair was a prominent Canadian geologist who was awarded an honorary degree from the University of Waterloo. Through a donation from his estate, the University of Waterloo Alumni is offering an entrance scholarship of $1,200 renewable for three years to a total value of $4,800 if the student maintains a term average of 80%. The award is made as funds permit to an outstanding student entering Geological Engineering.

*Colonel Hugh Heasley Engineering Scholarships
A number of scholarships in varying amounts are provided for outstanding students in Engineering from an endowment established by the estate of the late Colonel Heasley. For details see University of Waterloo Engineering Faculty Entrance Scholarships.

Leslie Klein Engineering Entrance Scholarship
One scholarship, valued at $3,000 and funded from an endowment provided by Dr. Leslie Klein, is given to an outstanding student entering Year One in the Faculty of Engineering. For details see the University of Waterloo Engineering Faculty Entrance Scholarships.

Shell Canada Engineering Entrance Scholarship
One award is given to an outstanding student entering Year One in the Faculty of Engineering from an endowment provided by Shell Canada. For details see University of Waterloo Engineering Faculty Entrance Scholarships.

Sullivan Entrance Award
One award of $1,000 is given to an outstanding student entering Engineering, Mathematics or Science from Pauline Johnson Collegiate and Vocational School, Brantford, Ontario. Preference will be given to students entering Engineering.

FACULTY OF ENVIRONMENTAL STUDIES
SCHOLARSHIPS
Awards are available in varying amounts for one year. All students with an Ontario Secondary School average of 80% or better are considered.

Environment and Resource Studies Awards are offered on the basis of comments on the Admission Information Form and academic standing.

Geography Awards are offered on the basis of academic standing only.

Planning Awards are offered on the basis of comments made on the Admission Information Form and academic standing.

Peter H. Nash Environmental Studies Entrance Scholarship
A $400 scholarship was established by the Faculty of Environmental Studies to mark the retirement of Peter H. Nash, the founding Dean of the Faculty and, subsequently, in memory of the late Inez Frost Nash. The scholarship is made in conjunction with the Faculty of Environmental Studies Scholarships to Year-One students enrolled in full-time studies.
FACULTY OF MATHEMATICS SCHOLARSHIPS
Each September, over 140 first-year students enter the Faculty of Mathematics as Descartes Scholars. The Scholarships range in value from $16,000 to $1,000.

National Scholarships
There are four $16,000 and twelve $12,000 René Descartes National Scholarships. These are continuing awards with equal payments spread over eight academic terms. To be considered for the National Scholarships, candidates must apply by March 1. The typical National Scholarship candidate will have distinguished academic standing especially in Mathematics courses as well as a record of accomplishments in Mathematics or Computer Science competitions or contests throughout high school. Candidates will also be expected to demonstrate interest in Mathematics or Computer Science which goes beyond standard course requirements including activities such as active membership in math or computer science clubs, enriched mathematics studies, employment/voluntary experiences or hobbies. Application forms may be obtained from the Student Awards Office.

Friar Luca Pacioli Awards
One award, valued at $1,000, is provided annually to a Mathematics Accountancy Studies student entering Year One. Selection of the recipient is based on academic merit combined with contributions and involvement in extracurricular activities. Applicants must complete the Faculty of Mathematics Personal Information Form.

Sullivan Entrance Award
One award of $1,000 is awarded to an outstanding student entering Engineering, Mathematics or Science from Pauline Johnson Collegiate and Vocational School, Brantford, Ontario. Preference will be given to students entering Engineering.

FACULTY OF SCIENCE SCHOLARSHIPS
Entrance Scholarships are offered to students entering the Faculty of Science. All students with a secondary school average of 85% or better are considered. Scholarships are awarded by individual departments as listed below.

Biology Scholarships
Descartes Entrance Scholarships
There are twelve $8,000, thirty $4,000, and one-hundred $1,000 René Descartes Entrance Scholarships. The $8,000 and $4,000 scholarships are continuing awards with payments distributed over eight academic terms. The $1,000 scholarships are first-year awards. All applicants to the Faculty of Mathematics are considered for the Descartes Entrance Scholarships. No application is required.

High school grades and performance in the Descartes Mathematics Competition are the main factors in awarding scholarships. Participation and achievement in student government, athletics, music, art, etc., are also considered.

Art Headlam Accounting Entrance Scholarship
A scholarship, valued at $1,000, is named in recognition of Art Headlam’s contribution to the administration of the University and support of and interest in accounting and management education. The award is made annually to a student entering the Accounting Program through the Faculty of Mathematics. In addition to overall academic excellence the student will have exhibited leadership qualities.

CheM 13 NEWS Research Assistantships
The Department of Chemistry offers CheM 13 NEWS Research Assistantships to recognize academic excellence in students proceeding to a degree in Chemistry. The awards are made for one year at a time and are valued at $500 for one year. Award holders are required to work with a professor of her/his research group within the Department. Awards to students entering Year One are made on the basis of performance on the CheM 13 NEWS Examination competition held in May.

*Chemistry Scholarships
Several scholarships valued at $2,000 in Year One with an additional $1,000 available in Year Two may be offered providing an overall average of 83% is maintained.

Earth Sciences Scholarships
Scholarships valued at $1,000 may be offered for Year One only.

Honours Science, Honours Science and Business, Honours Environmental Science Scholarships
Several scholarships valued at $1,000 for Year One may be offered.
*Kay and Harry McLeod Chemistry Entrance Scholarship
One scholarship, valued at $1,200 may be offered for Year One in conjunction with the Chemistry Entrance Scholarships.

Optometry
No Entrance Scholarships are offered.

*Physics Scholarships
Scholarships are available in varying amounts up to $3,000 in Year One and a possibility of an additional $7,800 if the student maintains an 80% average or better. These scholarships are initially awarded based on secondary school results and the results of the Sir Isaac Newton Contest.

Sullivan Entrance Award
One award of $1,000 is awarded to an outstanding student entering Engineering, Mathematics or Science from Pauline Johnson Collegiate and Vocational School, Brantford, Ontario. Preference will be given to students entering Engineering.

UNIVERSITY-WIDE SCHOLARSHIPS
Canadian Merit Scholarship Foundation Award Series

*Canadian Merit Scholarship Foundation Award
The Canadian Merit Scholarship Foundation offers several awards each year to outstanding students entering participating universities. The awards are based on academic standing, evidence of moral force of character, capacity to lead and to motivate fellow students, extracurricular attainments, and evidence of a strong commitment to the community, both within and outside the school. Candidates are nominated by participating high schools. Awards are valued at $1,625 per term and are renewable for up to three years.

University of Waterloo – Canadian Merit Scholarship
The University of Waterloo will award national award winners an additional scholarship equivalent to the value of tuition and incidental fees. This scholarship is renewable for up to three years as well.

Wiegand Foundation/Canadian Merit Scholarship Foundation Scholarship
The Wiegand Foundation supports the goals of the Canadian Merit Scholarship Foundation and joins the University of Waterloo in recognizing national winners of the Canadian Merit Scholarship Foundation Award. A national winner of a Canadian Merit Scholarship Foundation Award entering Year One as a full-time student in a degree program at the University of Waterloo will be awarded the Wiegand Foundation/Canadian Merit Scholarship Foundation Scholarship in Year One. This award is equal to tuition and incidental fees. Those who renew the Canadian Merit Scholarship Foundation Award in Years Two, Three and Four will receive the

University of Waterloo – Canadian Merit Scholarship Foundation Scholarship.

Wiegand Foundation Scholarships
A number of scholarships valued at $500 to $1,000 may be awarded to those receiving Honours Citations and Provincial or Regional Canadian Merit Scholarship Foundation Scholarship winners attending the University of Waterloo. Selection of the winners occurs in the Fall term of each year. No application is necessary.

Deer Ridge Entrance Award
One award – established by the Deer Ridge Charitable Foundation to reflect its concern for the youth of the Region of Waterloo – is available each year to a full-time student entering the University from a secondary school in the region. To be eligible, candidates must have lived in the Region of Waterloo for at least 10 years, and demonstrated good academic achievement and financial need; participation in either school or community related extracurricular activities may also be a consideration. Applications are available in the region's high schools and must be submitted to the Student Awards Office, University of Waterloo, by May 15 of each year.

Hong Kong Alumni Association Entrance Awards
Awards of $500 are made available by donations from University of Waterloo alumni living in Hong Kong. Outstanding students of Hong Kong origin entering any full-time program at the University of Waterloo are eligible, provided they are willing to pledge to return to Hong Kong after graduation. Scholarships are not awarded on the basis of academic excellence alone; other factors such as personality, initiative and community involvement will also be considered. Applications must be submitted to the Student Awards Office by the beginning of May.

*University of Waterloo Alumni Scholarships
Entrance scholarships with a maximum value of $4,800 of which $1,200 is allocated in the first year and $1,200 may be allocated in each of three additional years, will be awarded from an endowment fund established by Alumni to outstanding students entering each Faculty. The criteria for awarding and renewing these scholarships will be determined by the awarding Faculty.

Waterloo County

University of Waterloo – Waterloo County Entrance Scholarships
One entrance scholarship per school may be awarded to an outstanding student entering the University from a secondary school in the Region of Waterloo. A small number of two-year special entrance scholarships may also be awarded with eligibility for the second year being dependent on the student maintaining an average of 80%.
*Walter A. Bean Kitchener and Waterloo Community Foundation Scholarship*
A $2,000 award is presented to the University of Waterloo – Waterloo County Special Entrance Scholarship winner who achieves high academic standing combined with outstanding leadership and good citizenship through involvement in extracurricular activities within the school or community. This award honours Walter A. Bean, LL.D, a distinguished friend of the University and business and community leader in Kitchener-Waterloo for several decades.

*John Buchholzer Award*
The John Buchholzer Award is awarded annually in October to a senior Recreation and Leisure Studies student in her/his final year, or a graduand of the Spring Convocation of that year. The award is intended to recognize a student who has faced a major personal challenge, but exhibits the determination to graduate. Some examples include, but are not limited to, the following: physically challenged, mature student, single parent.

*Kaiulani Carr Award*
Ford S. Kumpf Scholarships
The Kaiulani Carr Award is awarded annually to a senior Recreation and Leisure Studies student in recognition of superior contribution, academically, professionally and personally, to the Department, Faculty and student body. Selection is based on academic standing, other evidence of scholarship, involvement in student life, professional involvement and other personal factors.

*Joseph H. Lang Scholarship*
A $4,500 scholarship is awarded to an outstanding student entering Year One; $2,500 is payable in Year One and $2,000 in Year Two provided the student achieves an overall average of 80%. Preference is given to those who are Canadian citizens or Permanent Residents and who attended a secondary school in the Region of Waterloo. The scholarships honour the Lang family which operated one of the largest and most important businesses in the Waterloo region for 130 years.

*Gladys and Norman Raiter Memorial Scholarships*
A number of entrance scholarships are awarded annually to outstanding students entering the University from secondary schools in the Region of Waterloo. The awards are made in conjunction with Waterloo County Entrance Scholarships.

*Mark Forster Memorial Scholarship*
This $500 scholarship was established by friends, relatives and classmates of Mark Cameron Forster, BSc, in recognition of his contributions to the Kinesiology and Athletics programs at the University of Waterloo. The scholarship will be presented annually to a third- or fourth-year Kinesiology student who has achieved a minimum B average, has participated in varsity athletics, has a high level of involvement in the athletics program and has contributed to the Kinesiology program as a Kinesiology Student Association member or through other activities. Applications must be submitted by January 31 each year.

*Andrea Fraser Memorial Scholarship*
This $400 scholarship was established by classmates, relatives and friends in memory of Andrea Louise Fraser, Mr. and Mrs. C.W. Snider Memorial Scholarships
A number of entrance scholarships are awarded to the top eligible female students graduating from secondary schools in the Region of Waterloo. They are awarded in conjunction with Waterloo County Entrance Scholarships.

**University of Waterloo Upper-Year Awards**

Provincial and Federal Loan policies, under discussion at the time of printing, indicate that Awards/Bursaries provided to students receiving Provincial and/or Federal Student Loans, could reduce the loan entitlements. Please contact the Student Awards Office.

**Faculty of Applied Health Sciences Awards**

Faculty of Applied Health Sciences Upper-Year Scholarships
A limited number of upper-year scholarships in varying amounts are made available each year. Scholarships are based on academic achievement in the previous year.

**Robert Haworth Scholarship**
The Grand Valley Conservation Foundation has established the Robert Haworth Scholarship of up to $1,500. This scholarship is open to full-time students who have completed their third year or sixth term of an honours program in a watershed university or college. The program of study must be in resource management related to Park Planning and Management, Recreation, Natural Heritage and Planning, Outdoor Education or similar fields of study. Students must be Canadian citizens or Permanent Residents. Applications are available from the Student Awards Office and must be submitted during the 3B term or the third year of the Regular program by May 31 each year.
Michael Gellner Memorial Scholarship
A $700 award is presented annually to a Health Studies or Kinesiology student entering her/his fourth year. This award is to be given to a deserving student with an excellent academic record, who will complete a degree in either of the above programs. Preference will be given to a student who has demonstrated interest in heart-related research. Applications should be submitted in 3A or the 2nd term of the third-year Regular Program by March 15 each year.

Kate Kenny Memorial Award
This award has been established in loving memory of Kate Kenny. The award is presented annually to a third- or fourth-year full-time Kinesiology student intent on specializing in chiropractic health care. Students who have an interest in chiropractic health care, who have shown a unique desire to help others through participation as a varsity trainer or other related experience, and who have demonstrated leadership as evidenced by involvement in university extracurricular activities and student organizations may apply. A special application, available in the Student Awards Office should be submitted by October 31 of each year.

Warren Lavery Memorial Award
A $500 award has been established in memory of Warren Lavery a first-year Kinesiology student who excelled both academically and extracurricularly. Full-time undergraduate Kinesiology students who have completed first year with a minimum overall average of 83% are invited to apply in second year by October 11 each year. The successful candidate will also have demonstrated a strong interest and/or accomplishment in extracurricular activities with a strong emphasis on athletics and will have demonstrated leadership qualities through involvement in extracurricular activities within the University.

"Lois Matthews Scholarship Program for the Faculty of Applied Health Sciences
Three scholarships, valued at $600, are awarded annually to the full-time student with the highest overall cumulative academic average (minimum 80%) at the completion of Year Two in each of Honours Health Studies, Honours Kinesiology and Honours Recreation and Leisure Studies.

Ron May Memorial Award
A $500 award has been established in memory of Ron May, a member of the first Honours Co-op Recreation Class of 1973. This award is given annually to a third- or fourth-year Honours Recreation and Leisure Studies student who has maintained a minimum B average and who is involved in, or has contributed to, intramural athletics and has demonstrated interest and involvement in community recreation and sport activities. Letters of recommendation and the application should be forwarded to the Student Awards Office by October 11.

Recreationists' Association of West Central Ontario
One award valued at $150 is presented to a second-, third-, or fourth-year Recreation and Leisure Studies student based on exceptional performance on field placement, volunteer work, and involvement in school activities. A minimum overall average of B will also be required. In addition to the cash award, a one-year free membership in RAWCO and a commemorative plaque will also be awarded. Applications must be submitted by January 31 each year.

Sunnyside Home Award for Therapeutic Recreation
One award valued at $500 is offered by the Arts Student Union each year to recognize the most promising Therapeutic Recreationist. Selection is based on overall average (minimum B average required) at the end of Year Three to a student registered in Recreation and Leisure Studies, Therapeutic Recreation Option and proven work/volunteer experience related to Gerontology and/or Therapeutic Recreation.

FACULTY OF ARTS AWARDS

Faculty of Arts Upper-Year Scholarships
One term upper-year scholarships of varying amounts are awarded to full-time and part-time students on the basis of overall average.

Anthropology Silver Medal
A silver medal is awarded annually to a third- or fourth-year Anthropology Major or Honours student who has demonstrated academic excellence. No application is necessary.

Ambassador of Austria Book Prizes
These prizes are awarded annually to outstanding students in German language and literature.

Ambassador of Switzerland Book Prizes
The prizes are awarded annually to an outstanding student in each of the French, German and Italian programs.

Arts Associate Dean’s Undergraduate Prize
This $150 award is presented to the Faculty of Arts student with the highest overall average in courses taken at the University of Waterloo. The recipient must be in good standing, have completed Year Two and be continuing in a full-time undergraduate degree program.

Arts Student Union Award
One $200 award is offered by the Arts Student Union each term to an undergraduate Arts student who has been actively involved in University student affairs and who has a minimum overall average of 70% or better. Applications should be submitted at the beginning of each term.

Robin K. Banks/Pacioli Awards
One award, valued at $1,000, is provided annually to an Arts Accountancy Studies student entering Year Two. The award is based on academic merit combined with contributions and involvement in extracurricular activities.
Applications should be submitted to the Student Awards Office during the 1B term.

Robin K. Banks/Pacioli Fellowships
One fellowship, valued at $1,500, is provided annually to an Arts Accountancy Studies student entering Year Three and Four. The fellowship is based on academic merit combined with contributions and involvement in extracurricular activities. The recipient will be required to provide a maximum of eight hours per week of teaching/research assistance for Faculty for one of their two terms. Selection of the term will be at the discretion of the student. Fellowships will be allocated to faculty members based upon their requests for teaching/research assistance for a specific term. Applications should be submitted to the Student Awards Office during the 2B/3B terms.

Robin K. Banks Scholarship
The Faculty of Arts presents two scholarships valued at $500 to two students entering Year Four who have achieved the highest overall average at the end of Year Three. One scholarship is provided to a full-time student in an Honours Regular or Departmental Co-op program and one scholarship to a student in a Co-op Applied Studies Program. Robin K. Banks served as Dean of the Faculty of Arts from 1979 to 1991. His first concerns were always the quality of education offered to our students and their ability to benefit from it.

Kim Biggar Award
This award is presented to the Faculty of Arts student, entering Year Two of a full-time non-professional program, with the highest overall average in courses taken at the University of Waterloo. The recipient must be in good standing, have completed Year One in Arts at Waterloo and be continuing in Year Two of a full-time undergraduate degree program.

Geoffrey F. Butler Award
The Geoffrey F. Butler Award may be presented annually to a graduating student in the Arts Administration Specialization who has demonstrated exceptional potential in the field of arts administration through his or her four work-term placements in the field. The assessment will be based on both formal and informal feedback from employers as well as consistency of work-term reports. The $500 cash award will be made by the Arts Administration Scholarship Committee. No application is necessary.

Certified General Accountants Association of Ontario Award for Excellence
An annual award of $1,550 composed of a cash award of $150 plus a credit of $1,400 to be drawn down as and when the successful candidate wishes, for the purpose of defraying any fees related to courses in the CGA study program, is made to an outstanding graduating student who has displayed achievement in Accounting. No application is necessary.

Awards and Financial Aid
University of Waterloo Upper-Year Awards

*Chalmers Awards for Bicultural Development
Awards valued at $2,000 are awarded to University of Waterloo Arts Administration students to encourage attendance at a post-secondary Francophone institution in Quebec for one full-time term on a Letter of Permission. To be eligible, students must have completed a minimum of one year of university-level French or equivalent and be in good academic standing following their 2B term. Candidates will be judged on their academic standing, their commitment to the Arts Administration profession and their potential in the field. Awards will be made upon confirmed registration at the Quebec institution. Interested students should apply to the Director of the Arts Administration Specialization.

*Chalmers Scholarships for Outstanding Academic Achievement
A limited number of scholarships valued at $1,000 per term are available to Arts Administration students who have completed 2B and have met the Dean of Arts Honours List requirements. Final selection will be based on the candidates commitment to the Arts Administration profession and their potential in the field. The scholarships are awarded by the Arts Administration Scholarship Committee and may be renewed each term providing the student continues to meet the criteria. No application is necessary.

Classical Studies Book Prize
A book prize is awarded annually to the graduating Classical Studies student displaying the greatest academic achievement.

Classical Studies Distance Education Prize
A prize of $100 is awarded annually to an outstanding Distance Education student who is majoring in Classical Studies.

Classical Studies Essay Prize
The Classical Studies Essay Prize of $100 is awarded every September to the student who, in the opinion of faculty, has submitted the best essay in any course offered by the Department in the previous year.

Classical Studies Prize in Greek
A prize of $100 is awarded annually to the student who attains the highest mark in GRK 100B. To qualify for the prize the student must enrol in a further Greek course at the 200-level.

*Classical Studies Scholarship For New Majors
A scholarship of $500 is awarded annually to a new major in any on-campus program in the Department of Classical Studies. In addition, there is a $100 scholarship given to a distance education student of similar excellence.

*Classical Studies Senior Scholarship
An award of up to $600 is provided annually to an outstanding upper-year student registered in a Major or Honours program in the Department of Classical Studies.
Classics Companion Prize
A prize of $100 is presented annually to the student or students who have done most for other classics students as well as for themselves to enhance their formal learning experience.

Auggie Corvino Memorial Award
In memory of the late artist Auggie Corvino, his friends have established a $200 award to be presented annually to a distinguished second-year student of the Fine Arts Program, Studio Option.

Currie Scholarship
One $200 award is given annually to the upper-year Psychology student in the Faculty of Arts with the highest overall average.

*Diners Club/enRoute Business Scholarship
One scholarship, valued at $1,000, is presented annually to a full-time student entering fourth-year of an accounting program in either the Faculty of Arts or the Faculty of Mathematics. This scholarship, sponsored by Diners Club/enRoute Card, was created to recognize scholastic achievement in accounting programs.

Dixon Scholarships in International Trade
Established by the Ross and Doris Dixon Charitable Foundation to recognize academic excellence among students pursuing the Specialization in International Trade. A number of scholarships are awarded annually to outstanding students enrolled in any year of an Applied Studies Co-op Program with the International Trade Specialization.

*Drama and Speech Communication Senior Scholarship
An award of up to $500 is provided annually to an outstanding upper-year student registered in a Major or Honours program in the Department of Drama and Speech Communication.

*J.W. Dyck Honours Scholarship
An annual award of approximately $1,000 is provided to a student entering the second year of a German and/or Russian program. Interested students should apply to the Department of Germanic and Slavic Languages and Literature during the Winter term of their first year.

Federation of Chinese Canadian Professionals (Ontario) Education Foundation Scholarship
Two annual awards of $250 each are awarded, one to the student achieving the highest mark in ACC 442 (Accounting Information Systems 2) and one to the student achieving the highest mark in CS 486 (Introduction to Artificial Intelligence).

*Financial Executives Institute Prize
An award valued at $500 has been established by the Hamilton Chapter of the Financial Executive Institute. The award is presented annually to the student in any Honours Accounting program in Arts or Mathematics who has displayed outstanding achievement in finance.

Fine Arts Art History Scholarship
One award is presented annually to a deserving Fine Arts major who has completed, with distinction, three years of Art History studies and elects to continue in the fourth year of the Honours Arts History Program.

Jacqueline Forster Prize in French Language
A prize of $100 is awarded annually in honour of her FR 155/156 students by Jacqueline Forster, French language instructor at UW from 1976 to 1989 and recipient of the Distinguished Teacher Award in 1989. This prize is awarded to the most promising on-campus student in FR 192A who intends to specialize in French.

Department of French Prize
A prize of $200 is awarded annually by the Department of French to the fourth-year French major who attains the highest overall average in French.

*Robert E. Gobeil Auditing Scholarship
The Robert E. Gobeil Auditing Scholarship valued at $500, has been established by Alcan and many friends of Mr. Gobeil. Mr. Gobeil was a founding member of the University's Accounting Advisory Council. The scholarship is awarded annually to the third-year Accountancy Studies student who has achieved excellence in ACC 128 and ACC 228 and who does not hold another major University of Waterloo award.

*Lynn Holmes Memorial Award
An award of $500 is presented annually to a Fine Arts student who has completed, with distinction, three years of studio work and elects to continue in the fourth year of the Honours Program.

Jeanne La France Scholarship
The Jeanne La France Scholarship, valued at $200, is awarded in honour of Professor Jeanne La France who taught French-Canadian literature at Waterloo from 1966 to 1979. Eligible for the award are students entering their fourth year of a degree with French as a single or joint specialization and who qualify for a Faculty of Arts Upper-Year Scholarship for that year.

Donald C. MacKenzie Prize in Latin
This Latin prize of $100 is awarded annually to the student who attains the highest mark in LAT 100B, 203 or 204. To qualify for a prize the student must enrol in a further Latin course at the 200- or 300-level.

Manulife Financial Community and World Service Scholarships
Co-op students in the Faculty of Arts who complete a work-term in the service of others locally, nationally or abroad with little or no remuneration are eligible to apply for these awards, valued up to approximately $1,500. Information and applications are available through the Office of the Associate Dean of Arts, Special Programs.
McDonald's Second-Year Fine Arts Scholarship
McDonald's Restaurants of Canada has made available
a scholarship with a value of approximately $200 to be
awarded to a full-time Fine Arts major on the basis of
performance in first-year courses and presentation of a
portfolio.

J.C. McKeegney Memorial Award
Two awards may be presented annually to upper-year stu-
dents in the Faculty of Arts who have shown outstanding
academic performance and/or extracurricular interests in
the Hispanic Area: one in Peninsular Spanish Studies and
one in Spanish American Studies. Applications should be
submitted by February 28 each year.

Nancy-Lou Patterson Award for Works on Paper
In honour of Professor Nancy-Lou Patterson, the founder
of the University of Waterloo Department of Fine Arts, an
award of $200 plus materials is presented annually for
outstanding achievement in works on paper.
The award is open to all upper-year Fine Arts majors,
studio option. These works on paper will be judged by the
faculty near the end of the academic year. Information
about application procedures will be posted in the
department closer to the deadline.

Political Science Student Excellence Award
A $200 award, sponsored by the Political Science Student
Association and the Political Science Department, is available annually. The award is made to a student who has
demonstrated outstanding contributions to student life at
the University, as well as good academic performance.

Political Science Prizes
There are annual prizes of $100 awarded by the Political
Science Department to the third- and fourth-year majors
with the highest cumulative averages in their Political
Science courses taken in the previous years. There is a
$150 prize for the graduate with the highest Political
Science average in his or her fourth year.

Princess Cinema Award
The Princess Cinema Award will be presented annually to
the "best all-round" Film Studies major in his/her second
year of study. Selection will be based on general average,
major average, Film Society participation, professors' recom-
mendation, and the student's election to continue with
the UW Film Studies program. A "Film Card", valued at
$250, will be presented at the Fine Arts Awards ceremony
held at the end of Winter term.

Nicole Rolland Prize
An annual prize of $200 is presented in honour of the late
Nicole Rolland, a member of the French Department from
1974-1988. The prize will be presented to a senior single
or joint honours student in French. The prize is presented
on the basis of academic achievement and contribution to
"la presence francophone" on campus.

Spanish Book Prizes
In conjunction with the Spanish Embassy, four books will
be awarded annually to the most deserving students in
Beginning, Intermediate, Honours and Distance Education
Spanish.

*Stern Cohen Accountancy Studies Scholarship
Established by Stern Cohen, Chartered Accountants, in
recognition of their 30th Anniversary, one scholarship val-
ued at $500 is presented to an outstanding Accountancy
Studies student. The scholarship is based on performance
in ACC 128 and an overall average of 75% or better.

University of Waterloo Community and World Service
Scholarships
Co-op students in the Faculty of Arts who complete a
work-term in the service of others locally, nationally or
abroad with little or no remuneration are eligible to apply
for these awards, valued up to approximately $1,500.
Information and applications are available through the
Office of the Associate Dean of Arts, Special Programs.

R.H. Waiters Award
The award will be made on the basis of scholarly
accomplishment to outstanding students in the Honours
Psychology program and/or graduate students in
Psychology. Selection will be made by the Chair of the
department in consultation with the Graduate and
Undergraduate Chairs.

*Waterloo-Wellington Chartered Accountants
Association Scholarship
One scholarship, valued at $500, is presented annually to
a full-time undergraduate student entering Year Three in
either Honours Arts or Honours Mathematics, Chartered
Accountancy Studies. The scholarship selection is based
upon grades achieved up to the point of entry to Year
Three. No application is necessary.

Sally Weaver Award
A $500 award has been established, commemorating the
accomplishments of Professor Sally Weaver. The award
will be presented to a part- or full-time Honours
Anthropology student who is invited to apply by the depart-
ment as a result of high academic achievement and who
exemplifies the interests and concerns of Sally Weaver.
During her twenty-seven years as a member of the
Department of Anthropology at the University of Waterloo,
Sally Weaver achieved international recognition as a
scholar in applied anthropology. She has a lifetime com-
mitment to excellence in research and teaching and an
abiding determination to use her knowledge to promote
justice and recognition for native peoples. Candidates will
be asked to write a statement outlining their commitment
to Anthropology and further studies or plans related to this
field.
Michael Wright Memorial Scholarship
Three hundred dollars is awarded to an outstanding student in a course in Political Science. Established in 1975 in memory of Michael Wright by his mother and sister.

FACULTY OF ENGINEERING AWARDS

Faculty of Engineering Upper-Year Scholarships
Awards valued at $400 are presented to the top student in each class based on performance in terms 1B to 4A.

*Andersen Consulting Scholarship
One award valued at $1,000 is given to a student entering fourth year in the Faculty of Engineering. Selection of the recipient will be based on academic achievement, active participation/leadership in extracurricular activities, ability to communicate and career objectives of implementing change through Application Systems Development and/or Manufacturing Process Improvement. Relevant work-term experience will also be considered. Applications should be submitted to the Student Awards Office during the 38th term.

Albert Sherwood Barber Medal
A medal is awarded annually to the student graduating with the most outstanding performance in the Co-operative education aspects of the undergraduate Engineering program. The award was established in recognition of the contribution made to the University of Waterloo by Dr. A.S. Barber, the University’s first Director of the Department of Co-ordination and Placement, now the Department of Co-operative Education and Career Services.

Beynon Memorial Humanitarian Award
This $400 award is given in each of the Fall and Winter terms to an undergraduate Engineering student or students taking an STV course. Eligible students can be in any year of study, but must be completing a full-time academic term. The award recognizes humanitarian and ethical values in engineering and outstanding contribution to the course, goals and aims of the Centre for Society, Technology and Values. The recipient or recipients will be chosen by the Centre based on nominations from the course professor and teaching assistants.

*J.P. Bickell Foundation, Trustees, National Trust Scholarships
The Trustees of the J.P. Bickell Foundation provide a number of J.P. Bickell Foundation scholarships to be awarded to qualified students in the Chemical Engineering Department and the Earth Sciences Department in any of the second, third or fourth years of the program. To be eligible for one of these scholarships a student must obtain a minimum average of 75% in the previous term’s or year’s examinations.

Canadian Hospital Engineering Society’s Combined National and Ontario Scholarship
Two awards of $500 each are given to students entering fourth-year Engineering who have an interest in the health care field, have achieved a high level of academic excellence, exhibited leadership qualities and demonstrated an interest in extracurricular activities. Applications should be submitted during the 38th term.

*Canadian Posture and Seating Centre Scholarship
Two scholarships valued at approximately $2,500 have been established to recognize and encourage student interest and attainment of a high level of academic and practical achievement in preparation for development and delivery of systems, methodology or assistive devices in aid of full participation in Canadian Society by physically disadvantaged persons. The scholarships will be awarded to outstanding students who demonstrate an interest and ability in engineering and business directed toward delivery of such services. Interested candidates should apply by October 14th each year.

Canadian Society for Chemical Engineering Prize
One award, to a Chemical Engineering student, is made annually by the society. The award valued at $50, an engraved medal and a Certificate of Merit, is given to the student with the highest standing in the penultimate year of her/his course.

Canadian Society for Civil Engineering Awards in Building Science
Proceeds from the bi-annual conference on Building Science and Technology are used to provide $3,000 for scholarships to be awarded to Civil Engineering, Mechanical Engineering, or Architecture students at either the undergraduate (3B, 4A or 4B) or graduate level. For consideration, candidates should be academically above average and have an interest in Building Science and Building Technology. Interested students should contact Dr. Eric Burnett in Civil Engineering.

Canadian Society for Mechanical Engineering Gold Medal
The Canadian Society for Mechanical Engineering provides a gold medal and certificate to be presented to a graduating student in recognition of outstanding academic achievement in Mechanical Engineering.

Keith Carr Memorial Award
An annual award valued at $600 is presented to a student in third- or fourth-year Chemical Engineering who has an excellent academic record and has demonstrated strong leadership abilities both at the University and in the outside community. Students should apply in Winter or Spring term each year.

Morgan Champness Memorial Award
Two awards of $100 each are given to fourth-year Mechanical Engineering students who demonstrate outstanding leadership in extracurricular activities and also have the ability to effectively communicate engineering concepts to their classmates and professors.
*Dr. John H. Chapman Memorial Prize in Communications Engineering*
A prize of $1,500 has been donated by Spar Aerospace Limited, Toronto, in memory of the late Dr. John H. Chapman whose work and contributions in satellite communications resulted in his becoming known as "the father of the Canadian space program". The prize is awarded to the third-year student with the highest academic standing in the Electrical Engineering, Communications Option.

**Consulting Engineers of Ontario (CEO) Scholarship**
The Consulting Engineers of Ontario (CEO) has made available a $500 award to each of the 13 Engineering schools in Ontario. The selection will be based on academic achievement (75%+) and on extracurricular activities on campus or in civic organizations. Interested students in any Engineering program should submit an application during their 3A term.

*John Deere Limited Scholarship*
An award valued at $1,500 is available to an outstanding student entering fourth-year Mechanical Engineering who has an interest in manufacturing and/or product design. Applications should be submitted during the 3B term.

**Delcan Scholarship in memory of Charles E. DeLeuw**
The DeLeuw Cather and Company of Canada Limited, in memory of the company's founder, is making an annual award available to a fourth-year Civil Engineering student with the transportation option. The award is in the amount of $500 and will be given to the student showing high academic achievement, good character and financial need. Applications should be submitted during the fourth year.

**Dow Canada Scholarship**
Two scholarships, valued at $500 each, are presented: one to a third-year Co-op Chemistry student and one to a third-year Chemical Engineering student, who have attained good academic standing and demonstrated leadership abilities through either on campus or community related extracurricular activities and who have effective written communication ability. Applications should be submitted during the 3A term.

**George Dufault Medal for Excellence in Communication**
The George Dufault Medal is awarded annually to the graduating student in the 4B term in Engineering who has demonstrated excellence in communication ability through the submission of outstanding work-term reports and the oral presentation of one of these reports in a competition held during the last (4B) term of the academic program. The award was established by the family of the late George Dufault in recognition of his contribution to the University as its first Coordinator and first Head of the Department of Co-ordination, now the Department of Co-operative Education and Career Services and later as a Lecturer in Physics and a Professor of Electrical Engineering.

**Randy Duxbury Memorial Award**
Two $800 awards are presented to students entering fourth-year Chemical Engineering who have a good academic record, have demonstrated a strong interest in extracurricular activities and athletics and have evidence of leadership qualities. Applications should be submitted during the 3B term.

**English Language Proficiency Prize**
Prizes of $100 each may be awarded to students from Engineering who achieve the highest scores on the English Language Proficiency test.

**First Year Engineering Prizes**
Prizes of $100 are awarded annually to the top female student in each stream at the end of first-year Engineering who is continuing in the Engineering Program.

**John Fisher Award For Leadership**
The Sandford Fleming Foundation has established the John Fisher Award for Leadership in recognition of the outstanding contributions made towards the work of the Foundation by its former Chair, Dr. John Fisher. The award, consisting of a citation and a honorarium of $1,000, is made from time to time to a graduating Engineering student who has made significant contributions to Co-operative Engineering education. Nominations, which can originate from student groups or faculty members, should be directed to the Waterloo Chapter Awards Committee Chair of the Sandford Fleming Foundation.

**Sandford Fleming Debate Awards**
The Sandford Fleming Foundation has established the Sandford Fleming Debates Awards in order to encourage the art of debate among Engineering undergraduates. The Debates are held each term and awards of $100 each are made to members of the winning team and of $50 each to members of the runner-up team.

**Sandford Fleming Medal for Academic Excellence**
The Sandford Fleming Foundation has established six medals for graduating students, one in each of the following Engineering programs: Chemical, Civil, Electrical, Mechanical, Systems Design and Management Sciences. In each Department, the award is made to the student with the best academic record in the last six academic terms of the undergraduate program.

**Sandford Fleming Medal for Co-operative Proficiency**
The Sandford Fleming Foundation has established medals for graduating students, one in each of the following Engineering programs: Chemical, Civil, Electrical, Mechanical and Systems Design. In each Department, the award is made for outstanding overall performance in both the work-term experience and the academic program of Co-operative Engineering education. The nominees are selected by the Department of Co-operative Education and Career Services.
*Fluor Daniel Canada Inc. Scholarship*
Two scholarships, valued at $2,000 each, are presented to two third-year students in Chemical, Civil, Electrical or Mechanical Engineering. Students who obtain a minimum average of 75% or better at the end of Year Two will automatically be considered for the scholarship. One award will be presented to a female and one to a male student in the third year of their Engineering program. Candidates may not hold another major University of Waterloo award in Year Three. No application is necessary.

The Sir Casimir Stanislaus Gzowski Medal for Excellence in Communication
The Sir Casimir Stanislaus Gzowski Medal is awarded to graduating students in the 4B term in Civil Engineering who have demonstrated excellence in communication ability through the submission of outstanding work reports during their undergraduate careers at the University of Waterloo and through the oral presentation of one of these reports in a competition during the last (4B) term of the academic program.

*S.C. Johnson & Son, Ltd. Environmental Scholarship*
This $1,500 scholarship has been jointly established by S.C. Johnson & Son, Ltd., and The Grand Valley Conservation Foundation in recognition of the Company's ongoing commitment to helping protect the environment. The scholarship is open to full-time students who have completed their third year or sixth term of an Honours program related to the environmental sciences with emphasis on Chemistry and/or Chemical Engineering. Applicants must be Canadian citizens or permanent residents. Application forms are available in the Student Awards Office and must be submitted during the 3B term or the third year of the Regular program prior to May 31 each year.

W.W. King Exchange Fellowship
Undergraduate Engineering students who participate in one of the active exchange programs between the University of Waterloo and overseas engineering schools are eligible for financial assistance through the W.W. King Exchange Fellowship. Recipients must be on the Dean's Honours list prior to the exchange and before receiving the fellowship. The maximum amount per student is $500.

Karen Mark Scholarship
The $800 scholarship was established in 1989 by family and friends in memory of the late Karen Mark, a third-year Chemical Engineering student. The scholarship is awarded annually to a third-year Engineering undergraduate female student based on excellent academic achievement and demonstrated involvement and contributions to student life at Waterloo. No application is necessary.

Microsoft Technical Scholarship
Three awards, valued at $1,500 each, are awarded annually to full-time, undergraduate students in each of Years Two, Three and Four in Computer Science or Electrical and Computer Engineering. These awards are designed to recognize students' contribution and enthusiasm for the software industry. Selection will be made by the Computer Science Department. No application is necessary.

National Research Council Training Program for Women in Science
The three year training program is for women undergraduate students in Engineering, Mathematics and Science, completing the first year of their program (to be accepted in the training program in their second year), who are high academic achievers and willing to work for the National Research Council (or an NRC partner) in either the summer or during their co-op program. Applications and information are available from the University of Waterloo Graduate Office. U.G.O. Deadline: February 22 (approx.)

*Ontario Hydro Engineering Award*
Ontario Hydro provides one award valued at $2,400 to undergraduate students entering Year Two of Chemical, Electrical, Environmental or Mechanical Engineering. In support of employment equity, eligible candidates will be women, aboriginal(native) Canadians, persons with disabilities or visible minorities. Students will have demonstrated strong communication skills, leadership skills, involvement in extracurricular activities and will have maintained a minimum B average in 1A and 1B. The successful candidate must be legally eligible to work in Canada upon graduation. A University of Waterloo General Application for Award plus a complete resume is required by July 31.

Ontario Professional Engineers Foundation Medal for Academic Achievement Award
The Ontario Professional Engineers Foundation makes this award to the student in the fourth year of an accredited Engineering program who, having received honours, has obtained the highest standing in the final examinations of the current academic year.

Ontario Professional Engineers Foundation Undergraduate Scholarship
The Ontario Professional Engineers Foundation offers eight annual scholarships of $600 each to undergraduate students in an accredited Engineering program. Four of the scholarships will be awarded to students based on the results of the examinations in each year and do not require an application. The remaining four scholarships will be awarded to students who have exhibited exceptional role model qualities through participation in non-academic activities while maintaining above average marks. Applications should be submitted during the 1B, 2B, 3B and 4B terms.

Ontario Rubber Group/Rubber Chemistry Division, CSC Award
The Ontario Rubber Group and the Rubber Chemistry Division of the Canadian Society for Chemistry have made available a $750 award. The recipient must be in either Engineering or Science, have demonstrated interest in the rubber industry and have high academic standing. Consideration will also be given to experience gained in
work terms in a rubber-related field. Applications should be submitted during the 3B term.

*Marcel Pequegnat Scholarship
A $1,200 scholarship may be awarded to a full-time student who has completed the third year of study in resource management or a related field and who intends to continue in this program. Foundation applications are available in the Student Awards Office and must be submitted during the 3B term or the third year of the Regular program by May 31 each year.

Professor T. Prasad Award
The Professor T. Prasad Award, valued at $500, is presented annually to an outstanding Faculty of Engineering undergraduate who has exemplified a new direction in her/his academic efforts by demonstrating an increase in term average from 2B to 3A.

*Safety-Kleen Canada Inc./Oil Recovery Division Scholarship
Three scholarships, valued at $1,500 each, are awarded to outstanding Co-operative students entering Year Three and enrolled in Computer Science, Chemical Engineering or an Environmental Engineering Option in other Engineering Programs. No application is necessary.

Society of Chemical Industry Awards
An engraved plaque is awarded by the Society to the student with the highest standing in the final year of Biochemistry, Chemistry and Chemical Engineering.

*Sony Science Scholarship Fund
Established by Sony of Canada Ltd. to celebrate the 35th Anniversary of the arrival of the first Sony product in Canada and to show appreciation to Canadian people for their support, three scholarships, valued at $1,000 each, will be presented to an outstanding full-time undergraduate student entering fourth-year in each of Engineering, Mathematics and Science.

Student Industry Field Trip Award/CSPG
The Canadian Society of Petroleum Geologists makes available one award consisting of a certificate and a one-year membership in the Society. The award is presented to a student in either Earth Sciences or Geological Engineering who has demonstrated competence in petroleum geology or the related fields of stratigraphy, sedimentology, paleontology or structural geology.

Undergraduate Research Assistantships
These awards are valued at $600 per term and provide an opportunity for undergraduates to participate in original Engineering research. The awards are available to first class honours students in the 2A-4B terms. To be eligible, a student must apply at the beginning of the term and show an interest in a particular field. The Assistantship is made available through the professor pursuing research in that area.

Jack Wiseman Award
One award of $250 is presented annually to an outstanding third- or fourth-year Civil Engineering student who demonstrates a commitment to Construction or Project Management through course work, project work or work term job experience. Interested candidates registered in 3B or 4A in the Fall term should apply by September 30. Those registered in 3A or 3B in the Winter term should apply by January 31.

FACULTY OF ENVIRONMENTAL STUDIES AWARDS
Faculty of Environmental Studies Upper-Year Scholarships
A limited number of upper-year scholarships will be made available to students enrolled in the Faculty of Environmental Studies. The amounts of each award will vary and in general the scholarships are awarded on the basis of academic achievement in prior years.

American Institute of Architects Certificate
This certificate is presented to the graduating student in Architecture with the second highest overall academic standing from first- to fifth-year.

American Institute of Architects Medal
This medal is presented to the graduating student in Architecture with the highest overall academic standing from first- to fifth-year.

Architecture Fourth Year Entry Prize
This $500 award is given to the student returning to fourth-year Architecture with the best overall achievement in design in the Bachelor of Environmental Studies program.

Jo Beglo Book Prize
An annual award is presented for outstanding work in a designated project in the 2B cultural history course of the Architecture program.

Canadian Association of Geographers Prize
A prize is awarded annually for academic proficiency to a graduating student in a four-year Geography program.

Canadian Society for Civil Engineering Awards in Building Science
Proceeds from the bi-annual conference on Building Science and Technology are used to provide $3,000 for scholarships to be awarded to Civil Engineering, Mechanical Engineering, or Architecture students at either the undergraduate(3B, 4A or 4B) or graduate level. For consideration, candidates should be academically above average and have an interest in Building Science and Building Technology. Interested students should contact Dr. Eric Burnett in Civil Engineering.
Credit Valley Conservation Authority Foundation Scholarship

The Credit Valley Conservation Foundation offers one scholarship valued at $500 annually to an undergraduate student registered in either Geography or Urban and Regional Planning who attains the highest academic standing. Successful candidates' permanent address must be within a member municipality of the Credit Valley Conservation Authority. No application is necessary.

Energy + Design Award

Fibreglass Canada and Professor Joe Somfay of the School of Architecture have made available an annual award valued at $200. The award is presented to an Architecture student who submits the best energy-related design.

Environment and Resource Studies Scholarships

Interested students in their second, third or fourth year should submit a letter of application outlining the nature and significance of their recent or current activities on environmental issues, along with a copy of their most recent mark report to the Undergraduate Scholarship Committee no later than January 15th each year.

John Geddes Memorial Award

Three awards, valued at $150 each, may be awarded to full-time undergraduates in each of the departments of Environment and Resource Studies, Geography and Urban and Regional Planning. Selection criteria is based on marks received in Env S 178 and Env S 200 and on the individual's exceptional contribution to their community including involvement in both University and non-University groups or committees. Work-term performance may be considered in addition to community activities but will not be the sole basis of determination. Application deadline is October 31 each year.

Kaderall Prize for Excellence

A prize fund of $500 is awarded for design excellence to students in the final year of the Architecture Program.

Lieutenant Governor's Medal for Architecture

The medal is awarded to a graduating student for outstanding thesis work, high academic record and significant contribution to the life of the School.

John McKay Memorial Award

This award has been established in memory of a student who died in an airplane accident while on a work-term in Northwestern Ontario. Interest from an endowment is awarded annually to a Co-op Geography student who is completing the 4B term. Candidates are selected on the basis of good academic standing, work-term performance, and broad involvement in the Co-op Program and class activities.

*Mediacom Inc. Scholarship

In recognition of the multi-faceted nature of the planning discipline, Mediacom offers an annual scholarship of

Awards and Financial Aid

University of Waterloo Upper-Year Awards

$1,000. The scholarship is presented to a third- or fourth-year student in the School of Urban and Regional Planning based on an interest in planning and academic standing.

Herb Nemeth Scholarship

A $200 scholarship is presented to a student entering third- or fourth-year who has achieved the highest marks in three regional geography courses and who has an average of over 75% in all Geography courses.

Ontario Association of Architects Guild Medal

A medal is presented to a graduating student (BArch) for excellence in architectural design.

Ontario Association of Architects Second Year Award

An award of $1,200 is given in recognition of outstanding overall academic achievement in the second year of the Architecture program.

Ontario Association of Architects Third Year Award

An award of $1,200 is given in recognition of outstanding overall academic achievement in the third year of the Architecture program.

*Marcel Pequegnat Scholarship

A $1,200 scholarship may be awarded to a full-time student who has completed the third year of study in resource management or a related field and who intends to continue in this program. Foundation applications are available in the Student Awards Office and must be submitted during the 3B term or the third year of the Regular program by May 31 each year.

Pollution Probe at Brantford Award

The award is made annually to a deserving student from Brant County who has an excellent academic record in a program in Environmental Studies, preferably entering second-year.

Richard B. Rodger Memorial Prize

This book prize was established with funds contributed by relatives and friends in memory of the late Richard B. Rodger, BES '71 (Geography). The book is presented each year, on the basis of marks, to a Geography student completing the third year of study.

Royal Architectural Institute of Canada Medal

The medal is presented to a graduating student on the basis of high proficiency in the BArch Program.

Lorne H. Russwurm Memorial Scholarship

An annual scholarship valued at $600 has been established in memory of Lorne Russwurm, an internationally known researcher and a Professor of Geography from 1967 until his death in January 1987. Professor Russwurm was highly regarded by students for his excellence as a teacher and advisor. The recipient will normally be an undergraduate Geography student entering second-, third- or fourth-year who began studies as a mature student. No application is necessary.
Marj Schaefer Award
An award of $200 is given to an Architecture student in good academic standing who has made a notable contribution to the school community.

Ron Sims Purchase Prize
A $500 award, for outstanding presentation work in thesis, is presented to a fifth-year Architecture student. The work is retained by the School for permanent display in the Architecture building.

Smale Fellowship
An award of $600 is given to a student in the fourth year of the Architecture program with high academic and design achievement, who shows leadership ability and the potential to play a notable role in the profession.

Sweets Catalogue Prizes
An award of $500 is made available annually by McGraw-Hill for outstanding design work in the third year of the Architecture program. An award of $1,000 is made available annually by McGraw-Hill for outstanding design work in the fifth year of the Architecture Program.

Alan Weeks Memorial Award
Established in memory of Alan Weeks, an award is presented annually to a full-time student enrolled in Year Three of Honours Urban and Regional Planning based on academic achievement. Students who demonstrate the greatest degree of personal growth in the conceptual and innovative aspects of design during their second year (PLAN 210, Principals of Environmental Design) will be considered. No application is necessary.

Yolles Partnership (3rd year) Technology Prize
A prize, valued at $500, will be provided to a third-year Architecture student. The prize is made to a student who has achieved the highest overall standing in Technology courses taken from Year One to Year Two. The award will be made in April each year.

Yolles Partnership (5th year) Technology Prize
A prize, valued at $500, will be provided to a fifth-year Architecture student. The prize is made to a student who has achieved the highest overall standing in Technology courses throughout the course of the Architecture program. The award will be made in April each year.

INDEPENDENT STUDIES AWARDS
A limited number of upper-year scholarships in varying amounts are made available each year.

FACULTY OF MATHEMATICS AWARDS

*Andersen Consulting Scholarship
One award, valued at $1,000, is given to a student entering fourth-year of a Co-operative Mathematics Program. Selection of the recipient will be based on academic achievement, active participation/leadership in extracurricular activities, ability to communicate and career objectives of implementing change through Application Systems Development and/or Manufacturing Process Improvement. Relevant work-term experience will also be considered. Applications should be submitted to the Student Awards Office during the 3B term.

Ailey Bailin Memorial Award in Actuarial Science
This award, in memory of the late Ailey Bailin, is presented to a student with the highest cumulative overall average who is entering the fourth year of the Honours Actuarial Science Program.

George Barnard Statistics Prize
This prize is awarded, once each year, to a student completing third-year studies, and who has taken STAT 331, STAT 333, and at least one other third- or fourth-year Statistics course. It goes to the student deemed by the Statistics and Actuarial Science Department to have obtained the best results in these courses. The prize consists of one or more books in probability and statistics.

Bell Sygma Computer Science Award
Bell Sygma provides a $1,500 award to a full-time undergraduate Computer Science student entering Year Four. The successful candidate will have maintained good academic standing (minimum 70%) and will have demonstrated leadership abilities through either on-campus or community related extra-curricular activities. Recipients may not simultaneously hold any other major UW award. Applications must be submitted during 4A or the first half of the fourth year, not later than October 30 of each year. The successful candidate may be offered summer or work term employment with Bell Sygma.

Combinatorics and Optimization Book Prize
A book prize is awarded to an outstanding student of Combinatorics and Optimization.

E.T. Davies Memorial Prizes
In memory of the late Professor E.T. Davies, his colleagues in the Applied Mathematics Department offer annually two prizes of approximately $150 each. One prize is for a first-year student, enrolled in Applied Mathematics. The other prize is for the third-year Applied Mathematics student who ranks first on the final examinations.

René Descartes Scholarships, Fellowships and Bursaries
Upper-year prizes and fellowships in varying amounts are awarded to students in the Faculty of Mathematics based on outstanding performance in the previous year.
Awards and Financial Aid
University of Waterloo Upper-Year Awards

*Diners Club/enRoute Business Scholarship*
One scholarship, valued at $1,000, is presented annually to a full-time student entering fourth-year of an accounting program in either the Faculty of Arts or the Faculty of Mathematics. This scholarship, sponsored by Diners Club/enRoute Card, was created to recognize scholastic achievement in accounting programs.

*Doris Dixon Award*
Each Dixon Award is presented by the Descartes Foundation to a student who, while not receiving a Descartes Entrance Award, demonstrates excellence during her/his program of undergraduate studies. The initial award of $1,000 is accompanied by an offer of a Descartes Fellowship.

*Ross Dixon Award*
Each Dixon Award is presented by the Descartes Foundation to a student who, while not receiving a Descartes Entrance Award, demonstrates excellence during her/his program of undergraduate studies. The initial award of $1,000 is accompanied by an offer of a Descartes Fellowship.

*Samuel Eckler Medal in Actuarial Science*
This prize was established to recognize the contribution of Samuel Eckler to the actuarial profession and is provided by Eckler Partners. The medal, which is cast in gold, is awarded each year to the outstanding graduating student of the Honours Actuarial Science Program.

*Electrohome 75th Anniversary Scholarship*
Established by the Victor Company of Japan Ltd. and Kanematsu-Gosho Ltd. in recognition of the 75th Anniversary of Electrohome Ltd., one scholarship of $1,500 is presented to an outstanding undergraduate entering the final year of Computer Science. The award will be based on academic performance in the second-year core and a minimum of three third-year Computer Science courses. A University of Waterloo General Application for Scholarship with a copy of the Student Examination Report and a recent résumé should be submitted during the third year or 3A term.

*Equitable Life Award*
The Equitable Life Scholarship, worth $3,000, for students who have completed their second year of study in the Actuarial Science Program. The recipient will receive $750 in each of four terms beginning at the 3A level providing that an overall average of at least 80% is maintained. The scholarship is made possible through the generosity of Equitable Life of Canada and is administered by the René Descartes Foundation.

*Fryer Gold Medal*
The Fryer Gold Medal is in honour of Kenneth D. Fryer, a professor of Mathematics since 1959. As Associate Dean of Undergraduate Studies for a number of years, he served the Faculty with academic distinction and good humour until his death in 1984.

*Fejer/Aczel Mathematics Award*
Awarded wholly or in part to one or more graduate or senior undergraduate students enrolled in the Faculty of Mathematics. The annual value will not exceed $3,200. Preference will be given to those whose specialization is functional equations, information theory, or applications of mathematics to the social or behavioural sciences. Application should be made to the René Descartes Foundation, Faculty of Mathematics.

*Scott Kelsey Fevreau Memorial Award*
A $500 award has been established in memory of Scott Kelsey Fevreau, a first-year Mathematics student. The award is to be presented to a second-year Honours Co-op Mathematics student, based on high academic achievement, extracurricular activities and personal characteristics.

*Financial Executives Institute Prize*
An award, valued at $500, has been established by the Hamilton Chapter of the Financial Executive Institute. The award is presented annually to the student in any Honours Accounting program in Arts or Mathematics who has displayed outstanding achievement in finance.

*K.D. Fryer Gold Medal*
This award is presented annually, at Fall Convocation, to a graduating Mathematics student who best exemplifies academic excellence and good citizenship. Involvement in extracurricular affairs such as athletics, cultural activities and student government are important criteria in making the award. The medal is in honour of Kenneth D. Fryer, a professor of Mathematics since 1959. As Associate Dean of Undergraduate Studies for a number of years, he served the Faculty with academic distinction and good humour until his death in 1984.

*William Gartrell Award*
Dr. William Gartrell received an Honorary Doctor of Laws degree in 1968 from the University of Waterloo. To commemorate his contributions to education in high school Mathematics, the Faculty has established this award to recognize the scholastic achievements of a second- or third-year student not previously awarded a Descartes Scholarship. The initial award of $1,000 is accompanied by an offer of a Descartes Fellowship.

*Leslie Klein Mathematics Scholarship*
One scholarship, valued at $3,000 and paid in instalments of $500 per term through to graduation, is given to a student who has established an outstanding academic record by the end of her/his first year in the Faculty of Mathematics and who does not hold a continuing Descartes scholarship.

*K.C. Lee Computer Science Scholarship*
Established by Francis Lee, an alumus of the University, in honour of his father K.C. Lee, one scholarship valued at $1,000 is presented annually to an outstanding undergraduate student entering Year Three of Computer Science.
Selection will be based on excellent academic standing and commitment to Computer Science as evidenced by related work experience and/or related special projects. A University of Waterloo General Application for Scholarship should be submitted during 2B or the second term of Year Two.

**Microsoft Technical Scholarship**

Three awards, valued at $1,500 each, are awarded annually to full-time undergraduate students in each of Years Two, Three and Four in Computer Science or Electrical and Computer Engineering. These awards are designed to recognize students' contribution and enthusiasm for the software industry. Selection will be made by the Computer Science Department. No application is necessary.

**W.I. Miller Scholarship**

The W.I. Miller scholarship, worth $1,500, is awarded annually to a fourth-year student in the Mathematics Co-op Teaching Program who has demonstrated academic excellence and who has also displayed, during co-op teaching terms, the promise of leadership in mathematics teaching. The award is given in memory of Wilfred Isaac Miller, who following a distinguished teaching career in Ontario schools, was an assistant to the Dean and a Lecturer, Department of Combinatorics and Optimization, from 1967 to 1974.

**National Research Council Training Program for Women in Science**

The three year training program is for women undergraduate students in Engineering, Mathematics and Science, completing the first year of their program (to be accepted in the training program in their second year), who are high academic achievers and willing to work for the National Research Council (or an NRC partner) in either the summer or during their co-op program. Applications and information are available from the University of Waterloo Graduate Office. U.G.O. Deadline: February 22 (approx.)

**Friar Luca Pacioll Awards**

One award, valued at $1,000, is provided annually to a Mathematics Accountancy Studies student entering Year Two. The award is based on academic merit combined with contributions and involvement in extracurricular activities. Applications should be submitted to the Student Awards Office during the 1B term.

**Friar Luca Pacioll Fellowships**

One fellowship, valued at $1,500, is provided annually to a Mathematics Accountancy Studies student entering Year Three and Four. The fellowship is based on academic merit combined with contributions and involvement in extracurricular activities. The recipient will be required to provide a maximum of eight hours per week of teaching/research assistance for Faculty for one of their two terms. Selection of the term will be at the discretion of the student. Fellows will be allocated to faculty members based upon their requests for teaching/research assistance for a specific term. Applications should be submitted to the Student Awards Office during the 2B/3B terms.

**Pure Math Book Prize**

A book prize is awarded to an outstanding student of Pure Mathematics.

**Robert H. Quinn Memorial Prize**

Awarded annually to a student in the Business Administration Option of the Faculty of Mathematics who achieves the highest overall average mark at the end of the 3B academic term. This $400 prize is open to Honours students in either the Co-operative or Regular program. Those students completing the 3B term in the Fall or Winter will be judged together, with the award being announced in May. The minimum average which will be considered is 80% or A-standing.

**Rees-Bo&ang Scholarship**

The Rees-Bo&ang Scholarship is awarded to an undergraduate student beyond Year One in the Faculty of Mathematics in recognition of outstanding academic achievement. The recipient will also have demonstrated some contribution to student life in the Faculty or in society through volunteer activities.

**Safety-Kleen Canada Inc./Oil Recovery Division Scholarship**

Three scholarships, valued at $1,500 each, are awarded to outstanding Co-operative students entering Year Three and enrolled in Computer Science, Chemical Engineering or an Environmental Engineering Option in other Engineering Programs.

**Senate Scholarship Mathematics Awards**

Several scholarships are awarded to students who have established outstanding academic records by the end of their first or second year in the Faculty of Mathematics and who are not on continuing Descartes scholarships. Recipients receive $500 per term through graduation.

**Sony Science Scholarship Fund**

Established by Sony of Canada Ltd. to celebrate the 35th Anniversary of the arrival of the first Sony product in Canada and to show appreciation to Canadian people for their support, three scholarships, valued at $1,000 each, will be presented to an outstanding full-time undergraduate student entering fourth-year in each of Engineering, Mathematics and Science.

**Sprott Endowment Award**

An award, valued at $500, is made to an exemplary student of the Statistics and Actuarial Science Department. No application is necessary.

**Stern Cohen Accountancy Studies Scholarship**

Established by Stern Cohen, Chartered Accountants, in recognition of their 50th Anniversary, one scholarship, valued at $500, is presented to an outstanding Accountancy Studies student. The scholarship is based on performance in ACC 291 and an overall average of 75% or better.
**Sun Life of Canada Award**
This $1,000 award is made to an outstanding student who is entering the third year of the Honours Actuarial Science Program. The award will be based on academic performance and demonstrated leadership. Applications should be submitted during the 29 term.

*John Hin Chung Tsang Memorial Scholarship*
A scholarship of $750 is available annually to a student entering second-year of a four-year Honours Mathematics Program. Selection of candidates is based on academic achievement. The award has been endowed by Mrs. Pauline Tsang, through the Education Foundation of the Federation of Chinese Canadian Professionals of Ontario, in memory of Mr. John Hin Chung Tsang.

**Waterloo-Wellington Chartered Accountants Association Scholarship**
One scholarship, valued at $500, is presented annually to a full-time undergraduate student entering Year Three in either Honours Arts or Honours Mathematics, Chartered Accountancy Studies. The scholarship selection is based upon grades achieved up to the point of entry to Year Three. No application is necessary.

**R.A. Wentzell Memorial Award**
An annual award of $300 is awarded to the top male and female students at the completion of second-year in an Applied Mathematics program. The award honours the memory of Professor Wentzell, who was a valued member of the Department of Applied Mathematics for over 20 years.

**FACULTY OF SCIENCE AWARDS**

**Faculty of Science Upper-Year Scholarships**
A limited number of upper-year scholarships may be awarded to students in Honours Science.

**Alberta Optometric Association Scholarships**
The Alberta Optometric Association presents two scholarships in the amount of $500 to each of two students admitted to the first professional year of the School of Optometry. The scholarships are awarded on the basis of academic achievement to students who are residents of Alberta.

**Alcon Award for Achievement in Ocular Anatomy and Physiology**
Alcon Canada Inc. presents a cash award of $500 to the graduating student in Optometry who obtains the highest standing in the Ocular Anatomy and Physiology Comprehensive Examination.

**Allergan General Proficiency Prizes**
The gifts of Allergan Inc. are awarded to the final-year students in the School of Optometry who rank first and second in general proficiency.

**Awards and Financial Aid**
University of Waterloo Upper-Year Awards

**Allergan Prize for Excellence in Anatomy of the Eye and Visual System**
A cash award of $500 plus a plaque is presented to a second-year student in the Optometry program, on the basis of performance in the first-year anatomy courses.

**Allergan Research Scholarship**
The Allergan Research Scholarship is awarded to a student entering the third professional year of the Optometry program who has demonstrated academic excellence in Physiological Optics and who wishes to undertake research in this field during the summer. The candidate for this award will be selected by the Graduate Committee of the School of Optometry.

**American Optical Scholarship**
AOCC Limited/Limitee presents the American Optical Scholarship to a student admitted to the first professional year of the School of Optometry. This $1,000 award is made on the basis of academic achievement.

**Dr. W. Ross Andrews Prize for Clinical Proficiency**
This $500 award was established by Dr. W. Bruce Andrews in memory of his father who practised optometry in St. Mary's, Ontario and was a part-time clinical supervisor at the School of Optometry from 1967 to 1992. The prize is presented to the student with the highest standing in general clinical proficiency in Optometry 348A/B.

**G.F. Atkinson Citizenship Award**
The Faculty of Science Foundation makes one or more awards of $100 to undergraduate students in Science who have made a significant contribution to the Waterloo community or within the University of Waterloo. A letter of nomination is required.

**E.F. Attridge Prize**
The gift of E.F. Attridge is awarded to the final-year student in the School of Optometry ranking highest in the study of general and ocular disease.

**Dr. Howard A. Backman Scholarship**
The Dr. Howard A. Backman Scholarship for Physiological Optics is awarded to a student entering the third professional year of the Optometry program who has demonstrated academic excellence in Physiological Optics and who has demonstrated need for support. The Graduate Committee of the School of Optometry will select the candidate for the award from those students who are spending their summer as a research assistant in Physiological Optics.

**Barnes-Hind Student Recognition Award**
This award, valued at $500, is to be given to a graduating student from the School of Optometry, demonstrating academic and clinical expertise in the area of contact lenses.
Jausch and Lomb Contact Lens Awards
Two $500 scholarships are awarded to Optometry students who demonstrate need and academic excellence in the preliminary courses related to the contact lens program.

Jausch and Lomb Outstanding Achievement Awards
Awards with a total value of $1,000, are given in recognition of ability and effort in the pursuit and application of knowledge in the contact lens field while a final-year Optometry student.

T.T. Beattie Medal
The bequest of T.T. Beattie is awarded to the final-year student in the School of Optometry ranking highest in Orthoptics or Visual Training. The award is made as funds permit.

Bennell Clinical Optometry Award
This award is presented to a graduating student in the Optometry program who demonstrates high achievement and clinical proficiency in Binocular Vision. It consists of a certificate and $300 worth of equipment provided by the Bennell Corporation.

J.P. Bickell Foundation, Trustees, National Trust Scholarships
The Trustees of the J.P. Bickell Foundation provide a number of J.P. Bickell Foundation scholarships to be awarded to qualified students in the Chemical Engineering Department and the Earth Sciences Department in any of the second, third or fourth years of the program. To be eligible for one of these scholarships a student must obtain a minimum average of 75% in the previous term's or year's examinations.

Don E. Brodie Scholarship in Science
This scholarship is awarded to the full-time first-year Science student who earns the highest weighted average in the Fall Term Year One Honours Physics course and laboratory. The award honours the Dean of Science at the time of the creation of the Faculty of Science Foundation.

Canadian Contact Lens Society Prize
The proceeds of a fund invested on behalf of the Canadian Contact Lens Society are awarded to a final-year student in the School of Optometry who shows the greatest proficiency in the theoretical and clinical application of contact lenses.

Canadian Ophthalmic Laboratories' and Suppliers' Prizes
The Canadian Ophthalmic Laboratories and Suppliers provide funds to award the following prizes. Since the amount in the fund varies from year to year, they are awarded in sequence until the fund is exhausted each year.
- Three General Proficiency Prizes (value $250 each) are awarded to the students in the School of Optometry ranking highest in General Proficiency in each of the first, second and third years.
- Canadian Ophthalmic Laboratories: Montreal, PQ
  - Luxottica Canada Inc., Mississauga, ON
  - Menrad Canada Inc., Mississauga, ON
  - Opal Optical Ltd., Georgetown, ON
  - Professional Optical Co., Ltd., Willowdale, ON
  - Rodenstock Canada Inc., Toronto, ON

Canadian Society for Chemistry Prize
One award, to a Chemistry student, is made annually by the society. The award, consisting of an engraved medal and a Certificate of Merit, is given to the student with the highest academic standing in the penultimate year of her/his course.

Centennial Optical Scholarships
The Centennial Optical Company offers two scholarships in the amount of $250 to each of two students admitted to the first professional year of the School of Optometry. These awards are made on the basis of academic achievement. Recommendations for these awards are made by the Scholarship Committee of the School of Optometry.

Central Optical Award for Excellence in Special Studies
An award of $500 is given to a final-year Optometry student who has achieved excellence in her/his special area of independent study.

Helen Charron Optometric Entrance Award
A $200 award donated by Robert J. Charron, in appreciation of his mother’s support through his entire educational training. The award will be presented to a female entering the first professional year of Optometry who possesses a BSc degree and who completed her Pre-Optometry program at an external University. Preference is given to Ontario residents.

Joseph R.P. Charron Optometric Entrance Award
A $200 award donated by Dr. Robert J. Charron, in appreciation of his father’s support through his entire educational training. The award will be presented to a male entering the first professional year of Optometry who possesses a BSc degree and who completed his Pre-Optometry program at an external University. Preference is given to Ontario residents.
Chemistry Scholarships
Upper-year scholarships are offered to students on the basis of performance at UW.

CHEM 13 NEWS Research Assistantships
The Department of Chemistry offers CHEM 13 NEWS Research Assistantships to recognize academic excellence in students proceeding to a degree in Chemistry. The awards are made for one year at a time and are valued at $500 for one year. Award holders are required to work with a professor or her/his research group within the Department. Awards to students entering upper-years are based on the previous year's academic performance.

E.J. Chisholm Memorial Scholarship
This $200 scholarship, established in memory of the late E.J. Chisholm, is awarded annually to the third-year student who demonstrates highest academic and clinical proficiency in Paediatric Optometry.

CIBA Vision Award
The CIBA collection of Netter's Medical drawings is awarded to a final-year Optometry student for clinical excellence.

A.W. Cole Prize
This prize, is a gift of the Cole family and is donated in honour of their father A.W. Cole. It is awarded to the final-year Optometry student ranking highest in Clinical Proficiency.

College of Optometrists of Ontario General Proficiency Medal
The gift of the Council, College of Optometrists of Ontario is awarded to the final-year student in the School of Optometry ranking highest in general proficiency.

J.A. Cowan Book Prize for Optics
This book prize will be presented each year in September to the student entering the third year of any Physics program who has the highest grade in either the course PHYS 255 or the courses PHYS 226/246 (Geometrical Optics/Physical Optics) (weighted equally), provided that this grade is greater than 80%.

I.R. Dagg Memorial Scholarship
Dr. Ian Ralph Dagg (1928-1993) came to the University of Waterloo in 1959 and served the University and the Physics Department for thirty-four years, finally as Chair of the Department from 1988 until his death in 1993. A fund has been established to endow the I.R. Dagg Memorial Scholarships, each initially valued at $1,000. These scholarships will be awarded to full-time students (one female and one male) who have completed the third year of an Honours Physics degree program at Waterloo with cumulative and Year Three averages of at least 85%. The recipients of these scholarships will also have demonstrated leadership qualities through participation in extracurricular activities. No application is necessary.

Dow Canada Scholarship
Two scholarships, valued at $500 each, are presented; one to a third-year Co-op Chemistry student and one to a third-year Chemical Engineering student, who have attained good academic standing and demonstrated leadership abilities through either on-campus or community related extracurricular activities and who have effective written communication ability. Applications should be submitted during the 3A term.

Earth Sciences Scholarships
The Department of Earth Sciences awards a number of scholarships in varying amounts to students in the Earth Sciences Department in each academic year based on academic standing in the previous year. These scholarships may be subject to the condition that no other scholarships are held concurrently.

Eastern Optical Bursary Scholarships
The Eastern Optical Laboratories Ltd. of Dartmouth, Nova Scotia offers two awards valued at $500 each to students admitted to the first professional year of the School of Optometry. The awards are made on the basis of academic standing in preoptometry studies and financial need to residents of New Brunswick, Newfoundland, Nova Scotia or Prince Edward Island. Applications to the Student Awards Office are due on September 15th of each year.

William Felnbloom Low Vision Award
A Low Vision Trial Set is awarded to the final-year Optometry student who has shown excellence in both the didactic and the clinical aspects of Low Vision care.

William Eladon Thermodynamics Award
The prize is awarded annually to the highest ranking Science student in second-year thermodynamics courses offered by the Chemistry Department. No application is necessary.

Essilor Award for Academic and Clinical Excellence in Optics
The Essilor Optical Company presents this award of equipment to a final-year Optometry student with excellent academic standing in the areas of Geometrical or Optometrical Optics.

David M. Forget Memorial Award in Geology
Established in memory of David M. Forget, a $500 award will be made annually to a student enrolled in any Year Two Honours Earth Science Program. Students who can demonstrate an interest in geology combined with a love and respect for nature, display a good ability and interest in writing and can display dedication to studies should write a short essay (less than 1,000 words) explaining their interest in this award and addressing the criteria as stated above. Application essays should be submitted to the Scholarship and Awards Chair, Department of Earth Science, before the final day of lectures of the 2A term.
Dr. Michael Gutwein Memorial Award
This $500 award and plaque has been made possible by contributions from classmates and friends in memory of Dr. Michael Gutwein. This award, will be given to a final-year Optometry student who actively encourages fellow students to participate in athletic and social affairs. The student is selected by the class. Selection is not based on academic criteria.

Helen Sawyer Hogg Scholarship in Astronomy
A scholarship of $500 is presented annually in honour of Professor Helen Sawyer Hogg, a pre-eminent Canadian astronomer and inaugural chair of the Faculty of Science Foundation. Third- or fourth-year honours students enrolled in the Faculty of Science in a program leading to graduate work in Astronomy who have achieved an overall average of 80% are eligible. Candidates are nominated by the Faculty and interviewed by a selection committee.

International Exchange Award
The Faculty of Science Foundation makes awards totalling up to $2,000 to undergraduate students in Science who participate in International Exchange Programs or International Public Service Programs. Application forms are available in the Science Undergraduate Office, ESC-253, and are due on the last day of the second month of each term.

Don E. Irish Scholarship in Science
One scholarship is awarded to each full-time first year student, in an Honours Chemistry program and in an Honours Biochemistry program, who earns the highest weighted average in the Fall Term, Year One, Honours Chemistry course and laboratory. The scholarship honours the Executive Director of the Faculty of Science Foundation during its formative years.

William F. James Sr. Debate Awards
The Faculty of Science Foundation has established the William F. James Sr. Debates competition in order to encourage the art of debate among Science undergraduates. Awards of $100 are made to each member of the winning team and $50 to each member of the runner-up team.

S.C. Johnson & Son, Ltd. Environmental Scholarship
This $1,500 scholarship has been jointly established by S.C. Johnson & Son, Ltd., and The Grand Valley Conservation Foundation in recognition of the Company’s ongoing commitment to helping protect the environment. The scholarship is open to full-time students who have completed their third year or sixth term of an Honours program related to the environmental sciences with emphasis on Chemistry and/or Chemical Engineering. Applicants must be Canadian citizens or permanent residents. Application forms are available in the Student Awards Office and must be submitted during the 3B term or the third year of the Regular program prior to May 31 each year.

K-W Optical Company Awards
Awards are made to the two students in each of the second, third and fourth professional years in Optometry who have shown the greatest improvement in academic performance. In the fourth professional year the awards are for $250 and $200. In the other years the awards are for $200 and $150.

Bruce Wyler Kelly Memorial Prizes
Two prizes, valued at $150 each, are awarded to the two Science students with the highest standing at the end of Year Two. One prize is to be awarded to a student in Regular or Co-op Honours Biochemistry and one prize to a student in Regular or Co-op Honours Biology.

Leopold LaCoursiere Award for General Proficiency
The Sudbury Association of Optometrists presents an award of $250 to the top final-year student of the School of Optometry who was from District #3 of the Ontario Association of Optometrists at the time of acceptance to the School.

Lyle/Fisher/Bobier Prize
This prize is awarded annually to a student in the Optometry Program who has demonstrated academic excellence and is engaged in summer research at the School of Optometry. It was established to honour the contributions of Professors Lyle, Fisher and Bobier to optometric research.

J.R. Matthews Memorial Prize in Biology
The colleagues, friends and relatives of the late Dr. Jonathan R. Matthews offer an annual $200 prize to the student who graduates from the Honours Biology (or Biochemistry) program with the highest overall average in third- and fourth-year courses.

Harry McLeod Co-op Chemistry Scholarship
A $600 scholarship may be awarded annually to a high-ranking student entering Year Four of the Co-op Chemistry Program, selected on the basis of academic performance in 3A and 3B terms. No application is necessary.

Jerome T. Miller Memorial Prize
A $50 prize was established in 1968 by relatives and friends in memory of the late Jerome Thomas Miller, BSc, MSc U66 (Honours Chemistry and Physics). The cash prize is awarded each year, on the basis of marks, to the student in third-year of a program which combines studies in Chemistry and Physics.

Monahan Memorial Scholarship
A scholarship is awarded to a student admitted to the first year of the Optometry program on the basis of academic achievement. Candidates must be Ontario residents whose birthplace is within 50 kilometres of Listowel, Ontario.
*Gretchen E. Mueller Memorial Biochemistry Scholarship*

Scholarships, valued at one-term's tuition, have been established in memory of Gretchen Mueller by family and friends. The recipient will be the top student in Year Three (and in Year Four, when more than one scholarship is available) of the Honours Biochemistry programs, Regular or Co-operative. Recipients must be Canadian citizens or Permanent Residents who do not simultaneously hold any other major internal or external scholarships. No application is necessary.

**National Research Council Training Program for Women in Science**

The three year training program is for women undergraduate students in Engineering, Mathematics and Science, completing the first year of their program (to be accepted in the training program in their second year), who are high academic achievers and willing to work for the National Research Council (or an NRC partner) in either the summer or during their coop program. Applications and Information are available from the University of Waterloo Graduate Office. U.G.O. Deadline: February 22 (approx.)

**New Brunswick Association of Optometrists Scholarship**

The New Brunswick Association of Optometrists presents a scholarship in the amount of $250 to a resident of New Brunswick who is entering the first professional year of Optometry.

**L.M. Newell Clinical Optometry Prize**

This $500 award was established by Dr. Janie Newell (UW Class of 1982) to honour her father on his retirement from optometric practice after 43 years. The prize is awarded to an Optometry student on the basis of clinical proficiency demonstrated in Optometry 348A/B.

**Ocular Pharmacology Prize**

A cash prize is awarded to an outstanding Optometry student for performance in the Ocular Pharmacology course.

**Sir Isaac Newton Scholarships**

SIN Scholarships are awarded annually to the top four students entering each of second-, third-, and fourth-years in Honours Physics, both Regular and Co-op. Values are $750, $600, $450, $300 in each year. (These scholarships may be subject to the condition that no other scholarships are held concurrently.)

**Ontario Rubber Group/Rubber Chemistry Division, CSC Award**

The Ontario Rubber Group and the Rubber Chemistry Division of the Canadian Society for Chemistry have made available a $750 award. The recipient must be in either Engineering or Science, have demonstrated interest in the rubber industry and have high academic standing. Consideration will also be given to experience gained in work-terms in a rubber-related field. Applications should be submitted during the 3B term.

**OSI Award for Excellence in Practice Management**

Optometric Services Inc., the national optometric services group, presents annually an award valued at $250 to the final-year student in the School of Optometry. The award is given in recognition of demonstrated leadership in the areas of professionalism and communication skills, as well as excellent academic standing.

**Optometry Faculty Summer Research Scholarships**

The faculty of the School of Optometry provide funds for these scholarships to support Summer research by Optometry students. These scholarships are awarded on the basis of merit using the same criteria as the Natural Sciences and Engineering Research Council of Canada uses to award Undergraduate Student Research Awards.

**Optometry Scholarships**

The School of Optometry awards scholarships annually to students admitted to the School of Optometry from Regular Science at the University of Waterloo. These awards will be made chiefly on the basis of scholastic achievement and as funds permit in Years One, Two, Three and Four in the School of Optometry.

**Glyn Reesor Prize**

A prize of approximately $200 in honour of Dr. Reesor is awarded annually to the third-year Physics student who obtains the highest mark in electronics.

**Saffio Research Scholarship**

The Saffio Research scholarship is awarded to a student entering the third professional year of the Optometry Program who has demonstrated academic excellence in Physiological Optics and who wishes to undertake research in this field during the Summer. The candidate for this award will be selected by the Graduate Committee of the School of Optometry.

**Saskatchewan Optometric Association Scholarships**

The Saskatchewan Optometric Association presents two scholarships of $500 each to two students admitted to the first professional year of the School of Optometry. These awards are made to students who are residents of Saskatchewan. They are awarded on the basis of academic achievement.

**Science Memorial Scholarships**

These awards honour deceased students, alumni, faculty, staff and friends of the Faculty of Science. Awards are made, as funds permit, to students at any level in an undergraduate program in the Faculty on the basis of academic achievement. Contributions have been received in memory of:

Alfred Babineau
Nancy O. Bray
J.L. Daniel
Nicola Duthie
Anne Fiedtkou
Roman Guzowsky
David Lamb
B.H. Luneberg

Wade Mesher
Mary R. Mitchell
E.J. (Ted) Mulrooney
John A. Reeves
Randall E. Soley
Robert G. Sommerville
Michael Souliere
Steve Llewellyn

**University of Waterloo Upper-Year Awards**

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<th>Award Name</th>
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<td>Optometry Faculty Summer Research Scholarships</td>
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<td>Prize for the third-year Physics student with the highest mark.</td>
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<td>Science Memorial Scholarships</td>
<td>Awards in memory of deceased students, alumni, faculty, staff, and friends of the Faculty of Science.</td>
</tr>
</tbody>
</table>
Society of Chemical Industry Awards
An engraved plaque is awarded by the Society to the student with the highest standing in the final year of Biochemistry, Chemistry and Chemical Engineering.

*Sony Science Scholarship Fund
Established by Sony of Canada Ltd. to celebrate the 35th Anniversary of the arrival of the first Sony product in Canada and to show appreciation to Canadian people for their support, three scholarships, valued at $1,000 each, will be presented to an outstanding full-time undergraduate student entering fourth-year in each of Engineering, Mathematics and Science.

H.A. Stein Scholarship
A $500 scholarship is awarded to a student who has demonstrated academic excellence in the Optometry Program and who has been accepted to spend a summer as an Optometric Research Assistant.

Student Industry Field Trip Award/CSPG
The Canadian Society of Petroleum Geologists makes available one award consisting of a certificate and a one-year membership in the Society. The award is presented to a student in either Earth Sciences or Geological Engineering who has demonstrated competence in petroleum geology or the related fields of stratigraphy, sedimentology, paleontology or structural geology.

Sunsoft Contact Lens Achievement Award
This award is provided by Sunsoft Contact Lenses, and is presented to a graduating student in the Optometry program who is deemed an outstanding contact lens clinician. The award consists of a certificate and $1,000 in Sunsoft contact lens products.

J.C. Thompson Memorial Prize
The $125 award is made by the College of Optometry of Ontario Alumni Association in memory of the late Dean J.C. Thompson. It is made to the final-year student in the School of Optometry who has ranked highest in clinical courses in Optometry (OPTOM 242, 252, 342 and 352).

Wesley-Jessen Contact Lens Award
This award of $1000 and an engraved plaque is presented by the Wesley-Jessen Contact Lens Company to the Optometry student who attains the highest mark in OPTOM 347 and 367.

Reginald Williams Memorial Scholarship
The award of $200 donated by Dr. L. Williams of Trinidad, is awarded to an outstanding student in the second professional year in the School of Optometry.

Michael Wong Memorial Award
One award, valued at $500, will be provided to a fourth-year Optometry student who has excelled in pediatric optometry. The successful candidate will be chosen by the Scholarship Committee of the School of Optometry. No application is necessary.

UNIVERSITY-WIDE AWARDS

Doreen Brisbin Award
An award will be presented annually to a female student entering Year Four of an Honours program in which women are currently under represented. Eligibility will be based on academic standing and demonstration of a sincere interest in and commitment to the area of study in which the student is enrolled. Interested third-year female students should apply by April 30 each year.

C.U.P.E. Local 793 Award
This award(s) is given annually to a student who is either a Union employee, a spouse of a Union employee or a child or grandchild of a Union employee and who is involved in and contributes to community activities, has achieved a B average and may have demonstrated financial need. Applicants should complete and submit the special application form for this award and the “Union Award Validation Form” (available from the Union Local Office, GSC 120) to the Student Awards Office by the end of the first month of registration for each term.

Andrew James Dugan Memorial Award
This award, established in the memory of Andrew James Dugan, is presented to a student who has completed the third year of the University of Waterloo/Conestoga College Print Journalism Option on the basis of strong academic record and financial need. Applications are made to the University of Waterloo/Conestoga College Print Journalism Option Academic Board.

Governor General’s Academic Medal
The Governor General of Canada provides one silver medal annually to the undergraduate student graduating with the highest academic standing.

Don Hayes Award
This award is given annually to a deserving undergraduate student who has a minimum B average and is involved in, or contributes to, athletics or the sports therapist function in the University or the community. Letters of recommendation and the special application should be forwarded to the Student Awards Office by January 31 each year.

*Husky Injection Molding Systems Scholarship
One scholarship, with a total value of tuition, Co-op fees and incidental fees for one academic year, is awarded to an outstanding Co-op student entering Year Two, Three or Four who has worked for Husky Injection Molding Systems Ltd. for at least one work-term.

Leeds-Waterloo Student Exchange Program Award
This award of $600 is available to students from the University of Waterloo in any faculty that have been approved for the Leeds-Waterloo Student Exchange Program. The record of marks and resume that accompany the application for the Leeds-Waterloo Student Exchange Program are considered part of this award application. In addition, candidates must write a 250 word
essay describing their extracurricular activities and reasons for going to Leeds. In general, candidates of good academic standing with abilities in other areas are encouraged to apply. Once the award is made, the successful candidate must participate in the Leeds-Waterloo Student Exchange Program, otherwise the award is forfeited.

James D. Leslie Prize
This $500 prize was established to recognize the contribution of Professor J.D. Leslie, the first Director of the Distance Education Program. It is awarded to the graduating student with the highest average who has completed at least 50% of his or her credits through the University of Waterloo Distance Education Program.

Mike Moser Memorial Fund
Awards are provided to deserving third- and fourth-year students who have financial need, a good academic record, and who have achieved a high level of accomplishment in extracurricular activities. A special application available from the Student Awards Office plus a resume and letters of reference should be directed to Neil Widmeyer, Faculty of Applied Health Sciences by mid January.

NSERC Undergraduate Research Award tenable at the University of Waterloo
University undergraduate student research awards are intended to stimulate the interest of undergraduate students in research by providing them with valuable experience in a university laboratory, and to encourage these students to undertake graduate studies. These awards are valued at $800 per month for 3 or 4 months. Applications and information are available from the University Graduate Office or from the Department Chair. U.G.O. Deadline: January 9.

University of Waterloo Alumni Gold Medals
University of Waterloo Alumni provide a maximum of six gold medals annually to be awarded in recognition of academic excellence. Each medal will be awarded on the recommendation of the Dean of a Faculty. The medals may be awarded, at either the Spring or Fall Convocation, as follows: one each to a student in each of the six Faculties of the University who has demonstrated outstanding academic performance on completion of an undergraduate degree program.

University of Waterloo Staff Association Award
The University of Waterloo Staff Association has made available three awards valued at $400 each. These awards are provided to deserving full- or part-time undergraduate students in a degree program at the University of Waterloo in each of the Winter, Spring and Fall terms. A recipient must be a current member of the University of Waterloo Staff Association or the child, spouse, grandchild or dependent of a current Staff Association member. The recipient must have good academic standing and will have demonstrated involvement with volunteer organization(s) and/or extracurricular activities. Financial need may be considered in the selection process. Applications are available from the Staff Association Office, GSC.

Douglas T. Wright Award
This award, valued at one term tuition, has been established by members of the university community to honour Douglas T. Wright upon his retirement as President of the University and to recognize his contribution to the University’s international reputation. All full-time, undergraduate students who have participated in a University of Waterloo Co-op international work placement may apply. Candidates, during the foreign experience, will have distinguished themselves in their Co-op work-term placement and may have demonstrated leadership qualities as indicated through extracurricular activities. Second-, third- or fourth-year students will apply in the term they return to full-time study at the University of Waterloo. Application deadline is October 15 each year.

Tom York Memorial Award
The Tom York Memorial Award was established in memory of Dr. Thomas L. York (1940-88), writer, scholar, adventurer, and pastor, who served the University of Waterloo and Wilfrid Laurier University as Chaplain from 1985 until his death. The award will be given for short fiction, not essays. Undergraduate or graduate students in any faculty, program or year, full- or part-time, may apply for this award by sending an item of prose unpublished, to TYMA Selection Committee, St. Paul’s United College, Westmount Road, North, Waterloo, Ontario N2L 3G5. Application deadline is December 31 each year.

Work-Term Report Awards
Provincial and Federal Loan policies, under discussion at the time of printing, indicate that Awards/Bursaries provided to students receiving Provincial and/or Federal Student Loans, could reduce the loan entitlements. Please contact the Student Awards Office.

All of the following are awards for work-term reports judged best for writing skills. The technical content of the report is important but not the most important factor.
Awards and Financial Aid

Work-Term Report Awards

Academic Reportings

- Awards are made each term and the winners will be determined by the Department of Co-operative Education and Career Services in consultation with the appropriate academic department. Reports considered confidential are not eligible.

Faculty of Arts Work-Term Report Awards

- Faculty of Arts Work-Term Report Award
  Two awards of $100 each are given each semester to the best work reports in the Faculty of Arts by a junior and senior student.

Institute for Improvement in Quality and Productivity Award

- Up to nine awards of $200 each to second-, third- or fourth-year Engineering, and $100 each to Mathematics or Arts Accounting students.

Beast Marwil Thorne Work-Term Report Award

- Three awards of $100 each to second-, third- and fourth-year Arts or Mathematics/Chartered Accountancy Option students.

Society of Management Accountants of Ontario Award

- Three awards of $100 each to second-, third- or fourth-year Arts or Mathematics/Management Accounting students.

Waterloo-Wellington Chartered Accountants Association Award

- Three awards of $100 each to second-, third- or fourth-year Arts or Mathematics/Chartered Accountancy Option students.

Faculty of Engineering Work-Term Report Awards

- Allen-Bradley Canada Limited Award
  Three awards of $200 each to second-, third- or fourth-year Electrical or Computer Engineering students.

Babcock & Wilcox Canada Limited Award

- Three awards of $200 each to second-, third- or fourth-year Mechanical Engineering students.

Dofasco Award

- Two awards of $200 each to Engineering students following their first work term and three awards of $100 each to second-, third- or fourth-year Applied Mathematics students.

Dow Chemical Canada Inc. Award

- Three awards of $200 each to second-, third- or fourth-year Chemical Engineering students.

George J. Dufault Award

- The George Dufault Awards arise from a fund established by the Sandford Fleming Foundation from contributions made by faculty, staff, students and friends in memory of the late Professor George Dufault of the Department of Electrical Engineering. Awards of $200 each are given to undergraduate students in Electrical and/or Computer Engineering for the best work-term reports in their class. Up to four awards are given in each calendar year.

Sandford Fleming Foundation Award

- Several awards of $200 each to second-, third- and fourth-year students in those classes of each undergraduate Department of Engineering in which industrially sponsored awards have not yet been established.

The Sir Casimir Stanislaus Gzowski Award for Work-Report Proficiency

- This award, in the amount of $200, is presented to a Civil Engineering student in each of the 1B Spring and 2A Fall terms, provided in each case that the student is in good academic standing. It is given to the student who has submitted the best work-report (graded “Outstanding”) in the class in the first work term. In the event that no student completes an “Outstanding” work-report, no award will be presented.

Inco Limited Award

- Three awards of $200 each to second-, third- or fourth-year Systems Design students.

Institute for Improvement in Quality and Productivity Award

- Up to nine awards of $200 each to second-, third- or fourth-year Engineering, and $100 each to Mathematics or Arts Accounting students.

Institute for Polymer Research Award

- Three awards of $200 each to second-, third- or fourth-year Chemical Engineering or Applied Chemistry students.

S.C. Johnson & Son Limited Award

- Three awards of $200 each to second-, third- or fourth-year Chemical Engineering students.

Fenco MacLaren Incorporated Work-Term Report Award

- Three awards of $200 each to second-, third- or fourth-year Civil Engineering students.

Novacor Chemicals (Canada) Ltd. Award

- Two awards of $200 each to Chemical Engineering students following their first work term.

Procter & Gamble Inc. Work-Term Report Award

- Three awards of $200 each to second-, third- or fourth-year Mechanical Engineering students.

Walter Runge Award

- One award of $200 to a first-year Computer Engineering student.

Safety Kleen Canada Inc./Oil Recovery Division Award

- Three awards of $200 each to students in Year Three of Computer Science, Chemical Engineering or an Environmental Engineering option in other Engineering programs.
FACULTY OF ENVIRONMENTAL STUDIES
WORK-TERM REPORT AWARDS

R.M. Irving Work Term Report Award
Awards of $100 to second-, third- or fourth-year Geography students.

FACULTY OF MATHEMATICS WORK-TERM REPORT AWARDS

Dofasco Award
Two awards of $200 each to Engineering students following their first work term and three awards of $100 each to second-, third- or fourth-year Applied Mathematics students.

Dow Canada Award
Three awards of $100 each to second-, third- or fourth-year Mathematics, Non-Specialist students.

Equitable Life Insurance Company of Canada Award
One award of $100 to a second-, third- or fourth-year Actuarial Science student.

Institute for Improvement in Quality and Productivity Award
Up to nine awards of $200 each to second-, third- or fourth-year Engineering, and $100 each to Mathematics or Arts Accounting students.

Manulife Financial Work-Term Report Award
One award of $100 to a second-, third- or fourth-year Actuarial Science student.

Microsoft Corporation Award
Three awards of $100 each to third- or fourth-year Computer Science students.

Motorola Canada Limited Award
Three awards of $100 each to second-, third- or fourth-year Applied Mathematics, Business Administration, Combinatorics and Optimization, Operations Research, Statistics or Teaching Option students.

Mutual Life Assurance Company of Canada Award
One award of $100 to a second-, third- or fourth-year Actuarial Science student.

Peat Marwick Thorne Work-Term Report Award
Three awards of $100 each to second-, third- and fourth-year Arts or Mathematics/Chartered Accountancy Option students.

Procter & Gamble Inc. Award
Three awards of $100 each to first year Mathematics students.

QUANTUM Information Resources Ltd. Award
Three awards of $100 each to second-, third-or fourth-year Computer Science students.

Awards and Financial Aid
Work-Term Report Awards

Safety Kleen Canada Inc./Oil Recovery Division Award
Three awards of $200 each to students in Year Three of Computer Science, Chemical Engineering or an Environmental Engineering option in other Engineering programs.

Society of Management Accountants of Ontario Award
Three awards of $100 each to second-, third- or fourth-year Arts or Mathematics/Management Accounting students.

Waterloo-Wellington Chartered Accountants Association Award
Three awards of $100 each to second-, third- or fourth-year Arts or Mathematics/Chartered Accountancy Option Management Accounting students.

FACULTY OF SCIENCE WORK-TERM REPORT AWARDS

Biochem Therapeutic Inc. Award
Three awards of $100 each to second-, third- or fourth-year Science students.

Borden Chemical Company Canada Limited Award
Three awards of $100 each to second-, third- or fourth-year Applied Chemistry students.

Dow Chemical Canada Inc. Award
Three awards of $100 each to second-, third- or fourth-year Environmental Chemistry students.

Eli Lilly Canada Inc. Award
Three awards of $100 each to second-, third- or fourth-year Biochemistry students.

Inmet Mining Corporation Work-Term Report Award
Three awards of $100 each to second-, third- or fourth-year Science students.

Institute for Polymer Research Award
Three awards of $100 each to second-, third- or fourth-year Chemical Engineering or Applied Chemistry students.

Labatt Brewing Company Work-Term Report Award
Three awards of $100 each to second-, third- or fourth-year Biology students.

O’Connor Associates Environmental Inc. Award
One award of $200 to an Earth Sciences student.

Xerox Research Centre of Canada Limited Award
Three awards of $100 each to second-, third- or fourth-year Applied Physics students.
Bursaries

Provincial and Federal Loan policies, under discussion at the time of printing, indicate that Awards/Bursaries provided to students receiving Provincial and/or Federal Student Loans, could reduce the loan entitlements. Please contact the Student Awards Office.

Bursaries are awarded to full-time undergraduates experiencing financial difficulties and normally maintaining a B average. Students must have completed at least one term at the University of Waterloo before applying for these bursaries. Students with Student Authorizations who have not been in Canada for more than one year will not normally be considered (see Barkley’s of Avonmore Bursary and Foreign Student Bursary). Applications are to be submitted to the Student Awards Office and will be accepted during the term, until funds are exhausted and/or until the first day of examinations. Applicants need complete only one bursary application to be considered for most bursaries, unless a special application is required. Bursary applications are available from the Student Awards Office.

FACULTY OF APPLIED HEALTH SCIENCES BURSARIES

Ross and Doris Dixon Award
A $1,000 award is presented annually to an outstanding full-time student enrolled in Years Two, Three or Four in the Faculty of Applied Health Sciences who demonstrates financial need. A special application is available from the Student Awards Office and must be submitted by October 13 each year.

FACULTY OF ARTS BURSARIES

William H. Gale Bursary
One bursary of $250 is awarded annually to a second-, third- or fourth-year student in Co-op Applied Economics.

FACULTY OF ENGINEERING BURSARIES

3M Canada Inc. Bursaries
Four bursaries, valued at $500 each, are awarded as follows: one to an Engineering student and the remaining three to students in either Business, Science or Computer Science-related fields.

J.P. Bickell Foundation, Trustees, National Trust Bursaries
The Foundation makes available a sum of money to be used in providing bursary assistance to Chemical Engineering and Earth Sciences students of good academic standing who need financial assistance.

R. Bruce Dymond Memorial Bursary
A bursary fund has been established in memory of R. Bruce Dymond to assist students in the Faculty of Engineering.

Emco Limited Bursary
Emco Limited has established a bursary program available to upper-year students in Computer Science, Mechanical and Electrical Engineering.

A.C. Nielsen Company of Canada Ltd. Bursary
A.C. Nielsen Company of Canada Ltd. has made available two bursaries in the amount of $500 each, to be awarded to Mathematics or Computer Engineering students at the University of Waterloo. The awards are presented on the basis of financial need and academic standing.

Procor Limited Bursary
A bursary, to the value of $100, is offered annually by Procor Limited. The bursary is to be awarded to students in the Faculty of Engineering who are in need of financial assistance and who have satisfactory academic standing.

Alan W. Shattuck Memorial Bursaries
Three bursaries of $500 each, are awarded annually on the basis of academic standing and financial need to students in fourth-year Civil Engineering. The funds were made available by associates of Mr. Shattuck in recognition of his contribution in both pollution and water control resources.

Suncor Inc. Bursary Fund
Suncor Inc. offers bursaries annually to students in Chemical or Mechanical Engineering which, in support of employment equity, will be awarded to women, aboriginal (native) Canadians, persons with disabilities and visible minorities. Interested students should apply on the University of Waterloo general bursary application and attach a letter indicating their eligibility for assistance from this source.

Sellim Yousef Memorial Bursary
A bursary fund has been established in memory of Sellim Yousef to be used in providing bursary assistance to Mechanical Engineering students of good academic standing who demonstrate financial need.

FACULTY OF ENVIRONMENTAL STUDIES BURSARIES

Shelley Ellison Memorial Award
An award is made to a third-year Planning student who has maintained a B average, has financial need and can document a commitment to Professional Planning and to the spirit of friendship within the School. Preference will be given to female applicants. A special application is required by November 30th.

Robert M. Irving Bursary
A bursary fund has been established in memory of Robert M. Irving, the first chair of the Geography Department. One bursary will be awarded annually to a full-time third- or fourth-year Geography student who is experiencing financial difficulties and maintaining a B average.
Awards and Financial Aid
Bursaries

INDEPENDENT STUDIES BURSARIES

Serendipity Bursary
A bursary fund has been established by Samuel Malenfant, Bachelor of Integrated Studies, 1976. The bursary is awarded to a full-time undergraduate registered in Independent Studies.

FACULTY OF SCIENCE BURSARIES

3M Canada Inc. Bursaries
Four bursaries, valued at $500 each, are awarded as follows: one to an Engineering student and the remaining three to students in either Business, Science or Computer Science-related fields.

J.P. Bickell Foundation, Trustees, National Trust Bursaries
The Foundation makes available a sum of money to be used in providing bursary assistance to Chemical Engineering and Earth Sciences students of good academic standing who need financial assistance.

Science Society Bursary
A bursary fund has been established by the Science Society for full-time undergraduate Science students. Special consideration will be given to those who have been involved in extracurricular activities. A minimum overall academic average of 60% is required.

University-Wide Bursaries

Jerzy W. Anders Memorial Award
A $150 award has been established in memory of Jerzy Anders, a graduate of the University of Waterloo. The award is given to mature individuals who were forced to interrupt their university education due to financial difficulties or family obligations and are experiencing financial hardship upon re-entering the academic world. Mature students experiencing financial difficulties should write to the Assistant Registrar, Student Awards detailing their circumstances.

Atkinson Charitable Foundation Bursaries
The Foundation has established a bursary program which gives assistance to students of merit and proven financial need. Awards are made only to students who are bona fide residents of the Province of Ontario.

Barkley’s of Avonmore Bursary
One bursary is awarded annually to a student from a Third World Country. Foreign students must complete a bursary application form and arrange an appointment with the Assistant Registrar, Student Awards.

Blrks Family Foundation Bursary
Bursaries are made available by the Foundation to deserving undergraduates.

Campus Centre Board Bursary
A bursary fund established by the Campus Centre Board is available to graduate and undergraduate students experiencing financial difficulties.

Campus Recreation Bursary
A bursary may be awarded to a student who has displayed an involvement in the Campus Recreation Program either as a leader or participant or both and who is in good health.
standing with Campus Recreation. The recipient must have achieved a minimum of 65% overall average in the previous term. The award is open to any full-time University of Waterloo student.

Canadian Federation of University Women – Kitchener-Waterloo Bursaries
The Canadian Federation of University Women has established a bursary fund at the University of Waterloo to assist one or more women, studying full-time in second-, third- or fourth-year who have attained second class standing and are in need of financial assistance. Preference will be given to women not holding tuition scholarships. Mature female students meeting these requirements are encouraged to apply.

Canadian Federation of University Women – Kitchener-Waterloo Part-Time Bursaries
A limited Bursary Fund has been established for mature female students who are studying on a part-time basis. Candidates must be pre-registered or registered in a degree program, have completed at least two half-credit University of Waterloo courses and be working toward an undergraduate degree through part-time studies. An application form as well as an explanation regarding financial need must be submitted. Special application is required.

John Dobson Foundation Bursary
Bursaries are made available by the Foundation to deserving undergraduates. The bursaries are awarded in conjunction with University of Waterloo Bursaries.

Ron Eydt Travel Award
Undergraduate students who participate in one of the approved exchange programs between the University of Waterloo and other universities are eligible for financial assistance through this Ron Eydt Travel Award. Students must apply in the term preceding their departure. Students must have demonstrated University of Waterloo student leadership and campus involvement and have maintained a minimum B overall average and must demonstrate financial need.

Federation of Students – UW Bursary
Bursaries will be awarded to full-time undergraduate students experiencing financial difficulties, maintaining a B average and who are active in campus student organizations.

Foreign Student Bursary
A $50 bursary has been established by the Committee for Emergency Relief for Foreign Students. Foreign students experiencing financial difficulties should complete the bursary application and arrange an appointment with the Assistant Registrar, Student Awards.

K.D. Fryer – F.A.S.S. Award
A bursary fund has been established in memory of Kenneth D. Fryer, one of the founders and long time supporters of the F.A.S.S. theatre company. Funds are available to full- and part-time students at any level in any discipline offered by the University of Waterloo. A minimum average of 60% will be required of the applicants and financial need, as determined by the Awards Office, will be the basis for awarding these funds.

J.G. Hagey Alumni Bursary
In memory of J.G. Hagey, President Emeritus of the University, and in recognition of his significant contributions to postsecondary education, the University of Waterloo Alumni has established a bursary fund. Several bursaries to a maximum of $200 each are awarded annually to students showing financial need. All students attaining a 60% or equivalent standing in their previous academic years are eligible to apply.

Interprovincial Pipe Line Company Bursary
The Company provides $2,000 for bursaries for students beyond the first year who are in need of financial assistance. Preference will be given to students whose normal residence is in Canada or the USA.

Fred Kelly Bursary
In memory of Fred Kelly, General Manager for the Federation of Students, the Federation has established a bursary fund. Bursaries may be awarded to full-time undergraduate students who have attained an overall academic average of 65%.

Hildegard Marsden Bursary Fund
A bursary fund has been established in memory of Hildegard Marsden, Dean of Women for more than 20 years, for her service to students and the University of Waterloo community at-large. This award is for students in third or fourth year of their degree program who demonstrate financial need, and is given in the Winter term. Preference will be given to female applicants.

Mature Student Bursary Fund
Undergraduate, part-time students, studying on campus encountering financial difficulties are invited to apply for this bursary. Interested applicants may wish to arrange an interview with a financial aid counsellor to discuss their financial difficulties. A special application is required.

Ira G. Needles Memorial Bursary Fund
A bursary fund has been established in memory of Ira George Needles, one of the founding fathers of the University of Waterloo, Chairman of the Board of Governors from 1965 to 1966 when he was named Chancellor. Bursaries are awarded to full-time undergraduate students experiencing financial difficulties and who have maintained a B average.

Professional Women's Association Award of Merit
The Professional Women's Association is a non-profit organization dedicated to the collegial support and advancement of women at the University of Waterloo. Recipients of the Professional Women's Association Award of Merit may be in any faculty and will have...
completed their first year in full or part-time study. The award is limited to regular students (vs. co-op) only, in satisfactory academic standing. The award is intended to respond to financial need experienced by students who have faced or are facing particular challenges in their university lives such as sole-support parent or other responsibilities, disabilities, illness or personal trauma. Men or women may apply using the general bursary application form available from the Student Awards Office, outlining in their application how they portray tenacity in the face of personal challenges.

Abraham Rosenberg Memorial Bursary
A bursary fund has been established in memory of Abraham Rosenberg, a former member of University of Waterloo Board of Governors.

Special Achievement Bursary for Students with Disabilities
The bursary, valued at $350, may be awarded to an undergraduate student who is studying on a full-time or part-time basis. Interested students should apply on the general University of Waterloo bursary application and attach a letter indicating their eligibility for assistance from this source and attach appropriate documentation outlining their disability.

University of Waterloo Bursaries
The University has established a bursary fund to assist students who have a proven financial need. Bursaries are awarded to full-time undergraduates in any faculty of the University.

University of Waterloo Retirees’ Award Fund
The University of Waterloo Retirees’ Association has established this award to assist students who have proven financial need. Bursaries are presented to full or part-time undergraduates enrolled in any discipline of the University.

University of Waterloo 25th Anniversary Bursaries
These funds were established by the University from the sale of anniversary souvenirs in the Bookstore along with proceeds from many anniversary events in recognition of the 25th Anniversary of the University of Waterloo. Bursaries are awarded to full-time undergraduate students in any faculty who are in need of financial assistance.

University Loan Funds
The Student Awards Office administers a number of emergency loan funds which are intended to provide emergency assistance to students experiencing temporary, short-term financial problems. The funds are provided on an interest-free basis for a stipulated period of time.

To be eligible for these loans, students must be in good academic standing and must provide proof of an acceptable source of repayment. Students wishing to obtain assistance from one of the following funds should apply to the Student Awards Office.

Accounting Alumni Emergency Loan Fund
Loans up to $200 for a maximum of 90 days are available to full-time undergraduate Honours Accountancy Studies or Honours Math/Accounting Program students experiencing short-term financial difficulties.

Alpay, Elligsen, Nicoll Memorial Loan Fund
This fund was established by the Sandford Fleming Foundation in memory of Robert Elligsen, a Masters graduate of the Department of Mechanical Engineering (1985) and Professors Alpay and Nicoll, Department of Mechanical Engineering, from funds contributed by faculty, staff and others. Emergency loans are made available to students in the Faculty of Engineering.

Applied Health Sciences Emergency Loan Fund
Loans up to $500 for a maximum of 120 days are available to full-time undergraduate Applied Health Sciences students experiencing short-term financial difficulties.

Arts Student Union Loan Fund
Loans to a maximum of $200 for a period of up to 90 days are available to full-time undergraduates who are members of the Arts Student Union.

Ian Carr Loan Fund
This loan fund has been set up by the parents in memory of their son, a former student at the University of Waterloo.

Civil Engineering Memorial Fund
The purpose of this fund is to serve as a Memorial to the memory of individuals associated with the Department and proceeds from the fund will be used to assist undergraduate students who are in need of financial assistance. To date, contributions have been received in memory of: Brian Kurt Legay. For further information, contact the Civil Engineering Undergraduate Office.

David Cook Memorial Fund
The University of Waterloo Mathematics Society has made an amount available to be used as an addition to the University’s Emergency Loan Program. The Society’s contribution is intended for Mathematics students who have been faced with unexpected expenses during their academic year.

Co-operative Lecture Emergency Loan Fund
This fund was established by Canadian politician T. Douglas in 1970.

Adelaide Detwiler Student Loan Fund
This loan fund was established by Mr. J.R. Detwiler in memory of his mother, Adelaide Detwiler.

Engineering Memorial Loan Fund
The Federation of Students has established an interest-free, short-term loan fund in honour of deceased students of the Faculty of Engineering. Loans are normally to a maximum of $300 for 90 days and are available to first-year Engineering students. To date, contributions have been received in memory of: Marc Cayouette.
Engineering Society “A” Loan Fund
This fund was established by the Engineering Society “A” to assist Engineering students in need of short-term loans.

Engineering Student Loan Fund
This fund was established by the Faculty of Engineering. Loans up to $300 for a period of up to 90 days are intended for Engineering students who have been faced with unexpected expenses during their academic term.

Environmental Studies Co-op Emergency Loan Fund
This fund was established by the Faculty of Environmental Studies to assist undergraduate Co-op Environmental Studies students who find themselves unplaced during a co-op work term or experiencing financial hardship due to late placement during a co-op work term. Loans up to $500 with repayment periods up to four months are available.

Environmental Studies Society Loan Fund
Short-term loans are available to full-time undergraduate students enrolled in the Faculty of Environmental Studies. The maximum loan is normally $100. These funds are made available by the Society and represent a part of the proceeds of functions sponsored by the Society.

John Faber Memorial Fund
This fund was established by the Circle K Club at the University of Waterloo in memory of John Faber, former club member. Short-term loans are offered to full-time students at the University of Waterloo.

Sandford Fleming Foundation Loan Fund
This fund was established by the Sandford Educational Press to provide emergency short-term loans to Engineering undergraduate students. The loans are normally for $200 or $300, and interest-free for up to 90 days. The Sandford Educational Press is the textbook publishing division of the Sandford Fleming Foundation, and the loan fund has been established from the proceeds of sales of its textbooks.

Sandford Fleming Foundation Memorial Loan Fund
The Sandford Fleming Foundation Memorial Loan Fund has been established in memory of deceased students, alumni, faculty and staff in the Faculty of Engineering. Emergency loans are made available to full-time students in the Faculty of Engineering. To date, contributions have been received in memory of: Sam Ceccherallo.

Graham, Myall, Thomson Memorial Fund
A memorial fund has been instituted by the classmates of the late J. Graham, M. Myall and J. Thomson, who lost their lives in an auto accident in 1969. The fund represents contributions received from their classmates and other interested donors. Loans are made available to students enrolled in the Engineering Faculty and to those who have completed at least one full year of academic study. Maximum loans are $200 with repayment terms extending up to 90 days.

Dorothy J. Guest Friendship Fund
Established by Applied Health Sciences Alumnae and varsity athletes in recognition of the help and encouragement given to them by Dorothy J. Guest. Short-term loans of up to $300 for 100 days may be made available to any female student in Applied Health Sciences or female varsity athlete.

Alan Hale Memorial Loan Fund
This loan fund was established in memory of Alan Hale, a professor in the Department of Mechanical Engineering for 27 years, from funds contributed by friends and relatives, faculty, staff and students. Emergency loans are made available to undergraduate students in the Faculty of Engineering.

Ginny Lee Memorial Fund
The Federation of Students has established in memory of Ginny Lee, a former student, an interest-free, short-term loan fund. Loans are normally to a maximum of $300 for a period of up to 90 days.

Peter H. Nash Student Loan Fund
This loan fund was established by the Faculty of Environmental Studies to mark the retirement of Peter H. Nash, the founding Dean of the Faculty. The fund represents contributions received on this occasion and also in memory of the late Inez Frost Nash. Emergency Loans are made available to students in the Faculty of Environmental Studies. Maximum loans are $300 with repayment terms extending up to 90 days.

Ontario Association of Optometrists’ Auxiliary Loan Fund
This fund has been established by the Auxiliary to provide interest-free short-term loans to all eligible full-time Optometry students at the University who are experiencing temporary financial difficulty.

Registrar’s Office Student Loan Fund
This fund was established in recognition of the University’s 25th Anniversary by Rose Klein, a retiring employee of the Office.

School of Optometry Emergency Loans
This fund has been established by the School of Optometry from monies donated by the profession, to provide interest-free loans to Optometry students who have completed or are about to complete third-year, registered or not, who are experiencing severe financial hardship. An appointment with a Financial Aid Counsellor is necessary.

University of Waterloo Alumni Student Assistance Plan
This loan fund has been instituted by the Alumni Association, University of Waterloo. Loans up to $200 with repayment periods of up to four months are available to students in all faculties.
University of Waterloo Foreign Student Emergency Loan
Undergraduate foreign students in their final year of studies encountering financial difficulties should arrange to speak with either the Foreign Student Officer or a Financial Aid Counsellor regarding assistance from this source.

University of Waterloo Loan Fund
Loans up to $400 for a maximum of 90 days are available to full-time undergraduate students experiencing short-term financial difficulty.

University of Waterloo Staff Association Emergency Loan Fund
The University of Waterloo Staff Association has established an emergency loan fund for full-time undergraduate students experiencing short-term financial difficulties. Preference will be given to students who are affiliated with the University of Waterloo Staff Association. Loans up to $200 for a maximum of 90 days are available.

Bruce Walker Memorial Loan Fund
This loan fund has been established by classmates of the late Bruce Walker who lost his life in an accident in 1973. The fund represents contributions received from classmates. Loans are made available to Kinesiology students. Maximum loans are $100 with repayment within 90 days.

Government Assistance Programs

Provincial and Federal Student Assistance policies were under discussion at the time of printing. The information provided below may not reflect current policies.

The Ontario Student Assistance Program (OSAP) provides various types of assistance based on financial need to eligible students. This assistance is intended to supplement, not to replace, the resources of students and their families. Although assistance is not based on academic standing, students are expected to make satisfactory progress in their studies.

OSAP consists of the following plans:

- The Canada Student Loans Plan provides assistance in the form of interest-free loans to students who wish to pursue full-time post-secondary studies.
- The Ontario Student Loans Plan provides interest-free loan assistance to full-time students whose needs are not fully met by the Canada Student Loans Plan.

First-time applicants to OSAP must apply no later than July 1, to be notified of the award before classes start in the Fall term; November 1 for classes that start in the Winter term; and March 1 for classes that start in the Spring term.

Returning students who have received OSAP in the previous year will receive a pre-printed application directly from the Ministry of Education and Training and should apply by the above deadlines directly to the Ministry.

- The Child-Care Bursary may be available to sole-support parents or married students who have applied for and qualified for OSAP funding and who will incur child-care expenses during the student's study period. Applications will accompany the Student Information Document mailed by the Student Support Branch of the Ministry of Education and Training.
- The Bursary For Students With Disabilities is available to students who have applied for and qualified for OSAP or Ontario Special Bursary funding and who will incur disability-related educational expenses. Applications are available in the Disabled Student Services Office.
- The Ontario Work-Study Plan provides a means whereby students can actively finance the cost of their education through part-time employment on campus. Students whose educational needs have not been fully met by OSAP are eligible to apply. Positions are posted outside the Student Awards Office.
- The Ontario Special Bursary Plan provides assistance based on financial need to students taking 40% or less of a normal full course load. This Plan is intended for individuals who are unemployed, receiving social assistance, or who have a low family income. Students receiving Ontario Special Bursary are not eligible to receive OSAP for the same study period.
- The Canada Student Loan - Part-time Loans and Special Opportunity Grants for High-Need Part-time students provides interest-bearing loans and the possibility of grants to eligible part-time students. Students eligible for the Special Opportunity Grant will automatically be assessed from the OSAP Part-time Loan application.

The Canada Student Loans Program also offers Special Opportunity Grants for Female Doctoral Students. Students interested in this program must submit the application along with the OSAP application to the Assistant Registrar, Student Awards.

Note
Students from provinces other than Ontario should approach the provincial assistance authority in their home province concerning the possibility of assistance from that source. Applications and/or addresses are available from the Student Awards Office, Needles Hall.
The Department of Co-operative Education and Career Services

Conducting a job search in the Career Resource Centre.
Department of Co-operative Education and Career Services

Director
B. A. Lumsden, BA (Western)

Program Administrators
K.B. Kenning, BA (Wilfrid Laurier)
J.F. Westlake, BASc, MASc, PhD (Waterloo), PEng

Systems Administrator
D.N. Thomas, BSc (McMaster)

Co-ordinators, Co-operative Education
R.S. Barr, BMath (Waterloo)
D.J. Beaupré, BComm (Loyola), CA
L.R. Bricker, BSc, MSc (Waterloo)
N.K.M. Chiang, BA (York), MEd (Hong Kong)
L. Davis, BA (Waterloo), BEd (Western)
S.W. Davis, BES, MA (Waterloo)
C.J. Engel, BSc (Toronto), BEd (Western)
D.B. Everest, BA (McMaster), MA (Waterloo)
M.E. Grosch, BA (Western)
J.W. Holland, BASc (Toronto), MBA (Western), PEng
C.E. Jenkins, BA (Western)
S.J. Kimberley, BA (Toronto), CA
J. Martin, BA (Windsor), MEd (Toronto CIIE), CHRP
P.J. Mazzei, BSc, MSc (Queen's), PEng
W.B. Moore, BA (McGill)
R. Parker, BSc (Montreal), MBA (Toronto)
L.I. Pinaud, BSc, MSc (Queen's)
D.E. Rittenhouse, BASc (Waterloo), MEng (Carleton), PEng
R.H. Roach, BSc (Waterloo)
G.D.J. Ross, BA, MA (Wilfrid Laurier)
F.M. Russer, BA, MSc (Guelph)
P. Schrader, BA (Waterloo)
D.A. Schunk, BArch (Notre Dame)
V.E. Sparrow, BA (Waterloo)
W.P. Ungar, BES, BArch (Waterloo)
E.A. Van Den Berg, BA (Waterloo)
J.A. Van Roon, BSc (Northrup), PEng

Special Projects Co-ordinator
I.A. Lebold, BA (Waterloo)

Operations and Liaison Co-ordinator
O.F. Naese, BA (Waterloo)

Placement Advisors
A.F.H. Bieth
R.A. Hawes, BREP (Emmanuel)
J.L. Metz
B.A. Robertson, BA (Toronto)

The Co-operative Education and Career Services

The Co-operative Plan

Co-operative education is based on the principle that during the undergraduate years an academic program combined with integrated work experience in alternating terms, is relevant to, and desirable for, effective professional preparation. The work terms allow the student to acquire experience in the area of career interest, while the academic terms can more properly be devoted to fundamental and theoretical studies. The practical experience complements academic studies.

The motivation, responsibility and opportunity for insight gained through Co-operative education can be of significant value to the student's future. The Co-operative concept enables those with a career orientation to become full-time students of their subject, both during the academic terms and during the related work terms, within a structure of organized purpose and serious study.

Operation of the Plan

Necessary arrangements for integrating work terms, securing potential employers, arranging interviews and generally managing the employment process are the responsibilities of the Co-operative Education unit. Co-ordinators counsel students, visit them on the job, assist them to adjust to work situations and encourage their professional development.

The Work/Study Sequence

All Year One students enrol in September and spend the first term together at the University. In some programs, the class is split into two approximately equal groups, one known as Stream 8, the other as Stream 4. Both groups receive the same total time on campus and at work. Stream 8 has a double academic term at the start of the course; Stream 4 has a double academic term at the end of the course. Other programs provide several academic/work term sequences as shown in the charts. Variations may be requested due to academic or work situations in upper years. The dates for the beginning and end of academic terms are shown in the Academic Calendar. Precise start and finish dates for individual work terms are established in consultation with Co-operative employers.

Employment

Although every effort is made by the Department to find a sufficient number of work-term positions for students enrolled in all Co-op programs, no guarantee of employment can be made. The employment process is competitive and academic performance, skills, motivation, maturity, attitude, and potential will determine whether a student is offered a job.

If a student is not employed through the interview process, the Department will attempt to find suitable work experience for that student.
## Work/Study Sequence

**Note:**
- The letters A and B denote academic terms.
- *) denotes work term.

### Program (By Faculty)

#### Applied Health Sciences
- Health Studies, Kinesiology, Recreation and Leisure Studies
- Stream A: 1A, 1B, 2A, 2B, 3A, 3B, 4A, 4B

#### Arts
- Stream A: 1A, 1B, 2A, 3A, 3B, 4A, 4B

#### Applied Studies with Honours in:
- Arts Administration Specialization
- Stream A: 1A, 1B, 2A, 3A, 3B, 4A, 4B

#### Applied Studies with Honours in:
- French, Teaching Specialization
- Stream A: 1A, 1B, 2A, 3A, 3B, 4A, 4B

#### Accounting Studies
- Chartered Accountancy
- Stream A: 1A, 1B, off term

#### Management Accountancy
- Stream A: 1A, 1B, off term

#### Economics (Applied)
- Stream A: 1A, 1B, 2A, 2B, 3A, 3B, 4A, 4B

#### English — Literature
- Stream A: 1A, 1B, 2A, 2B, 3A, 3B, 4A, 4B

#### English — Rhetoric and Professional Writing
- Stream A: 1A, 1B, 2A, 2B, 3A, 3B, 4A, 4B

#### Anthropology, Political Science, Psychology, Sociology
- Stream A: 1A, 1B, 2A, 2B, 3A, 3B, 4A, 4B

#### Engineering
- Chemical, Civil, Computer*, Electrical, Environmental (Chemical and Civil Branches), Geology, Mechanical, Systems Design
- Stream A: 1A, 1B, 2A, 2B, 3A, 3B, 4A, 4B

#### Environmental Studies
- Architecture
- Stream A: 1A, 1B, 2A, 2B, 3A, 3B, 4A, 4B

#### Geography
- Stream A: 1A, 1B, off term

#### Urban and Regional Planning
- Stream A: 1A, 1B, off term

---

*This term is spent at a Faculty of Education.
† Teaching work term
U Subject to minimum enrolment targets and availability of suitable Co-op placements, students select a Co-op stream to follow beyond 3B in consultation with their Co-op employer and Faculty Advisor.
V Students seeking admission must normally have satisfactorily completed two work terms in another Co-op Math program.
W Admission occurs by January for the 2B term.
X Although the Co-op program begins in 2A, admission is made to the program at the time of the initial application to the University.
Y Admission occurs after first year.
Z Admission occurs at the time of selection of second-year courses. Students cannot be admitted to Co-op in first year.

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(continued on next page)
## Work/Study Sequence (continued)

**Note:**
The letters A and B denote academic terms.
- denotes work term
- indicates that a Co-op stream continues to beyond 3B.

### Program (By Faculty)

#### Mathematics

|                      | Sep-Dec | Nov-Jan | Feb-Mar | Apr-May | Jun-Jul | Aug-Sep | Sep-Nov | Nov-Jan | Feb-Mar | Apr-May | Jun-Jul | Aug-Sep |
|----------------------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|
| Stream 1             | 1A      | 1B      | 2A      | 2B      | 3A      | 3B      | 4A      | 4B      |         |         |         |         |         |
| Stream 2             | 1A      | 1B      | 2A      | 2B      | 3A      | 3B      | 4A      | 4B      |         |         |         |         |         |

#### Applied Math, Applied Math with Engineering Electives, Applied Math with Physics Electives, Pure Math

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<tr>
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<tr>
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#### Three-Year General

| Stream 1             | 1A      | 1B      | 2A      | 2B      | 3A      | 3B      |         |         |         |         |         |         |         |
| Stream 2             | 1A      | 1B      | 2A      | 2B      | 3A      | 3B      |         |         |         |         |         |         |         |

#### Science

- Biochemistry, Biology, Chemistry
- Chemistry
- Earth Sciences, Environmental Chemistry, Geochemistry (Stream 8 only)
- Environmental Science – Programs 1 and 2 (Stream 8 only)
- Physics
- Psychology
- Science Teaching Option
- Science and Business

### Admission
- Admission occurs by January 28th.
- Although the Co-op program begins in A2, admission is made to the program at the time of the initial application to the University.
- Admission occurs after first year.
- Admission occurs at the time of selection of second year courses.

### Specializations
- Some students will be admitted to French Teaching from Arts Regular Year One, in which case they will not go on a work term after 1B.
- Students admitted to Applied Studies Regular will not have a Co-op work term following 1B.

### Optional Work Terms
- Some students may complete a 3-year program and then go on a work term following 1B.

### Program Duration
- Stream 1 only
- Stream 4 only
- Optional work term
- Specialization work term
- The Sloan Program
- The Actuarial Science Program
- The Chartered Accountancy Program
- The Management Accountancy Program
- The Math Teaching Option
- The Science Teaching Option
- The Science and Business Option

### Additional Notes
- This term is spent at a Faculty of Education.
- This term is optional.
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- This term is optional.
CAFCE Accreditation

The University of Waterloo is a member of the Canadian Association for Co-operative Education (CAFCE). In 1979 CAFCE established the Accreditation Council to regulate post-secondary co-operative education programs in Canada and to accredit those programs which meet specific criteria. The purpose of the accreditation process is to ensure the quality of the co-operative education program. Accredited Programs must meet the following criteria:

Guidelines
- each work situation is developed and/or approved by the co-operative educational institution as a suitable learning situation;
- the co-operative student is engaged in productive work rather than merely observing;
- the co-operative student receives remuneration for the work performed;
- the co-operative student's progress on the job is monitored by the co-operative educational institution;
- the co-operative student's performance on the job is supervised and evaluated by the student's co-operative employer;
- the total co-operative work experience is normally fifty percent of the time spent in academic study, and in no circumstances less than thirty percent.

Seeking Employment and Employer Interviews

Seeking Employment
Students are expected to seek employment through the interview process arranged by Co-operative Education and Career Services. The interview process occurs each term and consists of two distinct interview procedures. The "rank/match" process begins approximately a month after the start of the academic term. Employers arrange to come on campus for a block period of time, usually 2½ weeks, to interview applicants. At the end of the period the rankings of the employers and the students are “matched” and the results posted. Thereafter employers are continually on campus interviewing and making job offers on a "continuous" basis. Under this system students are expected to accept their first job offer. Students must consult with the appropriate department staff member immediately after an interview if they cannot commit to the job as discussed.

Students may not seek employment directly with a Co-operative employer unless specific arrangements are made with the Department. Students who wish to arrange their own work term employment must have the position evaluated by the Department before it can be considered for credit.

Initial Job Application
The maximum number of initial job applications allowed may vary from time to time, depending on the number of job opportunities and students seeking employment. The maximum number will be specified in co-op publications.

Release of Information
For those students seeking employment through the interview process, copies of their Co-operative Student Record, academic grades and resumes are made available to prospective employers. A file which includes the Co-operative Student Record, mark reports, "Employer Evaluation of Co-operative Student" forms, records of Co-coordinator interviews, etc., is kept for each Co-operative student. This confidential file is made available for examination with proof of identification. No information may be removed from the file.

Ranking Employers
Students are required to rank all employers by whom they are ranked. Ranking an employer indicates an agreement to work with that employer. Refusal to accept the job will normally be recorded on the Co-operative Student Record as: “Failed work term - refusal to honour previous agreement.”

Missing Interviews
Students are expected to attend all individual interviews granted to them. Students who anticipate missing an interview for just cause should inform the Department immediately so that other arrangements can be made. Students who miss interviews without just cause may be withdrawn from the placement program and placed “On Own - University Imposed”.

Signing Off Employment
Students may remove themselves from consideration for a potential job before the offer is made. The reason must be in writing and consistent with Departmental guidelines. Failure to obtain approval for a sign off may result in the student being placed “On Own - University Imposed”.

Acceptance of Employment
When students receive an offer of employment, they sign an “Acceptance of Employment” form, signifying their knowledge of having a work-term commitment with an employer.

Letter of Acceptance
Each student is expected to write a letter of acceptance to the employer following notification of employment.

Work Terms

Quantity
Upon entry to a Co-op program, a student is expected to follow the work-term/academic-term sequence which corresponds to that particular program. A student may, for one reason or another, fail to satisfactorily complete the full complement of work terms. For these students and for students given advanced admission to a Co-op program,
a certain minimum number of satisfactory work terms must be completed before graduation, namely, a number of work terms/months equal to, or greater than, half the number of academic terms/months in the program from the time the program begins. In those Faculties which offer both Regular and Co-operative programs, the minimum number of related work terms required for a Co-operative degree is normally four. In those Faculties offering only the Co-operative program, the minimum number of work terms normally equals the number of work terms available and remaining to the student in the program from her/his point of entry.

Allowance can be made for personal considerations, educational opportunities, and other "On Own" conditions with prior approval from the Department of Co-operative Education and Career Services. However, "On Own" conditions do not count toward the minimum requirements for graduation.

Performance Evaluation
Evaluation grades are recorded on the "Employer Evaluation of Co-operative Student" form or on a special form developed in conjunction with a professional licensing body. The student should ensure that the employer has sent a completed evaluation to the University.

Academic Record for a Student Enrolled In a Co-operative Program
The Student Academic Record for the student's last academic term will be sent to the Co-operative employer unless the student notifies the Department of Co-operative Education and Career Services to the contrary prior to the commencement of each work term.

Failure to Report to Employer
Failure to report to an employer will be recorded on the Co-operative Student Record as "Failed work term - terminating employment without prior approval". Withdrawal from the program may also be required.

Leaving Employer Without Prior Approval
Terminating employment without prior approval from the Department of Co-operative Education and Career Services may result in the Co-operative Student Record having the notation "Failed work term - terminating employment without prior approval". Withdrawal from the program may also be required.

Strikes
It is each individual student's responsibility to decide whether or not to cross a picket line in the case of a strike. The role of the Co-ordinator in this situation is to inform the student of the potential results of either decision.

Dismissed With Cause
Dismissal of a student by an employer will be investigated by the student's Co-ordinator and will normally be recorded on the Co-operative Student Record as "Failed work term - dismissed with cause".

Co-operative Education and Career Services
Work Terms

Commitment
A minimum of two consecutive work terms with an employer is expected. However, provision is allowed for such situations as one-term jobs and economic uncertainty. In all cases, failure to obtain approval from the appropriate Co-ordinator to not return for a second consecutive work term will normally be recorded on the Co-operative Student Record as "Failed work term - refusal to honour previous agreement".

Unsatisfactory Performance
Unsatisfactory performance by a student on a work term is investigated by the student's Co-ordinator. If benefits from further professional training are questionable, the student may be required to withdraw from the program.

On Own
This condition, as recorded on the Co-operative Student Record, does not count towards the minimum requirements for graduation. This terminology is used to denote the following conditions:

On Own - Self Imposed: The student has been granted a term off by the Department of Co-operative Education and Career Services for personal reasons. This condition may be changed on the Student Record should the student find suitable employment through her/his own efforts.

On Own - University Imposed: This notation normally indicates that a student has not complied with a program regulation or procedure. Reasons for this notation include, but are not restricted to, missing interviews without just cause and failure to obtain approval to sign off a job.

On Own - Non-Credit Term: The student was unable to obtain suitable employment through the normal interview process. If suitable employment is subsequently found, Student Records will be altered accordingly.

Change of Term Sequence
Term sequence changes are considered by the Faculty in which the student is enrolled. Application, in the form of a letter from the student (supported by an employer and/or a Co-ordinator) must be made to the appropriate Assistant Registrar. For some Faculties, an appropriate application form must be completed. Normally, the request should be made within the first two weeks of the term preceding the switch point. In addition, the student's academic performance must be "in good standing". It should be noted that the student's academic program may be restricted due to a lack of choice of core or elective subjects during particular terms.

Communication with the Department of Co-operative Education and Career Services
Each student is expected to maintain communication with the Department on all matters pertinent to participation in the Co-operative program. Consultation with the appropriate Co-ordinator, Program Administrator or Placement
Advisor is essential when regulations and procedures for Co-operative programs are an issue. It is the student's responsibility to ensure that her/his student file is updated and accurate.

Harassment/Discrimination
The Ontario Human Rights Code indicates "Every person who is an employee has the right to be free from harassment in the workplace". The University has a commitment to its students while engaged in University related activities on and off campus. Should harassment occur in a Co-op workplace, contact a Harassment Advisor in the Co-operative Education and Career Services Department.

Standings and Appeals
Applicable to information regarding "Seeking Employment and Employer Interviews" and above. The Department of Co-operative Education and Career Services which administers these Regulations and Procedures will first present any notation of "Failed Work Term", "On Own - University Imposed", or "Required to Withdraw" (as a result of unsatisfactory work-term performance) to the appropriate Faculty Examinations, Promotions and Standings Committee for a decision. The student is notified by letter of the final decision made by the Committee. The decision may be appealed through the normal appeal channels within the Faculty.

Work Reports

Quantity
Generally, the minimum number of satisfactory work reports required for graduation is four, the first one to be written during the first work term. Exceptions to this requirement are stated in the calendar or in the individual student's file. Employers may also require additional reports from students as part of the job. Normally, for a report to be considered, it must have been written during the work term and be related to or evoked by the work-term activity.

Grading
Work reports are graded as "Outstanding", "Very Good", "Satisfactory", "Unsatisfactory" (resubmit) or "Unacceptable". Provision is made for students to upgrade "Unsatisfactory" work reports for re-evaluation by the beginning of the student's next academic term.

Content and Format
The University provides a common set of written guidelines for all Co-operative programs. Some Faculties/Departments also provide written addenda.

Confidentiality
In programs where a faculty member or a Co-ordinator normally evaluates the report, provision may be made for the appropriate Co-ordinator or Employer to evaluate a confidential report. Some Faculties/Departments may provide more specific requirements in published addenda. Students should consult with their Co-ordinator or Program Administrator before writing a confidential work report.

Evaluator
Each program has a policy stating that work reports are evaluated and graded by either a faculty member, an Employer, a Co-ordinator or some combination of these.

Receipt and Return
When the work report is to be evaluated by a faculty member or a Co-ordinator, the report is presented by the student to the Department of Co-operative Education and Career Services and a receipt is issued. Normally, the report may be retrieved from the Faculty/Department responsible for the evaluation. Reports that are not picked up by the first week of the student's next academic term are destroyed. If the student is in a program where the Employer evaluates and grades the report, a copy of the report must be turned in to the Department of Co-operative Education and Career Services at return-to-campus time. No copy is required if the report has been declared "confidential" by the Employer.

Graduation Requirements for Co-operative Programs

WORK TERMS

Quantity
Students need to achieve standing in the required number of work terms as specified for their program. See "Work Terms" for specific requirements.

Performance Evaluation
In those programs with a stated minimum number of work terms, this number is also the minimum number of satisfactory work terms.

In programs having no stated minimum, the required number of satisfactory work terms is one less than the number of work terms remaining in the program from point of entry, provided that the number of work terms available to the student is greater than five; otherwise, all work terms must be satisfactory.

WORK REPORTS

Quantity and Grading
In most programs, the submission of a minimum of four work reports graded "Satisfactory" or better is a requisite for graduation. Provision is usually made for students to upgrade unsatisfactory reports or submit new reports. Special arrangements may be considered for cases such as those for which there are fewer than four work terms available to the student, and for other special situations which might arise.
Registration Through Final Term
All work terms must be completed before the final academic term and the last work report must be submitted no later than the beginning of the final academic term. In all Co-operative programs, students must be registered as full-time students in the program in all terms from point of entry through to the final academic term. The only exception occurs in programs on a credit system in which a student may have sufficient credits to be able to register as a part-time student in the final term, provided all full-time term requirements of the Faculty have been met.

Co-operative Degree Designation
Since Architecture and Engineering are mandatory Co-op programs, University of Waterloo graduates in those disciplines are known to have gone through the Co-operative system. In programs which can be taken on the Co-operative or Regular basis, graduates completing the Co-operative plan requirements will receive a "Co-operative" degree designation.

International Co-operative Education
There are opportunities for co-operative education students to participate in programs at Universities abroad. Eligibility, criteria and procedures are determined by faculties. Student inquiries should be directed to the appropriate faculty member.

Co-op Japan Program
The Co-op Japan Program is a national, multi-university program established in 1991 under the auspices of the Federal Government Pacific 2000 Japan Science and Technology Fund.

The goal of the program is to develop a pool of young Canadian engineers and scientists with hands-on experience in Japanese industrial engineering and research practices. By enabling university students to develop an understanding and appreciation of Japanese industry and by providing Japanese companies with the opportunity to take advantage of highly skilled and motivated students, the Co-op Japan Program encourages long term opportunities for scientific and industrial exchange between Canada and Japan.

Program Prerequisites
- Open to 2nd, 3rd and 4th year students currently enrolled, full-time in engineering, science, or computer science programs
- Minimum academic performance B+ or 75% average
- Minimum 8 months prior related work experience
- Time commitment: 8-12 months
- Minimum age: 19 years
- Open to Canadian citizens and permanent residents of Canada
- English language fluency

Co-operative Education and Career Services
Co-operative Degree Designation
International Co-operative Education
Waterloo Advisory Council

Application and Employment procedures
- Employment period, including language training, will normally be 8-12 months in duration.
- First 4 weeks will be a mandatory intensive language and culture preparation program. A student fee is levied for this program.
- Following completion of the language and culture program, the students will go directly to Japan.
- Students are housed by the receiving company and receive a living allowance and local commuting expenses.
- Student information packages are available from the Co-op Japan Program office in Needles Hall, Room 1079.

Waterloo Advisory Council
The Waterloo Advisory Council of the University of Waterloo was established in 1958 to bring guidance from business, government and industry to the University. The Council meets twice a year to discuss and make recommendations on items related to all aspects of the University.

D.B. Beldam (President)
Clarke, Henning & Beldam Ltd.
R. Francis (Vice-President)
Deloitte & Touche
T.F. Corcoran (Past President)
Bell Mobility
J.E. Moore (Secretary)
DMR Group Inc.
J.A. Howard (Membership Chair)
J.M. Schneider Inc.
R. Alarie
Paragon Engineering Ltd.
J. Bailey
Ontario Hospital Association
L. Bish
Regional Municipality of Waterloo
J. Bishop
Environment Protection Labs
J.R. Briant
Grand River Collegiate Institute
W. Carter
W.S. Carter Holdings
P. Clark
Novacor Chemicals Ltd.
F. Clegg
Microsoft Canada Inc.
D.R. Cox
Castek Software Factory Inc.
S.P. Crawford
The Co-operators Group Ltd.
J.P. Dillon
Basics Office Products
C. Edmonds
UMA Environmental
Student Advising Co-op (SAC)

The Students Advising Co-op is the formal liaison between students and the Department. The Committee consists of Co-op students appointed by the various Student Societies. These members advise the Department on matters of policy and procedures from the students' points of view.

Career Services

Career Resource Centre Supervisor
K. Mahoney, BA (Waterloo)

Assistant Supervisor
A. Lynch

Marketing Co-ordinator
J. Cullen, BA (Waterloo)

Career Advisor
C.A. Olheiser

The Career Services unit of the department offers a variety of services designed to assist all students with their career preparation. The Career Resource Centre houses a comprehensive reference library of career resource materials; each term workshops, seminars on career building skills are available on a group or individual basis; and an interview/employment process is available for graduating students and for alumni of the University.

Career Services facilities and services are available to all UW students and alumni.

Career Resource Centre
NH 1115, ext. 4047

Career Planning: occupational descriptions, job search materials and some national/international job postings, volunteer and entrepreneurial information

Education: universities, colleges, test applications, non-traditional education

Employer Information: employer files, videos and directories

Work/Study Abroad: programs and guides to going overseas

Career Preparation Services

NH 1115, 888-4047

Materials: Review printed and video materials in order to explore career options.

Group Sessions: Attend information sessions and workshops to enhance skills in career planning, self-assessment, researching occupations, résumé and letter writing, interviewing, job search, networking, and more.

Student Career Advisors: Students trained in the areas of career planning and job search are ready to help during the Fall and Winter terms with résumé and letter writing, interview skills and job search strategies. SCA office hours are posted around campus and in Career Services.

Individual Appointments: an appointment may be scheduled with a Career Advisor to resolve any concerns.
Employment Network
NH 1115, 888-4047

Part-time, Summer Jobs: advertised throughout the year, in the Career Resource Centre.

Graduating Students: Regular and Co-op programs in all disciplines. Students may register in September of their graduating year (or the May prior for co-op students off-campus in the Fall) to pick up their copies of The Graduate newspapers. Interviews are held on campus during the Fall and Winter terms. For additional jobs during the Winter term, check in the Career Resource Centre.

Alumni: Inquire about the Employment Network job publication that enables UW Alumni to gain personal access to all permanent and contract jobs received by Career Services.

Short Term Contract: Alumni and graduating students seeking temporary employment, may register with Career Services.
The University Library

Davis Centre Library: a second home to students.
The University Library

University Librarian
M.C. Shepherd, BEd (Saskatchewan), MA (LS) (Denver)

Co-ordinator, Library Resources Management
L. Beattie, BA (Loyola of Montreal), MA, PhD (Waterloo)

Library Development Officer
M. Stanley; BA (Waterloo)

Head, Special Collections Department
S. Bellingham, BA (Waterloo Lutheran), MLS (Western Ontario)

Librarian
R. Lamb, BA (Guelph), MLS (Western Ontario)

Collections Division

Co-ordinator, Cataloguing
B. Graf, BA (Waterloo)

Cataloguer (Materials Acquisition Department)
J. Kuhn, BA, MA (Creighton), MLS (Western Ontario)

Head, Interlibrary Loan and Document Delivery
F. Abrams, BA (Sir George Williams), MLS (McGill)

Co-ordinator, User Services
S. Routliffe, BA (Carleton), MLS (Western Ontario)

Co-ordinator, Management Information Services
A. Lakos, BA (Jerusalem), MLS (British Columbia)

Information Division

Head, University Map and Design Library
R. Pinnell, BSc (Toronto), MSc, MLS (Western Ontario)

Cataloguer (University Map and Design Library)
A. Chan, BA (Hong Kong), MLS (Western Ontario)

Head, Porter Reference and Collections Development Department
M. Hendley, BA (College of New Rochelle, N.Y.), MLS (Western Ontario)

Reference and Collections Development Librarians (Porter)
M. Aquan-Yuen, BA, MLS (Toronto), MA (Waterloo)
H. Calogerdls, BA, MLS (McGill)
D. Fitzpatrick, BA, MA (Windsor), MLS (Toronto)
J. Forgay, BA (Regina), MA (McMaster), MLIS (Western Ontario)
C. Jewell, BA (C.W. Post College of Long Island University) MA, MLS (Toronto)
S. Moskal, BSc, (Wisconsin, Madison), MLS (Western Ontario)
E. Murphy, BA (St. Mary's), MLIS (Dalhousie)
S. Rahman, BA, MA (Punjab), MA (Waterloo), MLS (Indiana)
M. Sawchuk, BA, BEd, MLS (Western Ontario)

Head, Davis Reference and Collections Development Department
J. Macdonald, BSc, BEd (Dalhousie), MLS (Western Ontario)

Reference and Collections Development Librarians (Davis)
J. Cummings, AB, MLS (California, Berkeley)
A. Fullerton, BSc (Queen's), MSc (Dalhousie), MLIS (Western Ontario)
Y. Gordon, BA (Manitoba), BLS (Toronto)
W. Macpherson, BSc, MLS (Dalhousie)
J. Parrott, BSc (Queen's), MSc, BLS (Toronto)
C. Stephenson, BSc (Guelph), MLIS (Western Ontario)

Co-ordinator, Computer Assisted Reference Service and Industrial and Business Information Services
D. Morton, BSc, MLS (Western Ontario)

Systems

Networked Information, Research Associate
W. Oldfield, BA (Waterloo Lutheran), MLS (Western Ontario)

Electronic Resources and Services Librarian
M. Wan, BSc (Hong Kong), BMath (Waterloo), MA, MLS (Western Ontario)

Library Systems, Support Services
L. Teather, BA, MLS (British Columbia)
The University Library

The University Library is on the World Wide Web at: http://www.lib.uwaterloo.ca.

The Library is central to the academic programs of the University. Its function is to provide access to information (books, journals, and other information sources) to support these programs. The library staff, aided by the university community, works to make the library a base for teaching, study and research. The University Library is composed of two divisional libraries, the Dana Porter Library, and the Davis Centre Library; one branch library, the University Map and Design Library; and one reading room, the Optometry Learning Resource Centre.

The ten storey Dana Porter Library is situated in the centre of the campus. The lower floors house the main public services and support services. Public services located on the first floor include the Doris Lewis Rare Book Room, and the microform collection. The second or main floor contains the Circulation Counter and the Information Desk. Also on the main floor are the Copy Centre and the Reference Collection. The periodical collection and Interlibrary Loan are located on the third floor. Government publications is located on the fifth floor. Catalogue terminals are located on each floor with a bank of terminals located on the second floor. Floors six through ten house the circulating book collection and contain seating accommodation for more than 1,398 library users.

The Dana Porter Library houses collections to support programs in the social sciences and humanities. The collection numbers over 2,590,000 items including books, pamphlets, theses, microforms, documents, reports and other material. The Library subscribes to over 3,179 serials and over 40 newspapers.

The Davis Centre Library is located on the main floor of the William G. Davis Computer Research Centre. The three principal public areas – the Catalogue, the Circulation and Information Desks – are visible from the entrance to the Library. Seating is provided for 755 library users.

The Davis Centre Library houses collections to support programs in engineering, mathematics and science. The collection numbers over 468,000 items including books, microforms, government publications, technical reports and maps. The Library subscribes to over 2,568 current serials.

The University Map and Design Library is located on the main floor of the Environmental Studies I Building. It is the principal centre on campus for the provision of service relating to cartographic and architectural design materials. The collection consists of more than 119,749 items including maps, air photographs, books, theses, and periodicals.

The Optometry Learning Resource Centre contains the Library's collection in the field of optometry.

The Library uses an on-line circulation control system to record the loan of material to library borrowers.

WATCAT, the online catalogue, is the central record of the library's catalogue holdings. WATCAT may be searched from any terminal in the library, elsewhere on campus or from any location off campus using a terminal and a modem.

The UW Electronic Library (UWELib) is the Library's homepage on the Internet. It is designed to help UW Library users access information on the World Wide Web. The UW Electronic Library offers: direct access to WATCAT, the online catalogue; electronic forms for Interlibrary Loan service; access to discipline specific resources around the world; keyword searching on the Internet using search engines; references to current journal articles via UNCOVER, an online periodical index database and document delivery service; and much more.

An electronic reference service (ASK) is available to any member of the University community with access to an electronic mail system or through the UW Electronic Library. The service is meant for brief factual questions and is not intended to replace the need for direct in-person instructional assistance and in-depth research. The service provides an alternative means of communication that can be used at any time of day regardless of hours of staffing at the Information Desks.

Special services including microcomputers with voice output, large print readers, a brailer and four-track cassette recorder and playback units are available for the visually handicapped. Two rooms in the Dana Porter Library are available for use by the visually handicapped and their readers. The Library can also provide access to talking book material through the W. Ross Macdonald School, Brantford. TDD equipment is located in the Dana Porter Accessibility Office to serve the needs of the hearing impaired. All libraries are accessible by wheelchair.

The Federated and Affiliated Colleges (St. Jerome's, Conrad Grebel, and Renison) have their own libraries which are accessible to University of Waterloo students, staff, and faculty. The St. Jerome's College Library houses a collection of approximately 40,000 volumes reflecting the broad range of courses taught at St. Jerome's, with particular strengths in English Literature, History, Psychology and Religious Studies. Most items are accessible through WATCAT. Conrad Grebel College has over 32,000 items with special emphasis on Peace, Anabaptist-Mennonite studies, Music, and Religious Studies. The library is located on the third floor of the Academic Building and participates in the on-line catalogue and circulation system of the UW Library. It is also the home of a Mennonite Library Archive which consists of church records and documents of the Mennonites of Ontario. The 10,000 volumes in the Renison Library serve the College's Social Development Studies Program and its courses in East Asian Studies and General Arts. A small section deals with Anglican theology.

The University of Waterloo Library participates in a Direct Borrowing Program sponsored by the Ontario Council of University Librarians (OCUL). The program allows students, staff and faculty members to borrow in person from all of the following libraries: Brock; Carleton; Guelph; Lakehead; Laurentian; McMaster; Ottawa; Queen's; RMC; Ryerson; Trent; Waterloo; Western; Wilfrid Laurier; Windsor; and York. Graduate students, staff and faculty members may also borrow directly from the
libraries of: Ontario College of Art (OCA); Ontario Institute for Studies in Education (OISE); and Toronto. To obtain information about collection strengths at these libraries, please ask at the Information Desk in the Dana Porter and Davis Centre Libraries.

The staff of the University Library is engaged in obtaining material, processing it for the collections, and providing access to the collections. During the day and evening, reference and user services staff are on duty to assist in the use of collections, facilities and services. The libraries remain open after reference and user services close.

Service to the business and industry community is provided through the Library's Industrial and Business Information Service (IBIS). The Service draws on the collections at Waterloo and other institutions, including hundreds of databases around the world. The Service, available for a fee, can be used in person, by phone, mail, or electronic mail.

The Library provides a comprehensive assortment of publications that describe its services and collections.

The University Library offers a full range of orientation and instructional services designed to introduce users to the Library and to assist them in their use of library resources. Ranging in scope from introductory tours to term-paper strategy sessions, these services are available at scheduled times and upon request throughout the year.
Creating intricate models in the Computer Graphics Lab, Davis Centre.
Computing Services on Campus

APPLIED HEALTH SCIENCES COMPUTING OFFICE
Associate Dean for Computing
R.P. Wells, BSc (Manchester), MEng (McMaster), PhD (Manchester)
Co-ordinator of Computing
T.O. Stewart, BA, MA (Waterloo)

The mandate of the Applied Health Sciences Computing Office is to provide a wide range of computing and consulting support for students, faculty and staff of Applied Health Sciences.

The Computing Office maintains a UNIX server for general computing and especially for the analysis of large statistical databases. X-windows workstations allow access to various UNIX-based graphical software.

The Computing Office also maintains a WATSTAR network for students that provides access to a full range of PC-based software, including Windows applications, word processing, statistical and graphics software.

In the research labs, many other forms of computing and testing equipment are supported. Equipment varies by area of study and includes highly specialized commercial and custom equipment.

Computing and statistical consulting are provided on a regular basis. Courses on the use of equipment and software are offered frequently both by the Applied Health Sciences Computing Office and by the Department of Computing Services.

ARTS COMPUTING OFFICE
Associate Dean for Computing
D. Kennedy, BMath (Waterloo), MBA (McMaster), MS, PhD (Cornell)
Manager
V.G. Neglia, BSc (Waterloo)

The Arts Computing Office (ACO) is a computer resource and consulting facility for members of the Faculty of Arts. The Office addresses the special computing needs of those in the Humanities and Social Sciences. To this end the office is staffed by trained consultants available to help users with their problems. The ACO operates UNIX systems on DEC 5000 and DEC 2100 computers and a WATSTAR system which is a network of IBM PC microcomputers. The WATSTAR and UNIX systems are connected to the campus network enabling file transfer, electronic mail and other internet services between these systems and other systems on and off campus. Both undergraduate and graduate students registered in the Faculty of Arts may apply for a no-charge computer account, allowing them access to the internet, e-mail and a variety of software such as spreadsheets and graphics for use with their academic courses. However, a small fee is charged for accounts that allow word processing.

Documents requiring printing may be done on Postscript Laser printers available 24 hours a day for a small charge. Public terminals and microcomputer workstations reserved for use by members of the Faculty are located in PAS 1098, PAS 1102 and HH 236. Printer facilities are located in HH 236 and PAS 1099.

ENGINEERING COMPUTING DEPARTMENT
Associate Dean for Computing
To be announced

The Engineering Computing Department provides general-access and special-purpose computing resources for the Faculty of Engineering, for undergraduates, graduates, and faculty members involved in both teaching and research. It employs a variety of hardware platforms, operating systems, software packages, and delivery environments ranging throughout Engineering.

Term-use accounts are provided for all registered students on both our WATSTAR and UNIX systems, and specialty accounts may be set up for specific projects extending beyond one term.

Engineering WATSTAR
Our WATSTAR system is a DOS-based network which provides access to popular software packages (e.g. Windows, Word, Excel, Corel DRAW) along with centralized storage and backup of user files. Distributed printing facilities allow users to obtain a “hard copy” of what they are working on, and our Output Centre provides best-quality output at a nominal charge.

There are five general-access WATSTAR labs, and most departments within Engineering provide departmental labs for undergraduate use.

Off-campus users can access a limited number of WATSTAR machines using a modem to connect to the University Terminal Server.

Undergraduate UNIX
Undergraduate students can create an account on one of our UNIX machines, NOVICE, which allows them the opportunity to acquire or improve the UNIX skills many employers seek.

General Access Facilities
In addition to the open Watstar labs, we provide two rooms of X-terminals, which can communicate with any other on-campus UNIX machines.

Special Purpose Laboratories
Two engineering workstation labs are available for specific course and project work. A total of 35 full-colour UNIX workstations enables undergraduate users to explore new software packages for symbolic computation, computer-aided design, visual image processing, and mathematical simulation.
Computing Services on Campus

Consulting Support
In conjunction with the Department of Computing Services, we operate a consulting office to provide users with answers to their questions on supported operating systems and software. The service, available during core university operating hours, can be addressed by mail, telephone, or in person. The centre also develops and teaches special-interest courses for groups of users with specific computing needs.

Engineering Education Research Centre
The Engineering Education Research Centre (EERC) was established to improve the quality of undergraduate education, particularly through the use of appropriate information technology. The Centre co-ordinates a variety of special projects, as well as creating and managing new educational computing facilities.

ENVIRONMENTAL STUDIES COMPUTING: MAPPING, ANALYSIS AND DESIGN

Associate Dean, Computing
G.B. Hall, BA Honours (Otago, New Zealand), MA, PhD (McMaster)

Information and Services Technology Manager
M. Dumancic, BMath, MA (Waterloo)

Instructional Lab Co-ordinator and Office Manager
M. Ruehlke

Remote Sensing Systems and Instruction Manager
J. Piwowar, BES, MA (Waterloo)

Graphics and Computer-Assisted Design Systems Manager
P. Ochotta, BFA (Alberta), BArch (Waterloo)

Instruction and Geographic Information Systems Manager
L. Elliot, BES, MA (Waterloo)

The Mapping, Analysis and Design (MAD) facility provides a wide range of computing and consulting support for students, faculty and staff in Environmental Studies. Students have access to basic and advanced computing equipment, as required by their studies.

MAD supports three Macintosh computer networks which are available for graduate and undergraduate student use. The networks provide access to widely used productivity tools such as word processing, spreadsheets, statistical analysis, graphics packages, architectural design applications as well as advanced undergraduate and graduate courses in areas such as remote sensing and computer cartography.

MAD also supports a network of UNIX workstations for use in computer assisted architectural design, geographic information systems, remote sensing and information analysis located in the Magellan Centre. In addition, the John Geddes GIS Lab provides a network of PC based geographic information system tools.

Training sessions and consulting are provided by MAD staff and the Department of Computing Services.

MATHEMATICS FACULTY COMPUTING FACILITY (MFCF)

Director
J. Black, BSc (Calgary), Diplôme d'Ingénieur (Grenoble), PhD (Waterloo)

Manager – Hardware
K.L. Martin, BSc (New Brunswick), MASc (Waterloo), PE

Manager – Software
W.C.W. Ince, BMath, MMath (Waterloo)

Manager – Operations
G.P. Embro

The Mathematics Faculty Computing Facility (MFCF) has a dual mandate to provide researchers in the Faculty with shared access to general computing facilities, and to provide all departments of the Mathematics Faculty with computing services supplementary to those available from the Department of Computing Services. The principal service provided to meet this mandate is general purpose time-sharing.

At the present time, MFCF operates a wide range of UNIX equipment from manufacturers such as DEC, Sun, IBM, Sequent, and Silicon Graphics. Most users access these from colour or black and white X terminals. Software includes several text editors, electronic mail, user-controlled archiving, plotting, text formatting, typesetting, and a wide range of general and special-purpose languages.

Communication between machines is primarily implemented with Ethernets. Traffic between machines consists primarily of file transfers, electronic mail, print requests, software distribution, and remote logins. MFCF participates in the campus and worldwide internets, providing all members of the faculty with access to this important information resource in general, and to electronic mail and news in particular.

Users at terminals may access machines operated by MFCF via Ethernet, a campus-wide Sytek local area network, Gandalf modems, dial-up telephone lines, or Datapac. Hard-copy output can be obtained from a variety of line printers and laser printers. Many of the graduate student offices are equipped with X-terminals, which provide access to any of the on-campus computers.

Terminal rooms, which contain X-window terminals and a laser printer, are also provided for the use of faculty and graduate students.

MFCF operates a number of laboratories for use in graduate and undergraduate courses. These include a real-time programming lab, a microsystems lab, a Maple instructional lab, and two Macintosh labs for first-year computer science courses.

The MFCF is located in the Mathematics and Computer Building.
SCIENCE FACULTY COMPUTING

Associate Dean for Computing
To be announced

Computer Liaison Officer
A. Fleming, BMath (Waterloo)

The Faculty of Science has a broad range of computing facilities available to undergraduates. Courses are taught using six WATSTAR networks, with at least one in each of the four Departments and the School of Optometry. These networks are used by students in many courses. The networks typically have eight to 32 IBM-PC 386/486/Pentium microcomputers linked to a central file server. Students are allocated disk space on this unit according to the requirements of the courses. For general student use software, for word processing, graphics, statistics and general programming is provided. The network work-stations are linked to laser printers. A plotter and a film recorder for high quality output is also available. Students will also encounter computers in many of the laboratories as they are used as data acquisition and analysis systems in many scientific experiments. In the Microcomputer Interface Laboratory in the Department of Physics, students gain "hands-on" experience in both the hardware and software aspects of such interfacing.

To enable students to gain experience in the UNIX environment, students may obtain accounts on the Faculty server SCIBORG. This DEC machine, running under Ultrix, provides a broad range of additional software resources, as well as providing access to the Internet with Telnet and FTP.

A laboratory of ten X-Windows workstations was installed in the Fall of 1994 for the use of senior undergraduate students within the Faculty, primarily for use with graphics and modelling software.

Plans are also underway to provide software support for student-owned microcomputers.

More information on Computing Resources within the Faculty can be obtained from: Allan Fleming or Bob Hicks in ESC 254.

DEPARTMENT OF COMPUTING SERVICES

Director
To be announced

Associate Directors
To be announced

– Operations
B.E. Uttley, BMath (Waterloo)

– Systems and Development
R.W. Watt, BSc, MMath (Waterloo)

– Distributed Computing

The Department of Computing Services (DCS) is located on the first two floors of the Mathematics and Computer (MC) building. DCS provides user- and system-support services and maintains and operates the University's campus computer network, terminal-to-host communication facilities, and central computing facilities.

The campus computer network is part of the worldwide "Internet" computer network. Remote access to computers in the campus network is possible from the Internet. Dial-up access from the Kitchener/Waterloo area is available via a Terminal Server modem pool, from elsewhere in Canada via Datapac, and from other countries via their international connections to Datapac.

The central computing facilities are provided for instruction, research, and administrative use to augment facilities provided by the academic units. Computing resources for use by graduate and undergraduate students are provided within the faculty in which the student is enrolled, although a few academic units still use the central computing facilities for special-purpose applications.

The central facilities include a multi-user Unix system, multiple-choice-exam scoring, colour and black-and-white image scanners and laser printers, and various shareware software servers. There is also a small lab of Apple Macintosh computers and IBM PCs for which students can obtain a user-id for a small monthly charge.

DCS also provides a variety of user-support services, available without charge to all members of the university community:

Courses: instruction in the use of the university-supported applications software and the Windows/DOS, MacOS, and Unix computing systems.

Consulting Offices: to help you resolve difficulties encountered in the process of using a computer.

UW COMPUTER STORE (MC 2018)

Director
J.W. Dodd, BASc (Toronto), MSc (Waterloo)

The Computer Store is located in the Math and Computer building and offers a wide range of hardware and software products at well-discounted prices.

The Store carries a full line of computers from Apple, AST, Digital Equipment, Hewlett-Packard, IBM, IPC, Silicon Graphics and SUN Microsystems. Application software for DOS, Windows, Macintosh OS and UNIX operating systems is also available.

A guaranteed loan program is available to full-time UW students.

OTHER FACILITIES

In addition to these major centres, a number of other computer systems are located in various laboratories across the campus. Some of these are used in courses and others are dedicated to research.
The five program areas of the Faculty of Applied Health Sciences.
Faculty of Applied Health Sciences

The Faculty of Applied Health Sciences consists of the Departments of Dance, Health Studies and Gerontology, Kinesiology, and Recreation and Leisure Studies. No new students are being admitted to the Dance Program. Current Dance students must complete their degree requirements by the end of Winter term 1997. The major theme of the Faculty is the development of knowledge and programs related to health and well-being. Inasmuch as contemporary definitions of health and well-being, such as that of the World Health Organization, embrace the mental and social, as well as the physical dimensions of life, the activities of the Faculty address the contribution to be made to the effective understanding of these issues through an interdisciplinary approach.

The emphasis is on the interaction between biological and behavioural factors as they contribute to 1) promoting health, 2) treating disease, 3) minimizing the impact of disease, and 4) fostering enhanced quality of life. This is reflected in the variety of academic perspectives provided by the research and teaching activities of the various programs within the Faculty. These include identification of the factors which place individuals at risk for developing disease, using appropriate scientific methodology to address psychological and sociocultural influences, as well as basic biological mechanisms. This knowledge is applied to the strategic development of programs which enhance the health status of populations, as well as to the identification of the principles underlying effective large scale dissemination of such programs.

The study of leisure and cultural phenomena, their related environments and historical development, contributes to the development of leisure and cultural opportunities and practices which are integral to the well-being of groups and individuals. General and specific problems associated with leisure services include their public acceptance, financing, quality, quantity, distribution and modes of delivery. Interest in the impact of new technologies on leisure and cultural practices continues to increase.

The Departments of Health Studies and Gerontology, Kinesiology and Recreation and Leisure Studies offer both Regular and Co-operative programs. Dance is offered through the Regular program.

Computing Facilities

The mandate of the Faculty is to provide a wide range of computing and consulting support for students, faculty and staff of Applied Health Sciences.

The Applied Health Sciences Computing Office maintains a DEC 5000/200 Unix server for general computing and especially for the analysis of large statistical databases. X-windows workstations, located in the building, allow access to a range of Unix-based graphical software.

The Computing Office also maintains a WATSTAR network for students that provides access to a full range of PC-based software, including Windows applications, word processing, statistical software, graphics software.

Laser printing is available on site.

In the research labs, many other forms of computing and testing equipment are supported. Equipment varies by area of study and includes highly specialized commercial and custom equipment.

Computing and statistical consulting are provided in the building on a regular basis. Courses on the use of equipment and software are frequently offered both by the Applied Health Sciences Computing Office and centrally by the Department of Computing Services.

Dance

The Dance program is currently being phased out at the University of Waterloo. Students currently enrolled in the degree program must plan to complete the degree requirements by the end of Winter term 1997. Students should consult with their faculty advisor regarding the sequence of courses leading to graduation.

Courses offered by the Dance Department are available to interested students in other departments provided that course prerequisites are satisfied.

Health Studies and Gerontology

The Health Studies program provides students with an integrated curriculum that combines the behavioural, biological, social, and health sciences in the examination of contemporary problems in health promotion and disease prevention. The program explores the causation and prevention of diseases that contribute significantly to chronic disability and premature death, increased medical and social costs, and reduced quality of life. Of primary interest is the role of personal risk factors and societal determinants of health of individuals and populations throughout the lifespan. Special emphasis is placed on the prevention of major chronic diseases which have modifiable risk factors - these include coronary heart disease, cancer, diabetes, obesity, drug and alcohol dependency, sexually transmitted diseases, dementia, mental illness, and other disabling conditions. The inclusion of methodology courses in statistics, research design, computer science, program evaluation, and epidemiology allows students to acquire the analytical skills necessary to pursue challenging careers in the development, management, and evaluation of health promotion programs, or in many other health-related careers.

Additional qualifications may be gained through the Pre-Health-Professions Option for those students intending to pursue careers in medicine, other health professions, or health research. Several other options or minor programs (e.g., Biology, Personnel Studies, Management Sciences) may be selected to further develop individual interests and career goals.

The Department also offers a Minor, Option or Diploma in Gerontology for students interested in the issues related to aging. The Minor/Diploma in Gerontology provides an awareness of aging processes and prepares students for careers or professions that deal with the institutional care or community support of the elderly. It also offers professional development for those already working in the field, as well as an opportunity for non-specialists to increase their understanding of aging and the life challenges of the older person.
Career opportunities for Health Studies and Gerontology students exist in the public sector through the federal, provincial, and regional health agencies; in school, hospital, and institutional health programs; and through community health programs. In the private sector, employment opportunities are found in the voluntary health organizations, in health management consulting, and in health related industries such as pharmaceuticals, medical products, and health services. Graduates may also pursue further studies in health promotion, medicine, biomedical research, gerontology, public health, health administration, environmental health, epidemiology, education, and related fields.

Kinesiology
The Kinesiology program permits the student to study, in depth, the science of human movement. A primary feature of the program is the breadth and depth of preparation in the biological, physical and social sciences. This forms a career foundation for a future which will demand both competence and flexibility.

The program may be customized by selecting specialized electives within the department. Traditional electives (e.g., Anatomy, Physiology, Biomechanics) allow the development of expertise in research-based occupations such as gait analysis in rehabilitation, microgravity or underwater physiology, work-station design and worker efficiency. In keeping with contemporary applied emphases, competence may also be developed in advanced practicum courses in sports medicine, cardiac rehabilitation, and movement assessment. Project-oriented courses are offered in biomechanics, sport psychology, and clinical studies such as the role of cognitive dysfunction in motor skill. Students with this preparation in Kinesiology find careers in areas such as ergonomics, neurobehavioral assessment, special education, fitness management, and exercise therapy for the elderly. Further specialization in graduate schools or in professional programs (e.g., medicine or chiropractic) is also pursued by our top graduates.

The program may be further tailored to individual interests and careers by selecting elective courses in renowned departments on campus, many of which offer Joint Honours degrees with Kinesiology (see sections under 'Kinesiology') or a minor in joint (e.g., Chemistry, Biology, Computer Science). Several Option programs (e.g., Ergonomics, Gerontology, Management Studies, Neurobehavioral Assessment, Society, Technology and Values) may be taken to broaden the science base and elective specialization of the programs in Kinesiology.

Recreation and Leisure Studies
Recreation and Leisure Studies combines a knowledge of people, environments and management into an academic package that prepares graduates for careers in a variety of public and private agencies. In addition, the program provides a good foundation for future graduate studies.

This Honours Bachelor of Arts program allows students to obtain a proficiency in a specialization by taking one of the following options/specialization:

1. Business Option
2. Parks Option
3. Therapeutic Recreation Specialization

Students also have the freedom to complement their Recreation and Leisure Studies program with courses from a broad range of subjects offered outside of the Department. Business, Dance, Geography, Gerontology, Kinesiology, Planning, Political Science, Psychology, and Sociology are popular choices.

Through technical and report writing, group and independent projects, interactions with leading professionals from the field, research, applied computer work, presentations, and case studies, students develop professional skills which are marketable in many employment settings.

The diverse backgrounds of the faculty, the variety of courses from which students may choose, and the option to select the Co-operative or Regular mode of education, make Recreation and Leisure Studies at the University of Waterloo one of the leading programs of its kind in North America.

Degrees
Health Studies graduates receive an Honours Bachelor of Science degree. Kinesiology graduates receive either an Honours Bachelor of Science degree or a General Bachelor of Science degree. Recreation and Leisure Studies program graduates are granted an Honours Bachelor of Arts degree. Those students who graduate from a Dance program receive an Honours Bachelor of Arts degree or a General Bachelor of Arts degree. Studies in Gerontology lead to either a Diploma, or a Minor in Gerontology in conjunction with any type of Honours degree.

Graduates who have pursued their studies in a Co-operative program and who have successfully completed four work terms, four work reports, and who remain registered in the Co-operative program, will have the words “Co-operative Program” added to their University diploma.

Systems of Study

Co-operative System
In the Co-operative system of study, after the eight-month academic year, the student alternates four-month academic terms on campus with four-month terms of related work experience.

Arrangements for work assignments are made through the Department of Co-operative Education and Career Services of the University which provides the liaison between the campus and the field situation. Students should refer to The Dept. of Co-operative Education and Career Services for further details concerning the program.

Regular System
In Regular programs students normally attend school during the Fall and Winter terms.
Admission

The admission categories, requirements and procedures for all programs are outlined in detail in the "Admissions" section of this Calendar. The following points emphasize some of the admission requirements which relate specifically to programs in the Faculty of Applied Health Sciences.

Application from Ontario Secondary Schools
Applicants to Health Studies require six O.A.C.'s including Ontario Academic credits in both Biology and Chemistry.

Six O.A.C.'s including Calculus, Chemistry and one of Biology or Physics are required for admission to Kinesiology.

Six O.A.C.'s are required for admission to Recreation and Leisure Studies. In the Faculty of Applied Health Sciences students who have taken Psychology 101 as part of their Psychology major or minor degree requirements can substitute another free elective to satisfy their degree requirements.

Advanced Standing

Normally, students transferring to Applied Health Sciences programs from other universities are granted credit for courses in which they have received a grade of C- (60%) or better. All transfer students will be required to complete at least the equivalent of one half of their program at Waterloo regardless of the number of courses that are presented for transfer. Grades achieved in courses which are transferred are not used in the calculation of averages.

One term of advanced work experience standing may be granted to students transferring into the third year of Co-operative programs in Applied Health Sciences. Details are available from the Department of Co-operative Education and Career Services.

Students transferring to the Faculty of Applied Health Sciences from another University of Waterloo Faculty have two options with respect to the assignment of transfer credits. These options are:

Option One: All courses, both passed and failed, taken in other Faculties at the University of Waterloo are transferred and are used in the calculation of cumulative and major averages.

Option Two: Only courses in which a grade C- (60%) or better has been achieved will be transferred. These courses will not be used in the calculation of cumulative and overall averages.

English Language Proficiency Requirement

The Faculty of Applied Health Sciences feels that a student in any of its programs should be able to demonstrate competency in writing before qualifying for a degree. Therefore, all students entering an Applied Health Sciences program who do not have a credit in OAC English must write an English Language Proficiency Examination (ELPE) which is scheduled during registration week. A grade of 50% or better on the examination will satisfy the requirement. If a student fails the examination, the requirement can be satisfied by one of the following:

1. Sitting for the examination again and achieving a mark of 50%.
2. Successfully completing the assignments of the UW Writing Clinic.
3. Achieving a passing grade in one of ENGL 109, 129R, 140R, 209, 210, 240R.

This requirement normally must be met by the end of Year Two.

Note

Students who arrange a special sitting of the ELPE outside the scheduled dates will be assessed an administrative charge.

Psychology 101 Requirement

In the Faculty of Applied Health Sciences students who have taken Psychology 101 as part of their Psychology major or minor degree requirements can substitute another free elective to satisfy their degree requirements.

Examinations and Standings

1. Final Examinations

- Each student is required to provide evidence, as required by the instructor, of satisfactory participation in term work. The marks obtained for work during the term are used, in part, in determining standing.

The ratio in which marks for term work and written examinations are combined is at the discretion of the individual departments. To pass a course, a student must obtain a minimum of D- in the combined term and examination marks. Some courses and/or instructors may not require final examinations. In such cases term work only will be used in determining a final grade.

- Students absent from examinations, except for properly certified reasons, do not have make up privileges, and must repeat the entire course. If a student has a Doctor's certificate covering the precise period of absence, with legitimate medical grounds, it must be submitted to the Associate Dean for Undergraduate Studies within one week of the scheduled examination.

- All examinations which receive a failing grade are automatically reassessed by the instructor. Students who wish to question their final grade should document their reasons in writing and consult with the Associate Dean. This may lead to either requesting an official reassessment of the grade by a second reader or to an appeal.

- Examination results are issued to individual students by the Registrar. Appeals against faculty decisions made under these regulations should be made in accordance with the regulations laid out in the Student Grievance Policy (UW Policy #70).

Additional regulations concerning examinations may be found in "Examination Regulations".
2. Standing

- The Faculty has endorsed the letter grade system outlined in "Grading System" of this Calendar.
- Unless as otherwise indicated (see below), overall standing will be determined at the end of each academic year for Regular programs and upon completion of the B term for Co-operative programs. This will be based on the cumulative average of all courses taken at the University while enrolled in the Faculty (whether passed or failed).
- Students who have successfully completed fewer than ten term courses will be considered Year One; those who have successfully completed at least ten term courses but fewer than 21 will be considered Year Two; those who have successfully completed at least 21 term courses but fewer than 31, Year Three; and those with 31 or more, Year Four.
- It should be noted that all programs use the term-course system (see "Grading System" of this calendar for a description of this system).
- Students who are readmitted after being required to withdraw may choose to have their average cleared. See "Advanced Standing" regarding transfer credit options.

The following cumulative averages are required to proceed in the programs of the Faculty:

<table>
<thead>
<tr>
<th>Program</th>
<th>Overall</th>
<th>Major Field</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kinesiology Honours</td>
<td>63</td>
<td>67</td>
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<tr>
<td>Health Studies Honours</td>
<td>63</td>
<td>67</td>
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<tr>
<td>Kinesiology General</td>
<td>53</td>
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<td>67</td>
</tr>
<tr>
<td>Dance General</td>
<td>60</td>
<td>63</td>
</tr>
</tbody>
</table>

- Students in the Faculty of Applied Health Sciences who receive a grade report with one of F, INC, DNW or NMR in any one academic year are placed on probation for the following academic year. Probationary status must be cleared within one academic year or the student may be required to withdraw from the program. The decision accorded those students who receive a grade report with two or more of any combination of the following: F, INC, DNW or NMR in any one academic year is "May not proceed" in the program. Students who attain this status in any one term may be required to withdraw at the end of that term. (The designation F takes into account all failing grades, i.e. F-, F, and F+). A student may be required to withdraw from the Faculty of Applied Health Sciences at any time under special circumstances, such as the student leaving the program without notification or failing to write examinations.

If a student clears her/his, F, INC, NMR, and DNW grades prior to the next term or session, this grade change may result in a change in the decision on her/his grade report. When an INC is given in a course, all work in that course must be completed by a date acceptable to instructor and student up to two terms from the end of the term in which the course was first taken.

All grades awarded to a student are recorded on the transcript. If a student fails a course, then repeats the course and passes it, both courses are shown on the transcript and both marks are counted in the overall and/or major average. The same rule holds for a student who upgrades a course (e.g. from a D to a B) by taking the same course twice.

Students who are required to withdraw are eligible to apply for readmission only after one year's absence.

It is recommended that during this absence, students do some academic work (extension, distance education, or community college study). Performance in such course work will be taken into consideration in assessing applications for readmission.

For students assessed on the per course basis, net drop/add activity may change the fee assessment.

In general, a net add is assessed at the full rate while a net drop is assessed on the same basis as withdrawal. It is the student's responsibility to ensure the necessary payment for added courses is made promptly. Failure to do so will result in penalty charges being assessed. Refunds for dropped courses are mailed after week seven of a term (week two of Summer Session).

3. Dean's Honours List

To recognize outstanding academic achievement, the Faculty has established the Faculty of Applied Health Sciences Honours List. To be included on the Dean's Honours List at the end of each academic year, the student must normally be registered full-time (five courses per term) and must achieve a cumulative 80% overall average and a cumulative 80% major average. A student normally must be in the Faculty of AHS full-time for a minimum of two terms in order to be eligible for inclusion on the Dean's Honours List. The designation "Dean's Honours List" will appear on the student's transcript for that year. A student with a DNW, INC, IP, NMR, UR, or any failing grade on her/his record during that year will not be included on the list. A student who graduates with a cumulative 80% overall average and a cumulative 80% major average, and who, in addition, has no F on her/his record for any academic year will have the designation graduating "Dean's Honours List" appear on her/his graduation diploma.

4. Submission of Course Material

In situations where a student wishes to submit a body of material to satisfy the requirement of more than one course, the student must notify the instructors of both courses of her/his intention where the courses are concurrent so that they may each decide what is appropriate for their own course.

When one of the courses has been taken in a previous term, the current course instructor must be informed by the student of her/his intention of submitting the same course material. The current instructor has the final decision on the extent to which the material is allowed.

Failure of a student to comply with the above regulations constitutes an academic offence.
Program Selection

Full-time students: Students normally take five academic term courses in all terms in which they are registered. Part-time studies or reduced programs: Except in exceptional circumstances, an Honours program may not be taken on a completely part-time or reduced program basis.

All undergraduate Honours degree programs in the Faculty of Applied Health Sciences must be successfully completed within eight calendar years from the time the student enters the program. Students may complete a segment of their program on a part-time basis but, normally, must successfully complete a minimum of 50% of their degree requirements while enrolled in full-time study (i.e., minimum of five courses per term) in the Faculty of Applied Health Sciences. In the case of students who have been granted the equivalent of one year of advanced standing, the Applied Health Sciences program must be completed in seven years and in the case of students who have been granted the equivalent of two years of advanced standing, the Applied Health Sciences program must be completed in six years. The Faculty of Applied Health Sciences does not encourage part-time studies, with the exception of the Diploma in Gerontology. However, a General degree may be pursued on a part-time or reduced-program basis subject to approval by the Associate Chair, Undergraduate Studies of the department concerned. Normally, no first-year program for a full-time student may be reduced below the ten courses minimum except in very exceptional circumstances.

Auditing a Course

It is the responsibility of the student to inform the course instructor at the beginning of the course that he/she would like to audit the course. The instructor and student may then form a contract outlining the particular auditing requirements for that course.

Letter of Permission Policy

A student may request permission to take a course(s) at another university for credit at Waterloo. A maximum of ten term courses (or equivalent) can be obtained this way, provided the grade is C- or above. Approval to take courses by a Letter of Permission from another university must be obtained from the UW departmental Associate Chair, Undergraduate Studies. To obtain any approval the student must obtain a Letter of Permission Request form from the Registrar’s Office and provide the details of the course(s) to be taken, appropriate course descriptions and the reasons for the request. When approved and the appropriate fee paid, the Registrar’s Office will prepare the Letter of Permission and forward it to the student, the host university and the major department.

It will be the student’s responsibility to ensure that an official transcript is sent to the Assistant Registrar, Faculty of Applied Health Sciences, Needles Hall, University of Waterloo, Waterloo, Ontario within two months of the completion of the course(s).

Note

The granting of any Letter of Permission request by the University of Waterloo does not necessarily ensure that the student will be able to enrol in the approved course at the other university. There may be restrictions on class enrolments, etc. at that institution. Students should contact that institution’s Registrar’s Office for procedural details.

Distance Education Courses

The University offers distance education courses for those students who would like to study part time and/or are not able to attend classes on campus. In addition, distance education courses may, under some circumstances, be taken while on a work term. The Associate Chair for Undergraduate Studies is the only individual who can grant permission to enrol in a distance education course. Permission must be granted before the student enrolls in the course and/or the course commences.

Course and Program Changes

1. Up to the end of the first two weeks of lectures, the student may drop or add any elective course without approval, provided that i) he/she does not predetermine a section, ii) the calendar sequence is followed, and iii) there is no change from the full-time course load as defined by the program of study. In order to exceed the normal course load of five courses per term approval of the Associate Chair is required. Dropping or adding required courses must be approved on the drop/add form by a faculty advisor.

2. After the first two weeks of classes any course may be dropped provided the course instructor initials the drop, and either the Associate Chair or the Associate Dean for Undergraduate Studies signs the registration form. This policy will permit course drops only up to November 1 in the Fall term, March 1 in the Winter term and July 1 in the Spring term. In the event that any of the above dates fall on a holiday or weekend, the final drop day will be the last school day prior to the listed date.

3. Students may withdraw from a program without academic penalty up to November 1 in the Fall term, March 1 in the Winter term and July 1 in the Spring term. In order to withdraw from a program (i.e., the University) a student must complete a standard Student Withdrawal form which is available in the Registrar’s Office. This form must be signed by the appropriate Associate Chair, Undergraduate Studies.

4. Students who voluntarily withdraw prior to or during the full refund period will not have the term recorded on their academic record. Students who voluntarily withdraw from their studies after the first three weeks of classes and before any deadlines set by their Faculty, will have this noted on their transcripts with the statement “Voluntary Withdrawal From Term (effective date) — No Academic Penalty”. Students should note the financial implications of dropping courses or withdrawing from programs (see “Fees and Registration”).
Appeals
Appeals are governed by the UW Student Grievance Policy, (Policy #70), outlined briefly in this calendar. Appeals cover any academic grievance by a student where it is alleged that a University policy or regulation has been violated, or applied in an unfair or erroneous fashion. Section II of the Policy states that "Students are expected to seek remedies for their grievances promptly and normally must lodge a grievance within two months either of being notified of an adverse decision or from the end of the term in which the alleged event or series of events occurred. Six months after graduation, a student's right to initiate a grievance ceases unless substantive new evidence is obtained. Students are entitled to timely responses to their queries, including the reasons for which decisions are made." Appeal forms may be obtained by making an appointment to speak with the Associate Dean of Undergraduate Studies.

Petitions
Petitions cover any student request to deviate from established procedures or regulations, while not disputing these procedures and regulations. Petition for Exception to Academic Regulations forms may be obtained from the Associate Chair for Undergraduate Studies in each department. A Standings and Promotions Committee will review the petition and make a decision. This decision will be forwarded to the Associate Dean and to the Registrar, who shall inform the student.

ACADEMIC PROGRAMS

Dance
The Dance program is in the process of being phased out at the University of Waterloo. New or transfer students will not be accepted into the degree program. The Calendar provides guidance for students currently in the program to plan their courses toward graduation.

The Dance program at the University of Waterloo enables students to pursue dance as both academic and applied study.

The program features a core of courses ensuring an appropriately balanced knowledge and technical base for all students. Additionally students may opt to focus their elective courses around one of several areas including teaching foundations, documentation, and performance. Each of these focal areas targets a number of potential career fields.

Courses offered in 1996-1997 are available to students on campus provided they meet the prerequisites.

Joint Program with National Ballet School of Canada
This program presents a unique opportunity for the prospective teacher of classical ballet blending the academic and professional expertise of the National Ballet School and the Dance Department. Graduates of this program earn both an Honours degree in Dance and a Diploma from the National Ballet School.

Joint Honours Degrees
Joint Honours degrees are available with a number of departments. Requirements in the Joint Honours programs vary and students should consult the Associate Chair Undergraduate Studies in both departments regarding course sequencing, course or credit requirements, minimum averages, and required courses.

Minors
A minor program in Dance consists of ten term courses or the equivalent. Students must complete DANCE 110, 111, 230, 235, plus six term courses including a maximum of four term-course equivalents in Dance Technique.

Course Requirements
To be eligible for the Honours BA degree in Dance, students must successfully complete 42 term courses and maintain an overall cumulative average of 63% and a cumulative average of 67% in their Dance courses. To be eligible for the General BA degree, students must successfully complete 30 term courses and maintain a minimum overall cumulative average of 60% and a minimum cumulative average of 63% in their Dance courses.

Note
Course sequencing for each program should be developed in consultation with the Undergraduate Officer for Dance or the Faculty Advisor for Dance in Applied Health Sciences.

Honours Bachelor of Arts Degree Program
1. Required Dance Courses (13):
   DANCE 110, 111, 230, 235, 336; 351 or 353; 241 and 341 or 242 and 342; 409 or 410
   Two term-course equivalents in each of Ballet and Modern Dance Technique.

2. Required Outside Courses (four):
   Two English courses as approved.
   MUSIC 100 and 111

3. Dance Electives (nine):
   Nine term courses in Dance. Of these, up to four term-course equivalents may be in Dance Technique.

4. Arts Electives (six):
   The student must present at least six term courses from the Faculty of Arts.

5. Other Electives (ten):
   These electives may be taken in any department of the University of Waterloo.

Honours Bachelor of Arts: Joint Program with National Ballet School
1. Required Dance Courses:
   o For Program A* (14) DANCE 110, 111, 230, 235, 241, 264, 336, 341, 351, 366, 367, 409 or 410, 484, and one DANCE-Elective;
For Program B** (eight) DANCE 111, 241, 264, 336, 341, 367, 409, or 410, 484.

2. Required Outside Courses (two):
   Two English courses as approved.

3. Dance Electives (two)

4. Arts Electives (six):
   Students must present six term courses from the Faculty of Arts.

5. Other Electives (12):
   These electives may be taken in any department of the University of Waterloo.

Only students currently accepted and enrolled in the Joint Program may proceed in these programs.

* Program A: three years at the University of Waterloo followed by two years at The National Ballet School (NBS). Students must pass the Elementary Cecchetti Exam and the ISTD Elementary National Exam by the time they have completed third year at the University of Waterloo.

** Program B: three years at NBS followed by two years at the University of Waterloo. Students are registered as Non-Degree Dance students. Students will complete three distance education courses with the University of Waterloo and three courses in dance offered at NBS as part of the program at NBS. For details on the Teacher Training Program at NBS students should contact NBS in Toronto.

General Bachelor of Arts Degree Program

1. Required Dance Courses (12):
   DANCE 110, 111, 230, 235, 336; 351 or 353; 241 and 341, or 242 and 342
   Two term-course equivalents in each of Ballet and Modern Dance Technique

2. Required Outside Courses (four):
   Two English courses as approved.
   MUSIC 100 and 111

3. Dance Electives (three):
   Three term courses in DANCE, including up to two term-course equivalents in Dance Technique.

4. Arts Electives (six):
   Students must present any six term courses from the Faculty of Arts.

5. Other Electives (five):
   These electives may be taken in any department of the University of Waterloo.

Gerontology

The Area of Gerontology

In recent years there has been an increased interest in the older person and in the aging process. An important reason for this interest is the recent growth in the proportion of older people in the population of many countries, including Canada. A host of concerns has been raised by the changing age structure of the Canadian population, which can be addressed properly only by examining carefully the aging process and the circumstances of the older person— the field of study known as Gerontology.

Gerontology involves a number of disciplines. For example, Biologists investigate the changes at the molecular, cellular and organismal level that take place over time, with a view to possible modification. Gerontologists trained in fields such as Psychology, Sociology, Health Studies and Environmental Studies focus on other age-related changes in individual and population aging. To illustrate, psychologists examine the changes with age in psychological functions (perception, thinking, learning) whereas sociologists are interested in reciprocal relationships between the aging person and society. Similarly, those with a background in Environmental Studies direct their attention to the impact of the environment on aging.

The introduction of a multidisciplinary Gerontology program is intended to provide a focus to aging studies at Waterloo. The program of courses offered has three components: a Minor in Gerontology, an Option in Aging Studies and a Diploma in Gerontology. The latter component may be of particular interest to part-time, mature students. In addition, graduate studies and research are carried out within the program.

The Minor, Option and the Diploma represent multidisciplinary programs combining courses from a variety of departments such as Biology, Psychology, Sociology and Statistics. These programs are intended to enhance students' understanding of aging processes and to prepare students for careers in those professions which deal with the care of the elderly in other relevant professions. The programs provide professional development to those already working in these areas, and raise the awareness of the non-specialist for this important, emerging area of study and concern.

MINOR IN GERONTOLOGY

The Minor program is open to University of Waterloo students who wish to obtain some specialization in Gerontology.

Academic Requirements for the Minor

1. Students must be in an Honours or four-year General program at the University of Waterloo.

2. An overall minimum average of 67% in the ten academic courses.

3. Successful completion of the following ten courses.
Required Courses (three)
GERON 100/HLTH 150 Introduction to Gerontology
GERON 400/HLTH 400 Multidisciplinary Seminar on Aging
An approved course in statistics (a list of approved courses is available in the Undergraduate Office)

Restricted Electives (seven)
List A (four of the following)
GERON 210/HLTH 210/KIN 210 Growth, Development and Aging
GERON 217/HLTH 217/PSYCH 217 Aging and Basic Psychological Processes
GERON 218/HLTH 218/PSYCH 218 Aging, Dying and Death
GERON 255/SCI 255 The Biology of Aging
GERON 352/HLTH 352/KIN 352/SOC 352 Sociology of Aging

List B (three of the following)
ANTH 464 Human Development in a Cross-Cultural Perspective: Human Development, Aging and Death
CS 316 Introduction to Statistical Problem Solving by Computer
ECON 361 Cost-Benefit Analysis and Project Evaluation
GERON 220/HLTH 220 Health and the Family
GERON 245/HLTH 245 The Canadian Health Care System
GERON 401A/B Direct Studies in Special Topics
GERON 402 Epidemiology of Aging
HLTH 420/PLAN 432 Health, Environment and Planning
ISS 350D Adult Life Crises and Events
PHIL 226 Ethics and Life Sciences
PHYS 480 Radiation Biophysics
PLAN 431 Issues in Housing
PSYCH 236 Psychological Analysis of Human Sexuality
REC 361 Aging and Leisure
RS 271 Personality and Religion
SIPAR 378 Aging as a Spiritual Journey
SOC 415 Social Networks
SOC WK 240R Palliative Care
SOC WK 367R Social Work with the Elderly

OPTION IN AGING STUDIES
The Option in Aging Studies is open to University of Waterloo students who wish to obtain some interdisciplinary knowledge issues related to aging, but do not wish to complete the minor.

Academic Requirements for the Option
1. A minimum overall average of 67% in the six academic courses for the Option.
2. Normally all courses must be taken at University of Waterloo; there is no allowance for transfer of previous course credits from other institutions.
3. Successful completion of the following six courses.

Required Course (one)
GERON 100/HLTH 150 (normally should be taken before List A or List B courses)

Restricted electives (five)
Four of the following courses from List A Gerontology courses (see Course Requirements for the Minor in Gerontology).
GERON 210/HLTH 210/KIN 210, GERON 217/HLTH 217/PSYCH 217, GERON 218/HLTH 218/PSYCH 218,
GERON 255/SCI 255, GERON 352/HLTH 352/KIN 352/SOC 352
One of the courses from List B Gerontology courses

DIPLOMA IN GERONTOLOGY
The Diploma program is available to those students who would like some training in Gerontology but are not interested in completing all the requirements of an undergraduate degree. It is also available to those students who have already completed an undergraduate degree but would like to obtain a better understanding of aging phenomena.

Diploma Admission Requirements
The following are considered minimum admission requirements. Students will be considered on an individual basis to determine admissibility to the program.
1. Post-Secondary degree or diploma,
   or Secondary School diploma and minimum 2 years work experience in a relevant health/social sciences environment within the past 5 years.
2. Grade 12 Biology or equivalent or HLTH 101, within the past five years.

Transfer Credits
A maximum of 2.5 transfer credits (five term courses) can be granted to students who have taken courses at the University of Waterloo before enrolment in the Diploma. A maximum of 1.5 transfer credits (three term courses) can be granted to students who have taken courses from other institutions.

Academic Requirements for the Diploma
1. An overall average of 67% in the ten academic courses.
2. A work placement may be necessary depending on your experience.
3. A maximum of five years to successfully complete the program from the time the student first enters the program. This limit is adjusted downwards on a pro-rated basis for transfer students according to the number of transfer credits granted at admission.
4. Successful completion of ten courses.

Course Requirements
See Course Requirements for the Minor in Gerontology
Health Studies

In the Health Studies program the knowledge from several traditional disciplines is combined and focused on the study of health and disease. Courses provide students with an understanding of (a) what diseases are, (b) their causes, (c) behavioural factors that contribute to disease, and (d) ways in which health behaviour can be changed.

The curriculum has four core areas:

1. Health Sciences – the scientific facts and principles pertinent to personal and community health. Specific subject areas include:
   - introduction to health sciences,
   - determinants of disease (epidemiology),
   - environmental health,
   - nutrition, and others.

2. Behavioural Sciences – introduction to psychology and sociology, determinants of health behaviour and health behaviour modification.

3. Biological Sciences – the basic principles of biology, physiology and biochemistry.

4. Evaluation and Research – the principles of statistics and research design aimed at developing sufficient competencies to enable students to evaluate and interpret the findings of health-related research.

Students may apply for admission directly into the Honours Health Studies program, Co-op or Regular.

In order to receive the Honours BSc degree the student must successfully complete 40 term courses including the following requirements:

Degree Requirements

1. Required Health Studies Courses (15):
   - HLTH 101, 102, 210, 220, 245, 340, 341, 344, 346, 348, 349, 432 or 433/443, 442, 445

2. Required Kinesiology Courses (three):
   - KIN 222, 217*, 330

3. Required Courses from other departments (seven):
   - BIOL 230, 239, 273
   - CHEM 116
   - CS 316
   - PSYCH 101; SOC 101

4. Restricted electives (four):
   - One of: ENGL 109 (recommended for Year One) or 210C (recommended for Year Two)
   - One of: PHIL 207, 219J, 220, 226
   - Two of: BIOL 211, 240, 241, 437, 441, 454, 455
   - HLTH 350, 407, 443**

5. Free electives:
   - 1 term courses

   * KIN 217 laboratory is mandatory
   ** HLTH 443 is a restricted elective only for those students choosing the HLTH 432 sequence.

Course Sequence

Year One (Co-op and Regular)

<table>
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<tr>
<th>Fall</th>
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<tbody>
<tr>
<td>HLTH 101</td>
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<tr>
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<td>BIOL 239</td>
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<td>PSYCH 101</td>
<td>BIOL 273</td>
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<tr>
<td>SOC 101</td>
<td>CHEM 116</td>
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Regular Program

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<td>KIN 222</td>
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<td>HLTH 344</td>
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<td>CS 316</td>
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<td>Fall</td>
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<td>HLTH 432 or 433</td>
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<td>HLTH 442</td>
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Co-operative Program

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<td>KIN 222</td>
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<table>
<thead>
<tr>
<th>2B (Spring)</th>
</tr>
</thead>
<tbody>
<tr>
<td>HLTH 348</td>
</tr>
<tr>
<td>HLTH 348</td>
</tr>
<tr>
<td>HLTH 349</td>
</tr>
<tr>
<td>KIN 330</td>
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<table>
<thead>
<tr>
<th>Year Three</th>
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<tbody>
<tr>
<td>3A (Winter)</td>
</tr>
<tr>
<td>HLTH 210</td>
</tr>
<tr>
<td>HLTH 340</td>
</tr>
<tr>
<td>HLTH 344</td>
</tr>
<tr>
<td>CS 316</td>
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<table>
<thead>
<tr>
<th>3B (Fall)</th>
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<tbody>
<tr>
<td>HLTH 341</td>
</tr>
<tr>
<td>HLTH 431</td>
</tr>
<tr>
<td>HLTH 432 or elective</td>
</tr>
<tr>
<td>HLTH 442</td>
</tr>
<tr>
<td>Two Electives</td>
</tr>
</tbody>
</table>
Honours Health Studies Program
Pre-Health-Professions Option
This program combines the Health Studies Honours BSc degree requirements with a specified grouping of elective courses from Chemistry, Mathematics, Physics, Biology, Kinesiology, Sociology and Computer Science.

This Option is intended to provide suitable preparation for entry into medical school and other health professional schools, as well as for graduate study in health-related disciplines. However, students must consult the admission requirements of specific professional schools and graduate programs when choosing from the electives.

In order to graduate with this option, the following requirements must be met:

1. An overall cumulative average of 75% and a cumulative average of 75% in Health Studies courses.
2. Successful completion of 21.0 credits, including all the requirements of the Honours BSc Health Studies degree.
3. Successful completion of eight of the following courses (4.0 lecture credits):
   - CHEM 120/120L, 123/123L, 266/266L, 267/267L
   - MATH 107, 108
   - PHYS 111/111L, 112/112L
   - BIOL 240, 241, 402, 404, 436, 437, 441, 442, 444
   - KIN 102, 200, 201, 242, 300, 321, 340, 341
   - REC 250
   - CS 102 or CS 112

A Pre-Health-Professions Option is also offered by the Faculty of Science, and suitable preparatory courses may also be taken with a Kinesiology degree program.

Kinesiology

Listed below are the course combinations leading to the Honours and General degrees in Kinesiology. Students are encouraged to make full use of the advisory system of the Department in planning their programs.

DEGREE REQUIREMENTS

Honours Program
Successful completion of 40 term courses is necessary in order to obtain the Honours BSc degree in Kinesiology. The program must be completed in eight years.

1. Required Kinesiology courses:
   - KIN 102, 103, 200, 217, 222, 250, 255, 300, 321, 330, 335, 354, 470
2. Required courses from other departments:
   - BIOL 230, 273, CHEM 116, CS 102, MATH 107, PHYS 111/111L, PHYS 112/112L, PSYCH 101, SOC 101
3. Kinesiology Electives: ten courses from those offered in the Department in addition to the required courses. As part of their Kinesiology elective package, those students who wish to do so may specialize in one of the streams designated by the Department.
4. Electives: Of the remaining seven term courses, five must be chosen from outside the Department of Kinesiology.

Students should choose electives in consultation with their Faculty advisor.

General Program
The General degree is offered on a regular basis only and may be taken by part-time study.
In order to receive the General BSc degree a student must successfully complete 40 term courses including the following requirements:

1. Required Kinesiology Courses:
   KIN 102, 103, 200, 217, 222, 250, 255, 300, 321, 335, 354

2. Required Courses from other departments:
   BIOL 230, 273, CHEM 116, CS 102, MATH 107,
   PHYS 111/111L, 112/112L, PSYCH 101, SOC 101

3. Kinesiology Electives:
   Ten elective courses in Kinesiology.

4. Electives: Of the remaining ten term courses five must be chosen from outside the Department of Kinesiology.

   * SCI Division

## Course Sequence

### Honours and General Program

#### Year One

(Common to Regular and Co-operative programs)

<table>
<thead>
<tr>
<th>Fall</th>
<th>Winter</th>
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<tbody>
<tr>
<td>KIN 102</td>
<td>KIN 255</td>
</tr>
<tr>
<td>KIN 103</td>
<td>BIOL 273</td>
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<tr>
<td>BIOL 230</td>
<td>PHYS 112/112L</td>
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<td>MATH 107</td>
<td>CHEM 116</td>
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<tr>
<td>PHYS 111/111L</td>
<td>PSYCH 101</td>
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</table>

Students may choose a computer science course in place of an Elective in Year Two. CS 102 must be completed by the end of 3A or 3N.

### Regular Program

#### Year Two

<table>
<thead>
<tr>
<th>Fall</th>
<th>Winter</th>
</tr>
</thead>
<tbody>
<tr>
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<tr>
<td>KIN 217</td>
<td>KIN 321</td>
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<tr>
<td>KIN 222</td>
<td>KIN 300</td>
</tr>
<tr>
<td>SOC 101</td>
<td>KIN 354</td>
</tr>
<tr>
<td>One Elective</td>
<td>One Elective</td>
</tr>
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#### Year Three

<table>
<thead>
<tr>
<th>Fall</th>
<th>Winter</th>
</tr>
</thead>
<tbody>
<tr>
<td>KIN 335</td>
<td>KIN 330*</td>
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<tr>
<td>Four Electives</td>
<td>Four Electives</td>
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</table>

#### Year Four

<table>
<thead>
<tr>
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<th>Winter</th>
</tr>
</thead>
<tbody>
<tr>
<td>KIN 431* or 433*</td>
<td>KIN 470*</td>
</tr>
<tr>
<td>Four Electives</td>
<td>Four Electives</td>
</tr>
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</table>

### Co-operative Program

<table>
<thead>
<tr>
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<th>2B Spring</th>
</tr>
</thead>
<tbody>
<tr>
<td>KIN 200</td>
<td>KIN 300</td>
</tr>
<tr>
<td>KIN 217</td>
<td>KIN 321</td>
</tr>
<tr>
<td>KIN 222</td>
<td>KIN 330*</td>
</tr>
<tr>
<td>SOC 101</td>
<td>KIN 354</td>
</tr>
<tr>
<td>One Elective</td>
<td>One Elective</td>
</tr>
</tbody>
</table>

### Joint Honours Degree

Joint Honours degrees with Psychology and Economics are available in addition to that with Health Studies. Students should consult with the Undergraduate Officer in both departments regarding specific course sequences, course or credit requirements, and minimum averages.

### Health-Professions Preparation Stream (*)

A stream is a suggested list of courses to achieve a goal. This stream, available on either a Regular or Co-op basis, combines the Honours Kinesiology program and its emphasis on human applications, with specific suggestions in Biology, Calculus, Chemistry, Physics, Psychology and Sociology. It is intended to develop an academic profile which may prepare students for potential study in medicine, podiatry, chiropractic and speech pathology. It is also intended for the student whose interests develop into graduate study in the health disciplines. Students are strongly urged to consult the admission requirements of the professional schools of interest to aid in their choice of electives. Overall and major cumulative averages of 75% are considered minimal to be competitive for application to programs in the health-professions. A suggested course sequence is available on request from the Department of Kinesiology.

1. Required Kinesiology Courses (14):
   KIN 102, 103, 200, 217, 222, 250, 255, 300, 321, 330, 335, 354, 431 or 433, 470

2. Required courses from other departments (13.5):
   BIOL 230, 273, CHEM 120'/120L*, 123'/123L*, 266'/266L*, CS 102 (SCI) MATH 107, PHYS 111/111L, 112/112L, PSYCH 101, SOC 101

3. Kinesiology electives (ten):
   Ten Kinesiology courses including at least five of the following: KIN 201, 242, 340, 341, 356, 357, 401, 402, 405, 407, 416, 420, 425, 426, 432, 456, 472, 491, 492, 493

4. Electives (three):
   Three courses must be chosen from the following:
   BIOL 240, 239, 402, 404, 436, 437, 441, 442
   CHEM 267, 267L
   HLTH 341, 442
   HIST 209
   MATH 108
   OPT 105
   PHYS 480
Honours Co-op Kinesiology Programs

Ergonomics Option

Injuries occur in the workplace every day. While this a sad commentary on the quality of worker safety it presents outstanding challenges to Ergonomists/Kinesiologists. The Department of Kinesiology of the University of Waterloo presents the only undergraduate ergonomic program in Canada. The ergonomics option is a unique opportunity to prepare those interested in making a contribution to the well-being of others. Kinesiologists are concerned with the assessment and prescription of solutions to problems in the workplace that involve issues such as human-machine interaction, matching skill level with job demands, employee wellness, circadian rhythm, workplace boredom, fatigue, design of equipment in the interests of maximizing productivity and minimizing the risk of injury.

Students who enrol in this Co-op program will be rewarded with deeper insight into solving workplace problems. Our Department has been the leader in producing graduates who secure high paying jobs due to their Co-op job experience and comprehensive course work. The course requirements have been selected to provide students with a thorough background in the biophysical and behavioural sciences of human motion and related measurement and problem-solving skills. Admission and graduation requirements are listed below.

1. Normally, Co-op Kinesiology students will apply at the end of Year One for admittance to the program for the Fall term of Year Two. Application materials will be available from the ergonomics coordinator during the Winter term. Approximately ten students per year will be selected, dependent upon the number of Co-op jobs available.

2. Normally at least three of the last four work terms, including work term reports, must be ergonomics related.

3. Forty-four term courses must be completed. (See current list of PROGRAM COURSES)

4. The cumulative averages required are the same as for Honours Kinesiology.

Program Courses (44)

1. Required Life Sciences (nine):
   KIN 102, 200, 217, 300, 321, 401, 425, BIOL 230, 273

2. Required Behavioural Sciences (seven):
   KIN 103, 250, 255, 354, 356, PSYCH 101, SOC 101

3. Required Physical & Technical Sciences (nine):
   KIN 222, 330, 335, MATH 107, PHYS 112/111L, CHEM 116, CS 102 (SCI)

4. Required Ergonomics (14):
   KIN 340, 420, 431*, 432*, 470E, 472*, 494
   SY DE 142, 442, 543, 548, M SCI 211 or PSYCH 338, M SCI 261, HLTH 350

5. Restricted Electives (five):
   Two courses from: KIN 341, 349, 352, 357, 402, 405, 407, 416,
   Three courses from departments other than Kinesiology
   Suggested list (but others are allowed):
   HLTH 340, 442, SY DE 281, 342, 444, ME 212, CIV E 203, 460

   * KIN 431, 432, 470, 472 must be on Ergonomics topics approved
     in advance by an Ergonomics Option Advisor.

Typical Course Sequence

<table>
<thead>
<tr>
<th>1A Fall</th>
<th>1B Winter</th>
</tr>
</thead>
<tbody>
<tr>
<td>KIN 102</td>
<td>KIN 255</td>
</tr>
<tr>
<td>KIN 103</td>
<td>BIOL 273</td>
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<tr>
<td>BIOL 230</td>
<td>PSYCH 101</td>
</tr>
<tr>
<td>MATH 107</td>
<td>PHYS 112/111L</td>
</tr>
<tr>
<td>PHYS 111/111L</td>
<td>CHEM 116</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>2A Fall</th>
<th>2B Spring</th>
</tr>
</thead>
<tbody>
<tr>
<td>KIN 200</td>
<td>KIN 300</td>
</tr>
<tr>
<td>KIN 222</td>
<td>KIN 321</td>
</tr>
<tr>
<td>KIN 217</td>
<td>KIN 354</td>
</tr>
<tr>
<td>CS 102 (SCI)</td>
<td>SY DE 142</td>
</tr>
<tr>
<td>M SCI 211</td>
<td>KIN 330</td>
</tr>
<tr>
<td>SOC 101</td>
<td>One Elective</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>3A Winter</th>
<th>3B Fall</th>
</tr>
</thead>
<tbody>
<tr>
<td>KIN 250</td>
<td>KIN 335</td>
</tr>
<tr>
<td>KIN 425</td>
<td>KIN 356</td>
</tr>
<tr>
<td>KIN 420</td>
<td>KIN 340</td>
</tr>
<tr>
<td>KIN 401</td>
<td>HLTH 350</td>
</tr>
<tr>
<td>SY DE 442</td>
<td>SY DE 543</td>
</tr>
<tr>
<td>One Elective</td>
<td>One Elective</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>4A Spring</th>
<th>4B Winter</th>
</tr>
</thead>
<tbody>
<tr>
<td>KIN 431</td>
<td>KIN 432 Ergo</td>
</tr>
<tr>
<td>KIN 470E Ergo</td>
<td>KIN 494</td>
</tr>
<tr>
<td>KIN 472 Ergo</td>
<td>SY DE 548</td>
</tr>
<tr>
<td>M SCI 261</td>
<td>One Elective</td>
</tr>
<tr>
<td>One Elective</td>
<td>One Elective</td>
</tr>
</tbody>
</table>

Honours Co-op Kinesiology Programs

Neurobehavioural Assessment Option

This limited enrolment Co-op program is designed to prepare graduates who can evaluate the physiological, biomechanical and neuropsychological bases of acquired or developmental motor impairments from a strong background in the neurosciences and the behavioural and biophysical sciences related to the learning and control of human movement.

The course requirements have been selected to provide students with a thorough background in the biophysical, behavioural and neural mechanisms involved in the learn-
ing and control of movement. Measurement and problem solving skills associated with the assessment of human movement in healthy individuals and persons with various disabling conditions are also learned. Admission and graduation requirements are listed below.

1. Normally, Co-op Kinesiology students will be admitted to the program for the Fall term in Year Two. First year grades and an interview will be part of the admission consideration. Approximately ten students per year will be selected, depending on the number of Co-op jobs available.

2. Normally at least three of the last four work terms, including work term reports, will be related to neurobehavioural assessment activities.

3. Forty term courses must be completed. (See current list of Program Courses)

4. The cumulative averages required are the same as for Honours Kinesiology.

Program Courses (40)
1. Required Life Sciences (Eight):
   - KIN 102, 200, 217, 300, 321, 425, BIOL 230, 273

2. Required Behavioural Sciences (Seven):
   - KIN 103, 250, 255, 354, 356, PSYCH 101, SOC 101

3. Required Physical and Technical Sciences (Nine):
   - KIN 222, 330, 335, MATH 107, PHYS 111/111L, CHEM 116, CS 102 (SCI)

4. Required Neurobehavioural Assessment Courses (11):
   - KIN 001*, 201, 242, 416, 422, 431*, 432*, 456, 457, 470*, 493, OPT 105

5. Restricted Electives (Five):
   - Two courses from: KIN 346, 348, 349, 357, 405, 420, 426, 472*
   - Three courses from departments other than Kinesiology Suggested list (but others are allowed):
     - HLTH 344, OPT 115, PSYCH 206, 207, 213, 217, 334, Geron 255, SY DE 261 or ME 215, CS 212, CS 230, CIV 203 or SY DE 181, SY DE 182 or ME 212

Typical Course Sequence

<table>
<thead>
<tr>
<th>1A Fall</th>
<th>1B Winter</th>
</tr>
</thead>
<tbody>
<tr>
<td>KIN 102</td>
<td>KIN 255</td>
</tr>
<tr>
<td>KIN 103</td>
<td>BIOL 273</td>
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<td>CHEM 116</td>
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<td>PHYS 111/111L</td>
<td>PHYS 112/112L</td>
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</table>

<table>
<thead>
<tr>
<th>2A Fall</th>
<th>2B Spring</th>
</tr>
</thead>
<tbody>
<tr>
<td>KIN 200</td>
<td>KIN 300</td>
</tr>
<tr>
<td>KIN 217</td>
<td>KIN 321</td>
</tr>
<tr>
<td>KIN 222</td>
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<td>KIN 356</td>
<td>KIN 330</td>
</tr>
<tr>
<td>KIN 242</td>
<td>SOC 101</td>
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<table>
<thead>
<tr>
<th>3A Winter</th>
<th>3B Fall</th>
</tr>
</thead>
<tbody>
<tr>
<td>KIN 250</td>
<td>KIN 335</td>
</tr>
<tr>
<td>KIN 425</td>
<td>KIN 416</td>
</tr>
<tr>
<td>KIN 201</td>
<td>KIN 422</td>
</tr>
<tr>
<td>CS 102 (SCI)</td>
<td>KIN 456</td>
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<tr>
<td>One Elective</td>
<td>OPT 105</td>
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<table>
<thead>
<tr>
<th>4A Spring</th>
<th>4B Winter</th>
</tr>
</thead>
<tbody>
<tr>
<td>KIN 431*</td>
<td>KIN 432</td>
</tr>
<tr>
<td>KIN 470*</td>
<td>KIN 457</td>
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<tr>
<td>Three electives</td>
<td>KIN 493</td>
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<tr>
<td></td>
<td>One elective</td>
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</table>

* KIN 431, 432, 470, 472 must be on Neurobehavioural Assessment topics approved in advance by the Option Co-ordinator.
** Non-credit required tutorial each term for work term review, advising and discussion of Neurobehavioural Assessment issues.

Recreation and Leisure Studies

The Recreation and Leisure Studies program contains a core of courses in leisure studies, research and management. Recreation and Leisure Studies electives provide students with the opportunity to specialize in an Option which reflects a desired academic and career path.

Degree Requirements
1. Recreation courses (minimum of 20):
   - Required (ten): REC 100, 206, 210, 220, 230, 250, 270, 371, two 400 level courses.
   - Recreation Electives (minimum of ten):
     - Each student must complete additional Recreation electives to meet the required minimum of 20 Recreation courses.

2. Courses outside the Department of Recreation and Leisure Studies:
   - Required (seven):
     - CS 100
     - PSYCH 101
     - SOC 101
   - Select one course from four of the following seven categories (Restricted Electives):
     - BUS 121 or ECON 101
     - A Fine or Performing Arts or Language course other than English
     - GEOG 101 or ENV S 195
     - A Science Faculty course
     - A Health Studies or Kinesiology course
     - A Political Science or History or Philosophy course
     - An English course
   - Additional courses to meet minimum requirements of 40 courses overall.

3. Total number of courses to complete degree is 40.
### Course Sequence

#### Year One Co-op and Regular

<table>
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<tr>
<th>Course</th>
<th>Semester</th>
</tr>
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<tbody>
<tr>
<td>REC 100, 210</td>
<td>Winter</td>
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<tr>
<td>PSYCH 101</td>
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<tr>
<td>Two Restricted Electives</td>
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</tr>
<tr>
<td>REC 230, 250</td>
<td></td>
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<tr>
<td>CS 100</td>
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<td>SOC 101</td>
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#### Regular Program

#### Year Two

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<th>Course</th>
<th>Semester</th>
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<tr>
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<td>Two Recreation Electives</td>
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<tr>
<td>One Non-Recreation Elective</td>
<td>Two Non-Recreation Electives</td>
</tr>
<tr>
<td>REC 220</td>
<td></td>
</tr>
<tr>
<td>CS 101</td>
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<tr>
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#### Year Three

<table>
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<th>Semester</th>
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</thead>
<tbody>
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#### Year Four

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</thead>
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<td>Winter</td>
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<tr>
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<td>A fourth-year Recreation course</td>
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<tr>
<td>Two Non-Recreation Electives</td>
<td>One or two Recreation Electives</td>
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<tr>
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### Co-operative Program

#### Year Two

<table>
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<th>Semester</th>
</tr>
</thead>
<tbody>
<tr>
<td>2A (Fall)</td>
<td>2B (Spring)</td>
</tr>
<tr>
<td>REC 205, 270</td>
<td>REC 220</td>
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<tr>
<td>One or two Recreation Electives</td>
<td>One or two Recreation Electives</td>
</tr>
<tr>
<td>One or two Non-Recreation Electives</td>
<td>Two or three Non-Recreation Electives</td>
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#### Year Three

<table>
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<th>Course</th>
<th>Semester</th>
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<tbody>
<tr>
<td>3A (Winter)</td>
<td>3B (Fall)</td>
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<tr>
<td>Two or three Recreation Electives</td>
<td>REC 371</td>
</tr>
<tr>
<td>Two or three Non-Recreation Electives</td>
<td>Two Recreation Electives</td>
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#### Year Four

<table>
<thead>
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<th>Course</th>
<th>Semester</th>
</tr>
</thead>
<tbody>
<tr>
<td>4A (Spring)</td>
<td>4B (Winter)</td>
</tr>
<tr>
<td>A fourth-year Recreation course</td>
<td>A fourth-year Recreation course</td>
</tr>
<tr>
<td>Two Recreation Electives</td>
<td>Two Recreation Electives</td>
</tr>
<tr>
<td>Two Non-Recreation Electives</td>
<td>Two Non-Recreation Electives</td>
</tr>
</tbody>
</table>

### Options

An Option is a specified combination or grouping of courses which provides the student with an emphasis in a particular discipline.

The Recreation and Leisure Studies Department offers the following Options to its students:

1. **Business Option**
2. **Parks Option**
3. **Therapeutic Recreation Specialization**

Consult the Undergraduate Office for more details.

The Options are currently under review. Interdisciplinary Programs are also listed.

### Joint Honours Degrees

Joint Honours degrees are available with Geography, Environment and Resource Studies, Political Science, Psychology, Social Development Studies, Sociology, English and Music. For Joint Honours programs, where the Department of Recreation and Leisure Studies is the home department, the requirements will be:

1. Department of Recreation and Leisure Studies core requirements (ten term courses).
2. All non-department Restricted Electives (CS 100, PSYCH 101, SOC 101 and four term courses).
3. Joint Honours requirements from the second department.
4. Additional Department of Recreation and Leisure Studies Electives (minimum eight term courses).
5. A minimum of 40 term courses in total.
6. Major average requirements for each department must be maintained. (The overall average is that of the home department.)

Further information concerning Joint Honours programs may be obtained from the Associate Chair Undergraduate Studies and the Recreation and Leisure Studies Undergraduate Student Handbook. If a student wishes to pursue a Joint Honours program with another department not listed above, he/she should contact the Associate Chair Undergraduate Studies.

### Minors

A Minor is a group of approved courses taken by an Honours student in a subject area outside of Recreation and Leisure Studies. Minors are available in most departments at Waterloo. Students interested in pursuing a Minor should consult with the department offering the Minor. A Minor normally consists of ten courses.
Faculty of Arts

*N* Drama Department production of "Chicago."
The Faculty of Arts

The main objective of the Faculty of Arts is to provide a liberal arts education which is designed to acquaint the student with some of the major ideas and forces that shape our civilization and other civilizations, to develop the ability to think clearly, critically and creatively, and to make a contribution to living a full life.

Degrees
The degree of Bachelor of Arts (BA) is awarded by the University upon successful completion of any of the undergraduate programs described under Arts Programs.

ADMISSION

1. General Requirements
The admission requirements of the Faculty of Arts are the same as the General Admission Requirements of the University for applicants from Ontario Secondary Schools and for those not currently registered in Ontario Secondary Schools. Admission requirements for part-time students are the same as for full-time students. See the "Admissions" section for the admission categories, requirements and procedures for all programs.

Applicants who wish to study full-time must submit their applications through the Ontario Universities' Application Centre (OUAC).

Applicants who wish to study on a part-time or non-degree basis or through distance education courses may obtain application forms from the Part-Time Studies and Continuing Education Office at the University of Waterloo.

Some programs may have additional admission requirements. Please see the "Admission and Degree Requirements" section under the specific programs.

2. Application Deadlines (On-Campus Students)
New full-time applications must be received by March 1 for the Spring term, July 1 for the Fall term and November 1 for the Winter term.

All other applications must be received by April 1 for the Spring term, August 1 for the Fall term and December 1 for the Winter term. These dates apply to the following: new applications for part-time studies, non-degree and post-degree studies and applicants on a Letter of Permission.

In addition, these dates apply to applications for re-admission by Arts students who have been 'required to withdraw' (after a minimum of 2 terms' absence), UW students in good standing resuming their studies in Arts following a voluntary absence of more than 12 months, and by UW students seeking to transfer from another Faculty.

Because of the time required to assemble all of the documents necessary to make an admission decision, it is advisable that applications and all supporting documentation be submitted well in advance of the deadlines. All application files must be complete with required supporting documents by April 1 for the Spring term, August 1 for the Fall term and December 1 for the Winter term.

3. Transfer Credit
Upon admission to Arts, a student may be granted transfer credits for university courses related to a Waterloo Arts degree in which a grade of 60% or better was obtained. Students entering Waterloo from other universities may have their transferred courses count toward the University of Waterloo degree; however, marks obtained in these courses will not be included in the calculation of the students' University of Waterloo averages.

Students admitted to Arts from faculties within the University may elect to transfer all passed Arts Faculty courses and all pertinent courses taken from other faculties in which they earned marks of at least 60% (C). These courses will not be counted in students' cumulative averages. Alternatively, students may elect to transfer all pertinent attempted courses (passed and failed). Under this option, all courses will be counted in students' cumulative averages.

Students transferring into the University of Waterloo with the maximum of 20 term courses as transfer credits toward their UW Arts degree requirements must have a minimum of 10 term courses constituting their UW overall grade average in order to qualify for graduation. In addition, for major students, at least half of the courses in the major must be UW courses, or, for non-majors, at least half of the courses must be Arts UW courses.

4. Courses at Other Universities (Letter of Permission)
On admission to a degree program in the Faculty of Arts, students wishing to take a course at another university for credit toward a UW degree must obtain a Letter of Permission. A Letter of Permission is granted only to degree students who have successfully completed a minimum of four University of Waterloo term courses and who are in good standing; that is, they have satisfied the minimum cumulative average requirements for the current program. A maximum total of 10 term courses may be taken on a Letter of Permission basis. Courses taken on a Letter of Permission at other institutions will appear on UW records as transfer credits (mark of CR) if a minimum grade of C- (60%) or equivalent is attained. Commencing Fall 1993, courses taken at Wilfrid Laurier University will appear on UW records as graded courses and the grades attained will be included in average and credit calculations.

A Letter of Permission must be approved by the student's advisor prior to enrolling at the host institution and subject to faculty and departmental regulations. You may obtain the necessary form from the Registrar’s Office. More information about the Letter of Permission Policy and Procedures is given on the reverse side of the form.

5. Canadian Exchange Programs
The Faculty of Arts participates in the Canadian University Student Exchange Consortium (CUSEC) and the Group of Ten Student Exchange Program (GOTSEP). Some departments within the Faculty permit student participation in these programs. Students interested in either of these programs should contact their Undergraduate Advisor. Courses taken at the host university will be recorded as equivalent courses, grades and credits on the student's University of Waterloo academic record.
Arts Programs

All Arts programs should be drawn up in consultation with the departmental Undergraduate Advisor or the Arts Academic Counsellor.

GENERAL PROGRAMS

1. General Major Programs
The University offers a General Bachelor of Arts (BA) degree upon successful completion of either a three-year General or four-year General program. A three-year General BA is offered in the following disciplines:

- Anthropology
- Canadian Studies
- Classical Studies
- Drama
- Economics
- English
- Fine Arts
- French
- Geography
- German
- History
- Latin
- Medieval Studies
- Music
- Philosophy
- Political Science
- Psychology
- Religious Studies
- Russian
- Slavic Studies
- Social Development Studies
- Sociology
- Spanish

Almost any two Honours programs may be combined or one Arts Honours program may be combined with a number of Honours programs offered in other faculties for a Joint Honours degree. Joint Honours programs other than those already listed under each department may be arranged by consultation with the appropriate department advisors. The Undergraduate Advisors of both departments should be consulted for any Joint Honours program. Descriptions of the single Honours programs and each discipline's requirements for Joint Honours programs can be found in the sections under the specific programs.

2. Co-operative Programs
A Co-operative program is an Honours program that allows the student to integrate work experience with an academic program. (For a detailed description of the Co-operative Plan, see "Co-operative Education and Career Services") Beginning in the first or second year, the Co-op student ordinarily alternates four-month terms on campus for academic studies with four months off campus for practical experience in business, industry, or government.

Students in Co-operative programs are required to complete a minimum of four work terms beyond the 2A level in order to be eligible to receive a Co-op designation at the time of graduation.

The following Co-operative programs are now offered:

- Applied Studies Co-op (See Note below)
- Co-op Honours Anthropology
- Co-op Honours Applied Economics
- Co-op Honours Chartered Accountancy Studies
- Co-op Honours English - Literature
- Co-op Honours English - Rhetoric and Professional Writing
- Co-op Honours French Teaching Specialization
- Co-op Honours Management Accountancy Studies
- Co-op Honours Political Science
- Co-op Honours Political Science (Administrative Studies)
- Co-op Honours Psychology
- Co-op Honours Sociology

Co-operative programs are open only to full-time students who are either Canadian citizens or permanent residents.

Note
The Applied Studies Co-operative Program combines an Honours program in most disciplines in Arts with Applied Studies courses. The Applied Studies courses are
intended to provide the student with a basic and practical general education and with skills appropriate to a wide range of careers. With the approval of the department, Honours programs in Arts may be combined with the Applied Studies courses for this Co-operative program. See the sections under the specific programs for details.

MINOR PROGRAMS

Students enrolled in Honours programs or four-year General Major programs in Arts or Honours programs in other faculties may elect a Minor in an Arts discipline. A Minor program in Arts requires the successful completion of ten term courses in the Minor discipline with an overall cumulative average of 65% in those courses. Students should consult with departmental Undergraduate Advisors for details of more specific requirements.

A Minor is available in Italian, although there is no Major program in that discipline.

INTERDISCIPLINARY PROGRAMS

Students in a General Non-major program and in many Honours programs within Arts may choose an Interdisciplinary Option or Minor which will be designated on the diploma and transcript. Students in some General programs may choose one of several available Options.

Interdisciplinary Programs Administered by the Faculty of Arts

Speech Communication (see Drama and Speech Communication)
Management Studies (see Interdisciplinary Programs)
Human Resources Management (see Interdisciplinary Programs)
Environmental Economics (see Economics)
Cognitive Science (see Interdisciplinary Programs)

Other interdisciplinary Programs

Canadian Studies
International Studies
Legal Studies
Liberal Science
Middle East Studies
Peace and Conflict Studies
Print Journalism
Russian and East European Studies
Society, Technology and Values
Studies in Personality and Religion
Studies in Sexuality, Marriage and the Family
Women's Studies

Notes

1. Normally a student may not double-count any course for more than one Interdisciplinary Option or Minor.
2. Students who intend to have an Interdisciplinary Option recognized on their transcripts must communicate that intention to the director of that program by the start of Year Three.

PRE-REGISTRATION DEADLINE (ON-CAMPUS PROGRAMS)

All Arts students must preregister no later than August 1 for the Fall term, December 1 for the Winter term and April 1 for the Spring term. The Faculty of Arts strongly recommends that returning students preregister during the official preregistration periods for each term to maximize their chances of obtaining access to limited enrolment courses. These periods include early November (Spring term), early March (Fall/Winter terms) and mid-June (Winter term).

APPLICATION/PRE-REGISTRATION DEADLINES (DISTANCE EDUCATION COURSES)

NEW applications must be received by June 3 for the Fall term, September 16 for the Winter term and January 20 for the Spring term. In order for an admission decision to be made, all supporting documentation must be received no later than July 12 for the Fall term, October 25 for the Winter term and February 28 for the Spring term.

Returning students must apply/pre-register by July 2 for the Fall term, October 14 for the Winter term and February 17 for the Spring term.

On-campus students who are pre-registered/registered for a given term may apply to add Distance Education courses to that term within the free on-campus course add period.

SELECTION OF YEAR-ONE PROGRAMS

The first year in Arts is usually an exploratory year during which students take courses (a maximum of 5 courses per term) in a wide range of subjects leading to the declaration of a General or Honours program and choice of a major. Year One students in Arts are usually classified in an Honours Arts program. Students admitted to Social Development Studies (Regular) declare General or Honours following a highly specified Year One program. Students admitted to Arts Co-op Applied Studies choose their Honours major on the basis of their first-year program. Several courses in first-year Applied Studies are required by the program. Students admitted to Accountancy Studies Co-op take a number of courses specified by their Honours major.

The Faculty of Arts recommends that its students take at least one course in mathematics and/or science.

Notes

1. From time to time, due to space limitations, students admitted to the University or continuing students in good standing, cannot be granted course and program selections of their choice.
2. Each student's program must be approved on or before registration date by a faculty advisor from the Faculty of Arts.
3. Students admitted to Social Development Studies should consult the Undergraduate Officer at Renison College before selecting a Year One program.
COURSES AND PROGRAM CHANGES
1. Changes in courses or programs must be submitted for approval to the appropriate Undergraduate Officer.

2. Courses may be added during the first two weeks of the term in which they begin only with the signature of the Undergraduate Officer of the student’s major department. Courses may be dropped during the first three weeks of the term in which they begin and do not require the approval of the Undergraduate Officer.

3. After these specified periods, courses will be added or dropped only with the permission of the Examinations and Standings Committee. The student is expected to submit a petition and to supply supporting documentation.

4. Courses offered during the Summer Session may be added or dropped during the first three days in which the course begins only with the signature of the Undergraduate Officer of the student’s major department, and thereafter only with the permission of the Examinations and Standings Committee.

5. A course that has not been dropped officially (i.e., recorded in the Registrar’s Office) will be graded and counted in the student’s average.

It is important that students settle their schedule of courses as quickly as possible. Students usually find that courses they add late in the second week of classes pose special problems in catching up with the work already covered.

Degree Requirements

In order to earn a BA, a student must complete, with the necessary cumulative averages, the required number of prescribed and elective courses for either the General or the Honours program.

It is the student’s responsibility to ascertain that all requirements for graduation have been met. Any exceptions in graduation requirements requested by a student must be approved in writing by the Examinations and Standings Committee of the Arts Faculty.

General Major Program
Students in the three-year General program with a major must complete a minimum of 30 term courses with a passing mark in each. Students in a four-year General program must complete a minimum of 40 term courses with a passing mark in each. All students in General programs with a major must achieve an overall cumulative average of at least 60% and a cumulative average in their major of 65% or better (some programs require a higher major average) and successfully complete:

1. a minimum of 16 term courses or their equivalent beyond the 100-level,
2. the Faculty of Arts Group A and B requirements (see below),
3. satisfy the English Language Proficiency Requirement (see below).

General Non-major Program
Students in the three-year General Non-major program may graduate upon completion of a minimum of 30 term courses with a passing mark in each including:

1. a minimum of 16 term courses beyond the 100-level,
2. a minimum of 15 term courses in the Faculty of Arts,
3. the Faculty of Arts Group A and B requirements,
4. satisfy the English Language Proficiency Requirement.

Honours Program
Students in an Honours program must complete 40 to 42 term courses (as specified in a departmental Honours program), of which 16 term courses or their equivalent must be beyond the 100 level, with a passing mark in each and an overall cumulative average in the Honours discipline of at least 75%. The Faculty of Arts Group A and B requirements and the English Language Proficiency Requirement must also be met. Students are asked to refer to “Departmental Programs” for other departmental requirements (including Joint Honours requirements).

Term Course System
A term course lasts one academic term (Fall, Winter or Spring) and carries a minimum of one-half credit (0.5). Courses with a 0.25 credit weight may be accumulated in pairs to equal one term course to a maximum of two term courses. Only the first four 0.25 credit courses appearing on the student’s record are included in term course and average calculations. Some programs (e.g., Music) may require more than four 0.25 courses for the major or Honours but only four will count toward Faculty of Arts requirements.

English Language Proficiency Program
In order to identify and help those students who lack the basic writing skills required for university work, the Faculty of Arts has introduced an English Language Proficiency program.

All students whose initial registration in programs in the Faculty of Arts was Fall 1977, or thereafter, must demonstrate competence in written English in order to qualify for the Bachelor of Arts degree. Students may fulfill this
Students entering the Faculty of Arts in the Fall of 1990 or after and who have achieved 80% or better on an OAC English course are exempt from the proficiency program requirements. There are no other exemptions.

The English Language Proficiency program comprises:

1. a Proficiency Examination (ELPE) which all new on-campus students are expected to write at the beginning of their first term of study in the Faculty of Arts;
   new Distance Education students are expected to write the ELPE at the completion of five term courses in the Faculty of Arts
2. a Writing Clinic where students may receive individual help on campus with their writing problems (at no cost)
   a non-credit English writing proficiency course offered for Distance Education students (at no cost).

Non-degree students are strongly encouraged to write the ELPE and, if necessary, take the Writing Clinic or writing proficiency course through Distance Education prior to the completion of their fifth course.

The ELPE is written at various times in the term on campus in the Physical Activities Centre. The ELPE for Distance Education students is administered by the Distance Education Office during the regularly scheduled examination period and is invigilated in the usual way. Distance Education students must make arrangements by writing to: Examination Co-ordinator, Distance Education Office, prior to the completion of their fifth course in the Faculty of Arts.

Students who receive a mark below 60% on the English Language Proficiency Examination should take the Writing Clinic or writing proficiency course. Students who do not fulfill the English Language Proficiency requirement at the completion of five term courses must then take the Writing Clinic or course.

Note
Students who arrange a special sitting of the ELPE outside the scheduled dates will be assessed an administrative charge.

Group A and B Requirements
All Arts students must meet the Faculty of Arts Group A and B requirements. Group A comprises courses in the humanities, and Group B comprises courses in the social sciences:

Group A (i)
English, History, Philosophy (See Note 3)

Group A (ii)
Arabic, Croatian, Chinese, Dutch, French, German, Greek, Hebrew, Italian, Japanese, Korean, Latin, Polish, Russian, Spanish, Ukrainian. (See Notes 1 and 2)

Group A (iii)
Classical Studies, Drama, Fine Arts, Music, Religious Studies

Group B
Anthropology, Economics, Geography, Political Science, Psychology, Sociology.

Only courses taken in the subjects listed above will satisfy the Group A and B requirements.

In order to complete the Group A and B requirements an Arts student must complete with passing marks a minimum of six term courses from Group A and a minimum of four term courses from Group B. Of the four term courses used to satisfy the Group B requirement, no more than two may be in the same discipline. A student may take more than two term courses in a specific discipline in Group B but only two of them will be applied to meet the four-course requirement. The student should note that Group A is further sub-divided into Group A (i), Group A (ii), and Group A (iii). Of the six term courses from Group A, the student must complete with passing marks:

- a minimum of two term courses from Group A (i).
- a minimum of two term courses from Group A (ii).
- a minimum of two term courses from any of the subjects listed in A (i), A (ii) or A (iii).

Notes
1. RS 105A/B: Elementary Biblical Hebrew, RS 106A/B: New Testament Greek, RS 107A: Introductory Standard Arabic may be used to meet the Group A (ii) requirement.
2. Arts students should note that they may elect to meet the Group A (ii) requirement in their second or subsequent years by completing with passing marks two of the following courses: FR 291, 292, GER 271, 272, RUSS 271, 272, SPAN 217, 218, CLAS 201, 202, ITAL 291, 292, or EASIA 201R. These courses are taught in English and are not open to first year Arts students. These courses are the only approved alternatives to the A (ii) requirement.
   Other courses taught in English by language departments are not approved alternatives to the A (ii) requirement. This will be indicated after the course description with a note such as "Taught in English" or "Does not meet A (ii) requirement".
3. ARTS 301: Studies in the Humanities may be used as a term course in Group A (i).
Examinations and Standings

The following regulations govern final examinations and standings for all students registered in courses in the Faculty of Arts. These regulations also apply to students in part-time and special programs. Further details concerning University Examination Regulations can be found in "Examination Regulations".

Students should note that the Faculty of Arts operates under a course system in which student progress is measured by courses successfully completed rather than by years. Students who have successfully completed fewer than ten term courses are considered Year One students; those who have successfully completed at least ten term courses but fewer than 20 will be considered Year Two students; those with at least 20 but fewer than 30, Year Three; and those with 30 or more, Year Four.

Final Examinations
1. The Faculty of Arts constitutes the examining body for all examinations. When a final written examination is required it is normally held at the end of the course. Oral examinations may be required at the discretion of individual departments. The normal time for written examinations is three hours.

2. In all courses each student is required to submit, in such form and at such time as may be determined by the instructor, evidence of satisfactory participation in term work. The marks obtained for such work during the term may be used, in part or in whole, in determining grades. At the discretion of the Department Chair concerned and of the Dean, a student may be barred from the final examination if the course requirements are not completed to the satisfaction of the instructor.

3. Failure to write an examination may be considered a failure to pass. A student who defaults a final examination, except for a properly certified reason, shall have no make-up examination privileges. If a student fails to write for medical reasons, a Doctor's certificate, covering the precise period of absence, must be filed in the Registrar's office within a reasonable period of time after the examination should have been written.

4. No instructor shall be permitted to administer and no student shall be required to sit final examinations in the formal lecture period.

5. Normally instructors may not hold major term tests in the last five teaching days of the lecture schedule in any term. Major term tests are those which account for more than 25% of the final course grade.

Grading System
1. Normally all courses should be completed within the term in which they are offered. Letter grades are used to signify evaluation in individual courses.

   For the purpose of calculating averages, the following weights will be assigned to grades received in individual courses:

<table>
<thead>
<tr>
<th>Grade</th>
<th>Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>A+</td>
<td>95</td>
</tr>
<tr>
<td>A</td>
<td>89</td>
</tr>
<tr>
<td>A-</td>
<td>83</td>
</tr>
<tr>
<td>B+</td>
<td>78</td>
</tr>
<tr>
<td>B</td>
<td>75</td>
</tr>
<tr>
<td>B-</td>
<td>72</td>
</tr>
<tr>
<td>C+</td>
<td>68</td>
</tr>
<tr>
<td>C</td>
<td>65</td>
</tr>
<tr>
<td>C-</td>
<td>62</td>
</tr>
<tr>
<td>D+</td>
<td>58</td>
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<tr>
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<td>55</td>
</tr>
<tr>
<td>D-</td>
<td>52</td>
</tr>
<tr>
<td>F+</td>
<td>46</td>
</tr>
<tr>
<td>F</td>
<td>38</td>
</tr>
<tr>
<td>F-</td>
<td>32</td>
</tr>
</tbody>
</table>

   Overall standing is determined by the cumulative average of grades assigned for all courses taken at the University (at any time, whether passed or failed) while registered in a degree program in the Faculty of Arts.

Note

When a course is repeated, the two marks are not averaged together. Rather, both marks are entered with all other marks in calculating the student's cumulative overall average. A passed course may be repeated once with the approval of the department concerned.

2. Students may request that their performance in any given Arts course be marked as either Credit (Cr) or Fail (F). The instructor of the course and the student's department must agree to this arrangement at the outset of the course and the student must communicate the decision in writing to the Arts Faculty Examinations and Standings Committee before the end of the two week add period.

   In satisfaction of the minimum degree requirements students in General programs may present up to six term courses with a grade of Credit (Cr) in courses outside their major. Students in Honours programs may present up to eight term courses with a grade of Credit (Cr) in courses outside their Honours area.

   Students considering teaching careers should especially note that the Ministry of Education will not accept courses with credit grades as satisfying the minimum requirements in defined specialist fields.

3. An Incomplete (INC) may be assigned by an instructor in exceptional circumstances, with the consent of the department. This extension of completion date is granted to students as a privilege for a limited and specified time and in normal circumstances shall be no longer than three months. Students should make themselves familiar with the internal procedures established by their major department in handling incomplete courses. A student with outstanding incompletes on her/his record will be unable to graduate until the INC has been replaced by a letter grade or an F- grade has been factored into the averages. In such cases, the student must meet all graduation requirements, including grade average and number of courses.

4. Students may request to register for Audit (AUD) in a course. No credit is granted for a course in which an AUD grade is awarded. Students interested in an Audit must consult with the course instructor at the beginning of the course to ascertain what conditions are attached to the granting of an AUD by the course instructor. Audits must be approved by the course instructor and the student's advisor during the two week add period. Failure to satisfy the conditions of Audit will result in the course being dropped from the academic record.

A- 83 B- 72 C- 62 D- 52 F- 32
5. There are a number of courses in the Faculty of Arts which are essentially year courses (of two terms duration) although they are listed as two separate term courses. Letter grades are not awarded until the second half of the course is complete and then the same grade is applied to both term courses. An in Progress (IP) grade is assigned to the first term course until a grade is designated for the second term course. The use of the IP grade is normally limited to 400-level courses which are Senior Honours Essay or Senior Seminar courses and which normally require eight months or so to complete. The grade may be used in other courses only with the prior approval of the Undergraduate Affairs Group of the Arts Faculty.

6. A grade of WD (withdraw after the course drop deadline) may be assigned by the Arts Faculty Examinations and Standings Committee. This grade is used when it is not appropriate to completely remove a course from a student's record and not in the academic interests of the student to continue with the course. The WD grade has no effect on average or credit calculations.

7. Some courses which are listed under separate labels or numbers have overlapping content. Only one of these courses may be taken for credit. These are designated with notes after the courses which would indicate one of the following:
   - the courses are cross-listed;
   - credit will only be granted for one of a pair of courses;
   - a course formerly was designated with a different number and/or label;
   - the courses are antirequisites.

   A student who wishes to enrol in a course which seems to have overlapping content with another course should consult with her/his Undergraduate Officer to be certain that credit will be awarded for both courses. Should a student register in and complete courses with overlapping content, mark reports will indicate the two repeated courses when the second course is completed.

   The following table indicates sets of statistics or research methods courses which have overlapping content. A student in an Arts Faculty program may take only one course from each set for credit.

<table>
<thead>
<tr>
<th>Set A - Basic Statistics Courses</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Set B - Advanced Statistics Courses</th>
</tr>
</thead>
<tbody>
<tr>
<td>BIOL 461, PSYCH 202*, 284*, 391, STAT 205*, 304, 321</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Set C - Research Methods Courses</th>
</tr>
</thead>
<tbody>
<tr>
<td>ISS 251R, KIN 330, PSCI 315, PSYCH 291, REC 270, 270A*, SOC 281*, 321</td>
</tr>
</tbody>
</table>

   *No longer offered

Course Load
1. Students in the Faculty of Arts will normally carry a maximum five-course load in a term.
2. Exceptions are allowed for students in Joint Honours programs and Honours programs where six term courses per term may be required.
3. Students in programs other than Joint Honours or Honours programs as indicated above may take six courses by permission of their Undergraduate Advisor provided that they have an overall average, based on a minimum of ten term courses from the Faculty of Arts, of 75% or better. Students with less than 75% require the permission of the Examinations and Standings Committee before enrolling in the sixth course.
4. Students in the Faculty of Arts who wish to enrol in courses in other faculties are expected to balance Arts and non-Arts courses, choosing a minimum of 50% of each term's course load in Arts disciplines.
5. In the Spring and Summer terms the total course load shall not exceed the normal course load permitted in one term.
6. Exceptions to these regulations may be sought by petition to the Arts Examinations and Standings Committee.

Distance Education Courses
Because of the different start dates and the different final exam periods for distance education and on-campus courses, students enrolled in full-time on-campus courses must have the permission of their Undergraduate Advisor to register for a distance education course.

Part-Time Studies
Students enrolled in one or two term courses in a given term are considered to be in Part-Time Studies. Students may enrol part-time in most General and Honours programs in Arts. Courses taken on a part-time basis may be scheduled in either the day or evening, or in courses offered through Distance Education (see the University of Waterloo Distance Education Calendar). No distinction is made between part-time and full-time students as to admission and degree requirements and standards, grading practices, or promotion policies.

Academic Standing
1. Academic standing is a measure of the student's eligibility to proceed in his or her program or to qualify for graduation.
2. The minimum criterion required to establish and maintain "good standing" in the Faculty of Arts is achievement of a cumulative Arts average of 65.0% and a cumulative overall average of 60.0% in University of Waterloo courses. Some programs of the Faculty of Arts, such as Applied Studies, Accountancy Studies and Social Development Studies, may require higher averages for good standing.
3. To be considered in good standing in a General program, a student must maintain a cumulative overall average of at least 60.0%, as well as an average of at least 85.0% in all courses taken in the Major discipline (unless the department specifies a higher average), or an average of at least 65.0% in Arts courses in the Non-major. If a student's overall average falls between 58.0% and 60.0%, or the major or non-major average falls below 65.0% (unless the department specifies a different average), the student may be granted conditional status for one academic term. During this period the student must make reasonable progress toward obtaining good standing or the student will be required to withdraw from the Faculty of Arts.

4. To be considered in good standing in an Honours program, a student must maintain a cumulative overall average of at least 60.0%, as well as an average of at least 75.0% in all courses taken in the Honours discipline (unless the department specifies higher average(s)). A student in a Joint Honours program must maintain a cumulative average of 75.0% in all courses taken in the two Honours disciplines (unless the departments specify other averages).

If an Honours degree student's cumulative major or overall average falls below the prescribed minimum the student will be considered for the General degree and the regulations in (3) above will apply. If, subsequently, the student raises the average(s) to the required level, he/she may be considered for reinstatement in Honours.

5. Good standing is automatically cancelled by an accumulation of academic failures. A student who fails four term courses in any academic year (two terms) will be required to withdraw. Further, a student may be required to withdraw who has an overall average below 58.0% following ten term course attempts or who has failed to meet the minimum cumulative average requirements of conditional standing for an Arts major or non-major program.

6. A student who has been required to withdraw for academic reasons is eligible to apply for re-admission after an absence of two terms. Given re-admission, the student's cumulative overall and arts (or major) averages will be cleared, that is, grades achieved in all previous course work will not count in cumulative averages; all previous course attempts and grades will remain recorded on the student's mark reports and transcript; credit will count toward the degree for Arts courses passed and for non-Arts courses in which a minimum grade of C- or 60% has been achieved. Cumulative and Arts (or major) averages will be based on courses taken following re-admission and cleaning.

7. Students whose cumulative average(s) have been cleared must observe the following requirements: 1) must complete a minimum of ten additional term courses to establish cumulative overall and Arts or major averages; (2) complete a minimum of half of the courses required in the major, or, for non-majors, at least half of the courses must be University of Waterloo Arts courses.

8. Those students who voluntarily withdraw prior to or during the full refund period will not have the term recorded on their academic record and transcript. After this period, students who voluntarily withdraw before the final day of classes, do so without Academic Penalty. However, this will be noted on their transcripts with the statement "Voluntary Withdrawal From Term (effective date) - No Academic Penalty". Students who withdraw to avoid a number of failures will likely be ineligible for re-admission for at least two terms. See "Fees and Registrations" for details on withdrawal procedure.

Academic Standing for Non-Degree Students

1. Non-degree students must attain a minimum cumulative overall average of 60.0% and a minimum cumulative Arts average of 65.0% to be in Good Standing.

2. Conditional standing may be granted for one academic term if the cumulative overall average falls between 58.0% and 60.0% or the cumulative Arts average falls below 65.0%. During the term in which conditional standing is in effect, the student must make reasonable progress toward obtaining good standing or the student will be required to withdraw.

3. Even while otherwise in good standing, a student who fails four or more term courses within the first ten term courses or fewer may be required to withdraw if the Examinations and Standings Committee considers that the student will not profit by further study.

4. Non-degree students may take no more than 20 term courses at UW without permission of the Arts Examinations and Standings Committee.

Dean's List
To recognize outstanding academic achievement the Arts Faculty has established a Dean's List. To be eligible for the Dean's List a student:
- must have completed a minimum of ten UW courses which count in the cumulative average,
- must have a cumulative overall average of 83.0 or higher,
- may not have any INCs or NMRs.

When a student receives Dean's List standing, it is noted on the transcript. Students who graduate with the Dean's List designation will have it noted on their diplomas.

Appeal Procedures
If a student wishes to appeal a grade, academic status or standing, the student should try to work the matter out informally with the instructor, officer or University authority concerned, as soon as possible and at the latest within six months of receipt of the grade or decision. If the problem cannot be resolved in this way, the student may submit, within the framework of the Student Grievance Policy (UW Policy #70), a Request for a Formal Review to the Associate Dean for Undergraduate Affairs of the student's
DEPARTMENTAL PROGRAMS

School of Accountancy

Students may earn a Bachelor of Arts Degree in accounting in Honours Chartered Accountancy Studies (Co-op or Regular) or Honours Management Accountancy Studies (Co-op or Regular), as outlined below. These accounting programs normally involve both academic study and practical work experience, and are designed to help students integrate the two aspects.

The Honours Accountancy Studies Co-op Programs

The School of Accountancy offers Honours Accountancy Co-operative Studies in two key fields — Chartered Accountancy and Management Accountancy.

The Honours Chartered Accountancy program in the Faculty of Arts anticipates the student's completion of a five-year integrated and professionally accredited program of study and work, leading to both an Honours Bachelor of Arts degree and a Master of Accounting degree. Completion of the entire five-year program will lead to fulfillment of the requirements of the Institute of Chartered Accountants of Ontario which qualifies the student for exemptions from other requirements, as described in the section Special Recognition by the Accounting Profession of the Professionally Accredited Stream (PAS). Students may opt to complete only the undergraduate portion, but only completion of the entire five-year program will qualify a student for the above-mentioned exemptions. The Bachelor's portion of the Professionally Accredited Stream (PAS) program is described below. Details of the Master's program (terms 5A and 5B) are found in the Graduate Calendar.

The Honours Management Accountancy program in the Faculty of Arts consists of a four-year program of study and work leading to an Honours Bachelor of Arts degree. This has been designed for students interested in working outside of public accounting in careers such as general management, controllership, management accounting and finance. Successful completion of the four-year program qualifies students to challenge the Society of Management Accountants' Entrance Examination. Successful completion of that examination will enable students to enter Year One of the Society's Professional Program.

The first Co-op work term will follow completion of the 2A academic term. Since the first three terms of study in all accounting programs are identical, students do not need to elect Chartered Accountancy or Management Accountancy until they have completed the courses in the joint portion of the program.

The Co-op program involves alternating terms of work and study in approved work settings. Four successfully completed work terms are required for the granting of a Co-op degree. Students may, for reasons beyond their control, fail to satisfactorily complete the full complement of work terms. In these exceptional circumstances, three work terms will be acceptable at the discretion of the School of Accountancy and the Department of Co-operative Education and Career Services. Work-term placements are in an accounting setting in the public and private sectors.

Because the Honours Accountancy Studies Co-op programs require work experience, admission requires Canadian Citizenship or Permanent Residence Status in Canada.

Admission to Honours Accountancy Studies Co-op

Students may apply for direct admission from high school into the first year of Honours Accountancy Studies Co-op. Students with an excellent academic record may also be accepted after they have completed one or two years of university studies in any field. As a general rule, qualifying students will be required to complete the required courses listed in the section entitled Degree Requirements, excluding courses for which equivalent status is granted by the School of Accountancy. Depending on the nature of their previous studies, qualified students may be required to complete prerequisite courses prior to being admitted. Further information may be obtained from the Undergraduate Officer, School of Accountancy.

The Honours Accountancy Studies Regular Program

The Honours Accountancy Studies Co-op programs are the principal programs in the School of Accountancy. In exceptional circumstances, with prior permission of the Undergraduate Officer, students may be admitted to the Honours Accountancy Studies Regular program. This is only available to transfer students or students in Honours Accountancy Studies Co-op who are unable to meet the
required work term experience to obtain an Honours Accountancy Studies Co-op degree.

**Degree Requirements**

Eligibility for the degree of Bachelor of Arts in the Honours Accountancy Studies (Co-op and Regular) program requires:

1. Successful completion of a minimum of 40 term courses including the Faculty of Arts requirements with an overall cumulative average of at least 60% and a cumulative average of at least 70% in all required courses listed in (2) below, and all electives labelled accounting (ACC). A 70% continuation average in the major courses will be required in each term after the end of the 2A term. (Students contemplating the five-year Professionally Accredited Stream (PAS) should note that graduate school entry requirements are more stringent than the above. An overall average of 75% is required for entry into the final phase of the PAS program.)

2. The following courses are required:
   - ACC 128 (1.0), 131, 228 (1.0), 371, 372, 382, 392, 401, 442. Students who have not completed an OAC in accounting will be required to successfully complete ACC 101 before taking any further accounting courses;
   - ECON 101, 102 and 201 or 202;
   - PHIL 215 (or another approved course in professional ethics), PHIL 243 (or another approved problem solving course), DRAMA 223, ENGL 210 (or another approved written communications course);
   - PSYCH 101, 338;
   - STAT 211 and 311 (or another approved statistics course);
   - CS 100 or another approved information technology course. Students may apply to the Undergraduate Officer for exemption from this course with evidence of adequate prior preparation in basic computing concepts and use of spreadsheets, wordprocessors, and database management systems;
   - MATH 109. Students who have not completed an OAC in calculus may be required to take MATH 104 before taking MATH 109. Students who have not completed finite mathematics or algebra and geometry at the high school level will normally be required to complete MATH 103;
   - either:
     - For Honours Chartered Accountancy Studies:
       - ACC 451, 461, 462, 463, 491
       - at least one of ENV S 220, PSCI 231, or ECON 331
     - For Honours Management Accountancy Studies:
       - ACC 454, 465, 480, 487, 488
       - BUS 352
       - M SCI 432
       - ENV S 220
       - PSCI 231
       - ECON 331.

A schedule outlining the recommended term-by-term sequence of courses is available from the School of Accountancy office.

3. All substitutions for required courses need prior approval of the Undergraduate Officer or designate.

The Honours Chartered Accountancy program in the Faculty of Arts anticipates the student's completion of a five-year integrated and professionally accredited program of study and work, leading to both a Bachelor of Arts degree and a Master of Accounting degree. At the end of the Honours Chartered Accountancy Studies program, which constitutes the undergraduate portion of the PAS, the student will have completed most of the formal university courses required at present by the Institute of Chartered Accountants of Ontario (ICAO). The other principal requirements for qualification as a CA, as stated by the ICAO, are passing of or being exempted from the ICAO's School of Accountancy Core-Knowledge Examination and the Professional Summer School (offered in May-June by the ICAO), successful completion of the Uniform Final Examinations, and work experience with a designated public accounting firm. By completing the graduate portion of the PAS the student will earn exemption from the ICAO's School of Accountancy Core-Knowledge Examination and the Professional Summer School and will be able to proceed to the Uniform Final Examinations directly upon completion of the PAS. For information about the Master of Accounting phase of the PAS program, please refer to the Graduate Calendar.

At the end of the Honours Management Accounting Studies program, the student will have completed the formal university courses required at present to challenge the Professional Studies Entrance Examination of the Society of Management Accountants of Ontario. Successful completion of that examination will enable students to enter Year One of the Society's Professional Program.

**Structuring Electives and Interdisciplinary Studies**

Accounting is a multi-disciplinary field and the accounting profession values breadth of academic study. The accounting programs described here purposely provide electives to permit students to broaden their horizons by taking courses beyond the accounting program requirements. Students are advised to consider using their electives in a structured way by completing a minor or diploma in one of the interdisciplinary programs described in this calendar, or by using available electives to choose a series of courses in an area of studies outside the major area to provide some depth of exposure in a field for which a minor or diploma program does not exist. In some of the programs described, some of the courses that are required in the accounting program will also qualify as part of the minor or diploma. Students are encouraged to take full advantage of the opportunities provided by the existence of electives and interdisciplinary studies programs.
Special Recognition by the Accounting Profession of the Professionally Accredited Stream (PAS)
The five-year professionally accredited stream is the only program in Ontario that has been accredited by the Institute of Chartered Accountants of Ontario as being sufficiently complete to justify special status for its graduates. Completion of the professionally accredited five-year program will lead to fulfillment of the requirements of the Institute of Chartered Accountants of Ontario which qualifies the student for exemptions from all ICAO education requirements (including the School of Accountancy Core Knowledge Examination and the Professional Summer School) except the Uniform Final Examinations (UFE) which can be written at the first opportunity following graduation from the PAS.

Anthropology
(Anthropology includes Archaeology, Socio-Cultural Anthropology, Physical Anthropology, and Linguistics.)

Three-Year General Anthropology
Eligibility for graduation in the Three-Year General Anthropology program includes fulfillment of the following requirements:

1. Successful completion of a minimum of 30 term courses including Faculty of Arts Group requirements with an overall cumulative average of at least 60% and a cumulative major average of at least 65%.
2. At least ten term courses must be in Anthropology. ANTH courses must include: 101, 102, 201, 202, 260, 352.

Note
Anthropology 371 at Wilfrid Laurier may be substituted for ANTH 352.

Four-Year General Anthropology
Eligibility for graduation with a Four-Year General degree in Anthropology includes the following requirements:

1. Successful completion of a minimum of 40 term courses including Faculty of Arts Group requirements with a cumulative overall average of at least 60% and a cumulative major average of at least 65%.
2. At least 16 term courses must be in Anthropology and must include the courses required in the Three-Year General program.

Honours Anthropology
Eligibility for graduation in the Honours Anthropology program includes fulfillment of the following requirements:

1. Successful completion of a minimum of 40 term courses including Faculty of Arts Group requirements with an overall cumulative average of at least 60% and a cumulative major average of at least 75%.

2. At least 20 term courses must be in Anthropology.
   ANTH courses must include:
   - 101, 102, 201, 202, 260, 300, 352, 499A/B;
   - one additional 400-level term course.

Anthropology Joint Honours Program
Joint Honours programs have been approved for Anthropology and:
- Classical Studies
- Geography
- Drama and Theatre Arts
- German
- English
- History
- Environment and Resource Studies
- Political Science
- Fine Arts
- Psychology
- Religious Studies
- Sociology
- French

Eligibility for graduation in the Joint Honours Anthropology program includes fulfillment of the following requirements:

1. Successful completion of a minimum of 40 term courses except in programs where another department requires 42.
2. These courses must include Faculty of Arts Group A and B requirements with an overall cumulative average of at least 60% and a cumulative major average of at least 75%.
3. Students enrolled in a joint major in Anthropology and either Geography or Environmental and Resource Studies will complete Faculty of Arts requirements if they seek a BA degree and Faculty of Environmental Studies requirements if they seek a BS degree.
4. At least 14 term courses must be in Anthropology.
   ANTH courses must include:
   - 101, 102, 201, 202, 260, 300, 352,
   - one 400-level term course;
   - 499A/B (the Anthropology Honours Essay) is recommended, but is optional if an Honours Essay is written in the Joint discipline.

Honours Anthropology (Co-op)
Co-op Anthropology students will pursue a normal first year Arts program, taking ANTH 101 and 102. In the second year and thereafter the student is required to pursue a normal Honours program. It is strongly advised that ANTH 300 be taken in the third year.

Students are admitted to the program in their 2A term. Their first work term follows 2B. Work terms and study terms alternate after that. A student must complete four successful work terms.

Honours Anthropology (Applied Studies Co-op)
Students may combine an Honours Anthropology program with Applied Studies Co-op. The requirements in Anthropology are identical to the Honours requirements listed above. See Applied Studies for requirements in Applied Studies.
Minor in Anthropology
An Honours student may Minor in Anthropology.
The requirements for an Anthropology Minor are identical
to the requirements for a Three-Year General BA in
Anthropology.

Applied Studies Co-op
A student in the Applied Studies Co-op program must
maintain good standing in an Honours program in Arts and
must complete 12 to 16 term courses in the area desig-
nated Applied Studies. These courses are intended to
provide the student with a basic and practical general
education and with the skills appropriate to a wide range
of careers. Specifically, they are intended to ensure that
students in the program are:

1. capable of clear and precise oral and written
   communication in English;
2. familiar with the history and political institutions of
   Canada;
3. familiar with the economic structure and economic
   institutions of Canada;
4. aware of the impact of science and technology on
   Canadian society, with a particular awareness of the
   role of computers and data processing.

Following Year One, six work terms alternate in regular
sequence with six study terms. A special non-credit semi-
nar (Co-op 000 AS), which is designed to prepare students
for their Co-op employment experience, is offered during
the two terms preceding the first work term at the end of
Year One.

Required Program

Year 1A
A second language
ACC 131
CS 100 or CS 112
Co-op 000 AS
Proposed Major Subject and Electives (two term courses)

Year 1B
A second language (second half of language taken in 1A)
ACC 123
ENGL 109
Co-op 000 AS
Proposed Major Subject and Electives (two term courses)

Year 2A (see Note 5)
HIST 253 or P SCI 260A
ECON 101 or 102
Major Subject and Electives (three or four term courses)

Year 2B (see Note 5)
HIST 254 or P SCI 260B; and PHIL 145
Major Subject and Electives (three or four term courses)

Notes
1. Students must normally have an overall average of
   75% in their Applied Studies courses in the first term of
   Year One (1A) to remain in the program.
2. Once a major has been chosen at the end of Year One,
   students must maintain an average of at least 75%
   both in the major and in the Applied Studies courses.
3. Arts Administration, French Teaching, International
   Trade, Human Resources Management and
   Management Studies specializations are available for
   qualified applicants at the beginning of the 2A term.
   (Details in HH 146.)
4. A list of approved Applied Studies courses is available
   from the Director of the program in HH 146.
5. Double-counting courses for credit in Applied Studies
   and a minor or option is allowed to a maximum of one-
   third of the total number of courses required for that
   minor or option.
6. Upon successful completion of the minimum of 42 term
   courses required in this program and a minimum of
   four successful work terms, a student is granted an
   Honours degree in the major discipline with an Applied
   Studies Co-operative program designation.

ARTS ADMINISTRATION SPECIALIZATION
The Faculty of Arts offers students in Applied Studies
Co-op the opportunity for academic and practical training in
Arts Administration as an integral part of their Honours
Co-op program. In conjunction with their academic pro-
gram, students in Arts Administration complete four (of six)
co-op work-term placements in performing and visual arts
organizations throughout Canada.

As part of the Applied Studies Co-op program, students
in the Arts Administration Specialization complete a mini-
mum of 42 term courses, of which 14 to 20 are in the
Honours major discipline, 8 to 10 are in Applied Studies,
and 6 are Arts Administration courses. The remaining 8 to
14 term courses are electives. Students must maintain an
overall average of 75% in their Honours major and in their
Applied Studies courses.

Students apply and are considered for admission to
the Arts Administration Specialization during their 2A
academic term in Applied Studies Co-op (following completion of Terms 1A and 1B, having declared an Honours major and normally having completed their first Applied Studies work-term placement).

It should be stressed that only students in Applied Studies Co-op are eligible for the Arts Administration Specialization.

Requirements
(Students should check course prerequisites when planning their program.)

In addition to satisfying all the requirements of Applied Studies Co-op, students in the Arts Administration Specialization have additional required and elective courses as follows:

1. **Required Courses**
   - DRAMA 348
   - DRAMA 349
   - DRAMA 350
   - BUS 352 (WLU)
   - BUS 362 (WLU)
   - HRM 200

2. **Elective Courses**
   - BUS 388 (WLU)
   - CDN ST 202
   - DRAMA 223/224
   - FINE 330
   - PHIL 331
   - PSCI 102
   - REC 304
   - RS 360

For further information, please contact the Program Director, William D. Poole, HH 144, ext. 5057.

**INTERNATIONAL TRADE SPECIALIZATION**

The globalization of the world economy, coupled with the accelerated process of economic integration, implies that Canada will increasingly demand people with education and skills in areas related to international trade. As an integral part of the Applied Studies Co-op program in the Faculty of Arts, the Specialization provides students with a broadly-based education in the liberal arts combined with courses targeted to international trade.

As part of their chosen Applied Studies Co-op program, students must successfully complete 11 term courses, divided between required and elective courses. An overall average of 75% must be maintained in the Applied Studies courses and that of 70% in International Trade.

In conjunction with the academic program, students will normally complete four (of six) co-op work-term placements with companies and organizations which concentrate in the area. The final two work terms are planned to occur abroad.

Enrollment in the Specialization is limited. Students enter the program in the 2A term through a process of formal application and personal interview.

**Required Courses**
- ECON 101 Introduction to Microeconomics
- ECON 102 Introduction to Macroeconomics
- ECON 231 Introduction to International Economics
- INTTS 400A/B International Trade Seminar
- Two consecutive language courses in one of Chinese, Croatian, Dutch, French, German, Greek, Italian, Japanese, Korean, Polish, Spanish, Russian, or Ukrainian.

**Elective Courses** (Other courses may be considered as electives upon written request to the Director of the Specialization)

- Students must complete five from at least three of the areas of Culture and Peoples, Business and Economics, Geography and History, and Political Science.

**Cultures and Peoples**
- ANTH 102A Social and Cultural Anthropology
- ANTH 202 Principles of Social and Cultural Anthropology
- EASIA 201R East Asian Civilization
- FR 292 French Civilization 2
- GER 272 German Thought and Culture
- ITAL 292 Italian Culture and Civilization
- PSYCH 253 Social Psychology
- PSYCH 338 Organizational Psychology
- PSYCH 354 Interpersonal Relations
- SPAN 217 Latin American Civilization 1
- SPAN 218 Latin American Civilization 2
- RUSS 272 Russian Thought and Culture

**Business and Economics**
- BUS 352W Marketing I (WLU)
- BUS 362W Marketing II (WLU)
- BUS 459 Lecture-Seminar: Issues in International Marketing (WLU)
- ECON 201 Microeconomic Theory 1
- ECON 202 Macroeconomic Theory 1
- ECON 302 Macroeconomic Theory 2
- ECON 331 International Trade
- ECON 332 International Finance
- ECON 431 International Economic Policy

**Geography and History**
- GEOG 101 Introduction to Human Geography
- GEOG 202A Location of Economic Activities
- GEOG 311 Regional and Local Development
- GEOG 411 Geography of Industrial Restructuring
- GEOG 353 Marketing Geography
- HIST 130 The Modern World in Historical Perspective
- HIST 239 History of Modern China, 1911 to the Present
- HIST 240 20th-Century Japanese History
- HIST 389 Canada in World Affairs: From Laurier to Trudeau

**Political Science**
- PSCI 231 Government and Business in Canada
- PSCI 255/256 The Politics of Western Industrial Nations 1/2
PSCI 281 International Politics
PSCI 282 Foreign Policy
PSCI 350AB The Politics of Developing Areas 1/2
PSCI 365A/B Politics in the Soviet Successor States 1/2
PSCI 380A World Politics
PSCI 381 Foreign Policies of South Asian States
PSCI 382 Politics of Canadian Foreign Policy
PSCI 434 Comparative Public Administration
PSCI 435 The Politics of Canadian Resource Development
PSCI 485 Selected Topics in International Political Economy

Quantitative Methods
In addition to the above, students must also demonstrate a knowledge of quantitative methods by completing a course in this area. Courses in quantitative methods and statistics are offered by the Faculty of Mathematics, and by several departments in the Faculty of Arts and the Faculty of Environmental Studies.

Further Information
Please contact the Specialization Director, Ramesh Kumar, HH 213, ext. 2644 or Christine Woods at ext. 2119.

For Information on:
French Teaching Specialization see French Studies
Human Resources Management Specialization see Interdisciplinary Programs
Management Studies Specialization see Interdisciplinary Programs

Arts
Canadian Studies

1. Successful completion of a minimum of 30 term courses including Faculty of Arts Group A and B requirements with an overall cumulative average of at least 60% and an overall average of at least 65% in Canadian Studies and Approved Canadian Content Courses.

2. 14 required courses including:
- six CDN ST courses: 101 or 102; 201, 202, and three from amongst CDN ST 301, 302, 311, 313, 365D, ECON 310, ERS 352, GEOG 322, PSCI 231, PSCI 435, SOC 407;
- a course that focuses on the French Canadian people and cultures [see Note 1];
- a course that focuses on First Nations people and cultures [see Note 2];
- at least two Humanities (ACCC) electives;
- at least two Social Science (ACCC) electives;
- at least two Faculty of Environmental Studies (ACCC) electives.

3. 16 elective courses to be chosen in consultation with advisors.

Notes
1. A course in French Canadian literature taught either in English translation or in French; or a course in French language or French Canadian culture. It is to be noted that the course in French Canadian literature in translation will not contribute to fulfillment of the Faculty of Arts Aii requirements.

2. As appropriate to their respective contents and discipline base, each course approved as a Native Studies course may meet one of the Faculty of Arts Group A, Aii, Aiii, or Group B requirements. Students are advised that they may apply to take courses in the Native languages of Canada, for example, Ojibway, Cree and Mohawk, on a letter of permission from other universities. Native language courses approved for transfer will fulfill the Arts Faculty Group Aii requirements.

3. Students intending to pursue graduate work in social science areas are encouraged to take a course in statistical and/or quantitative methods. General Degree students must satisfy the Canadian Studies requirements with an overall average of at least 65% in Canadian Studies and Approved Canadian Content Courses.

Canadian Studies

Students interested in the Canadian Studies Three-Year General Program will ordinarily be admitted at the beginning of Year Two. Admission will be based on academic performance in at least ten term courses in Year One including at least one Canadian Studies course or an Approved Canadian Content Course (ACCC).

Application for admission to the program is usually made at the time of preregistration for Year Two or after completion of ten term courses. Criteria for admission will normally include an overall Year One average of at least 60% and an average of at least 65% in Canadian Studies and Approved Canadian Content Courses (ACCC).

Because of limitations on resources, however, the student's fulfillment of minimum requirements may not guarantee admission to the Canadian Studies Three-Year Major and a higher average, and, in some instances, an interview may be required.

Three-Year General Canadian Studies
Eligibility for graduation in the Three-Year General Canadian Studies program includes fulfillment of the following requirements:
Classical Studies

(Latin, Greek, Classical Studies)

Three-Year General Programs
Eligibility for graduation in the General Latin, Greek or General Classical Studies program includes fulfillment of the following requirements:

1. Successful completion of a minimum of 30 term courses including Faculty of Arts Group requirements with an overall cumulative average of at least 60% and a cumulative major average of at least 65%.

2. At least ten term courses must be in the major field. In the Latin or Greek programs, normally not more than two of the ten may be in Classical Studies. In the Classical Studies program, normally not more than two of the ten may be in Latin or Greek; the ten must also include CLAS 251/252, 265 or 266, and at least two term courses at the 300-level. Knowledge of neither Latin nor Greek is required to obtain a General degree in Classical Studies.

Four-Year General Program
Eligibility for graduation in the Four-Year General Classical Studies program includes fulfillment of the following requirements:

1. Successful completion of a minimum of 40 term courses including Faculty of Arts Group requirements with an overall cumulative average of at least 60% and a cumulative major average of at least 65%.

2. At least 14 term courses must be in Classical Studies, including CLAS 251/252, 265 or 266, and at least two term courses at the 300-level. Normally not more than four of the 14 term courses may be in Latin or Greek.

Honours Programs
Eligibility for graduation in the Honours Classical Studies, Classical Studies (Languages Specialization) or Latin program includes fulfillment of the following requirements:

1. Successful completion of a minimum of 40 term courses including Faculty of Arts Group requirements with an overall cumulative average of at least 60% and a cumulative major average of at least 75%.

2. At least 20 term courses must be in the major field. In the Latin program, normally not more than six of the 20 term courses are Classical Studies courses. In the Classical Studies program, the 20 term courses must include: CLAS 251/252, 265 or 266; one senior seminar; at least seven term courses in LAT and/or GRK, including one at the 300-level; CLAS 490A/B (Senior Honours Thesis) or one of the options described below in Note 2 (see Notes). In Classical Studies (Languages Specialization), the 20 term courses must include: CLAS 251/252; at least 14 term courses in LAT and GRK, including one 300-level term course in both, and a 400-level term course in one; CLAS 490A/B or one of the options in Note 2.

Honours Classical Studies
Recommended Program

Year One
Two of CLAS 100/101/102
LAT 100A/B or GRK 100A/B
Six additional term courses

Year Two
CLAS 251/252; 265 or 266
One additional CLAS
Two 200-level term courses in LAT/GRK
Four additional term courses

Year Three
One 300-level term course in LAT/GRK
Two additional term courses in LAT/GRK
Three CLAS or Directed Study
Four additional term courses

Year Four
Two CLAS including one Senior Seminar
CLAS 490A/B or CLAS 486X or Y or Directed Study
Six additional term courses

Honours Classical Studies (Languages Specialization)
Recommended Program

Year One
LAT 100A/B or LAT 203/204
GRK 100A/B
Six additional term courses

Year Two
Two LAT, two GRK
CLAS 251/252
Four additional term courses

Year Three
Four term courses in LAT/GRK, including one 300-level term course in each
Two additional CLAS or LAT/GRK, or Directed Study
Four additional term courses

Year Four
CLAS 490A/B or CLAS 486X or Y or Directed Study
One 400-level term course in LAT/GRK
One additional term course in CLAS or LAT/GRK
Six additional term courses

Honours Latin
Recommended Program

Year One
LAT 100A/B or 203/204
Eight additional term courses

Years Two, Three, Four
Four term courses in LAT
Two term courses in CLAS
Four additional term courses
Honours Classical Studies or Latin
(Applied Studies Co-op)
A student may combine an Honours Classical Studies or Latin program with Applied Studies Co-op. The requirements in Classical Studies or Latin are identical to the Joint Honours requirements listed below. See Applied Studies for the Applied Studies requirements.

Joint Honours Programs
Eligibility for graduation in the Joint Honours Classical Studies, Classical Studies (Languages Specialization) or Latin program includes fulfillment of the following requirements:

1. Successful completion of a minimum of 42 term courses including Faculty of Arts Group requirements with an overall cumulative average of at least 60% and a cumulative major average of at least 75%.

2. At least 16 term courses must be in the major field. In the Latin program, normally not more than four of the 16 term courses are Classical Studies courses. In the Classical Studies program, the 16 term courses must include: CLAS 251/252; 265 or 266; at least five term courses in LAT/GRK; CLAS 490A/B (Senior Honours Thesis) or one of the options described below in Note 2 (see Notes), or a senior Honours thesis in the other discipline. In Classical Studies (Languages Specialization), the 16 term courses must include: at least 12 term courses in LAT/GRK, including at least four term courses in each language; CLAS 251/252; CLAS 490A/B or one of the options in Note 2, or a senior Honours thesis in the other discipline.

Joint Honours Classical Studies
Recommended Program

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<tr>
<th>Year One</th>
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<tbody>
<tr>
<td>Two of CLAS 100/101/102</td>
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<tr>
<td>LAT 100A/B or GRK 100A/B</td>
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<tr>
<td>Six additional term courses</td>
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<table>
<thead>
<tr>
<th>Year Two</th>
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</thead>
<tbody>
<tr>
<td>CLAS 251/252; 265 or 266</td>
</tr>
<tr>
<td>Two term courses in LAT/GRK</td>
</tr>
<tr>
<td>Seven additional term courses</td>
</tr>
</tbody>
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<thead>
<tr>
<th>Year Three</th>
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<tbody>
<tr>
<td>One term course in LAT/GRK</td>
</tr>
<tr>
<td>Three CLAS (one may be Directed Study)</td>
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<tr>
<td>Eight additional term courses</td>
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</tbody>
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<tr>
<th>Year Four</th>
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</thead>
<tbody>
<tr>
<td>CLAS 490A/B or CLAS 486X or Y or Directed Study</td>
</tr>
<tr>
<td>One additional CLAS</td>
</tr>
<tr>
<td>Seven additional term courses</td>
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</tbody>
</table>

Joint Honours Classical Studies (Languages Specialization)
Recommended Program

<table>
<thead>
<tr>
<th>Year One</th>
</tr>
</thead>
<tbody>
<tr>
<td>LAT 100A/B or LAT 203/204</td>
</tr>
<tr>
<td>GRK 100A/B</td>
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<tr>
<td>Six additional term courses</td>
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</tbody>
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<table>
<thead>
<tr>
<th>Year Two</th>
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<tbody>
<tr>
<td>Two LAT; two GRK</td>
</tr>
<tr>
<td>CLAS 251/252</td>
</tr>
<tr>
<td>Six additional term courses</td>
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<tr>
<th>Year Three</th>
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<tbody>
<tr>
<td>Three term courses in LAT/GRK</td>
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<tr>
<td>One additional term course in LAT/GRK or CLAS or Directed Study</td>
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<tr>
<td>Eight additional term courses</td>
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<table>
<thead>
<tr>
<th>Year Four</th>
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</thead>
<tbody>
<tr>
<td>CLAS 490A/B or CLAS 486X or Y or Directed Study</td>
</tr>
<tr>
<td>Eight additional term courses</td>
</tr>
</tbody>
</table>

Notes For All Honours Classical Studies Programs
1. Students in Classical Studies may take more Latin and Greek courses than the prescribed minimums. The decision whether to graduate in Classical Studies or in Classical Studies (Languages Specialization) may be left until registration in the final year.

2. Honours Classical Studies students are strongly encouraged to pursue the Senior Honours Thesis (CLAS 490A/B). However, a student may substitute one of the following options (after consultation with the Undergraduate Advisor):
   - One expanded senior seminar (466X or 466Y) at a credit weight of 1.0. Please note that in addition the student is still expected to take a regular senior seminar (466A-W, credit 0.5), as per the Honours requirements.
   - Under exceptional circumstances, and only with the prior approval of the department, a student may substitute Directed Study work for the thesis (see below, “Course Descriptions”, under CLAS 492-498).

3. In the senior Honours thesis or in any of the courses/work substituted for it (see Note 2), a grade of B- or higher must be achieved.

4. Students considering graduate work are strongly encouraged to pursue more than the minimum number of language courses.

Minor Programs
Minor programs are offered in Classical Studies, Greek and Latin. Students interested in planning a sequence of ten term courses to complement their Major field of study are encouraged to consult the Undergraduate Advisor in Classical Studies.
Drama and Speech Communication

DRAMA PROGRAMS

General Drama
Eligibility for graduation in the General Drama program includes fulfillment of the following requirements:

1. Successful completion of a minimum of 30 term courses including Faculty of Arts Group requirements with an overall cumulative average of at least 60% and a cumulative major average of at least 65%.

2. At least 12 term courses must be in Drama, including:
   - DRAMA 101A, 101B and 102 must be taken in the first year;
   - DRAMA 243, 244, 371 or 372, 409.

Four-Year General Drama
The requirements are the same as for the Drama section of the Joint-Honours program, with the following exception: an overall cumulative average of 60%, and a cumulative major average of 70%.

Honours Drama
The Honours program is designed so that a student can work through a particular sequence of courses in one field (acting, academic, directing, technical). The optional DRAMA 499 project in the fourth year may be centred on this specialization.

Eligibility for graduation in the Honours Drama program includes fulfillment of the following requirements:

1. Successful completion of a minimum of 40 term courses including Faculty of Arts Group requirements with an overall cumulative average of at least 60% and a cumulative major average of at least 75%.

2. At least 20 term courses must be in Drama including:
   - DRAMA 101A, 101B and 102 must be taken in the first year;
   - DRAMA 243, 244, 371, 372, 409.

Honours Drama (Applied Studies Co-op)
A student may combine an Honours Drama program with Applied Studies Co-op. The requirements in Drama are identical to the Drama Joint Honours program listed below, with the following exceptions:

1. Both DRAMA 371 and 372 and three Dramatic Literatures, OR
2. One of DRAMA 371 and 372 and four Dramatic Literatures.

Drama Joint Honours Program
Eligibility for graduation in the Joint Honours Drama program includes fulfillment of the following requirements:

1. Successful completion of a minimum of 40 term courses including Faculty of Arts Group requirements with an overall cumulative average of at least 60% and a cumulative major average of at least 75%.

2. At least 15 term courses must be Drama including:
   - DRAMA 101A, 101B and 102 must be taken in the first year;
   - DRAMA 243, 244, 371, 372, 409.

Minor Program
DRAMA 101A and 101B and DRAMA 102 plus seven other term courses of which two must be in dramatic literature.

Acting Courses
1. DRAMA 102 has limited enrolment; early registration is advised. DRAMA 101A or 101B, or DRAMA 223 or 224 are pre or corequisites.

2. Auditions are required for DRAMA 221, 222, 321, 322, 421, 422.

Note for All Programs
A student who has taken ENGL 362/363 may not also take ENGL 190.

Note for Drama Majors Enrolled in Minor or Option Program in Speech Communication
Students can double count two Drama courses in the Approved Cognate Courses list toward their Major in Drama and the Minor or Option programs in Speech Communication.

SPEECH COMMUNICATION PROGRAMS

Note
Students interested in the three- or four-year General Major program in Speech Communication will normally be admitted at the beginning of their second year of study based on their academic performance in ten term courses in Year One, including DRAMA 223 and 224. General students can apply for admission to the Major program at the time of preregistration for Year Two. Senior students may also apply and be evaluated on the same general basis. Normally only students whose Year One cumulative average is at least 70% for the four-year program or 65% for the three-year program will be admitted. Owing to resource limitations, however, fulfilling these minimum entrance requirements will not guarantee admission to the General Major program, and higher averages may be required for admission.
Four-Year General Speech Communication
1. 40 courses overall
2. Overall average of at least 60%; major average 70%
3. 14 term program courses from at least three departments:
   o six term courses in core Speech (DRAMA 102, 223, 224 required)
   o eight in the two discipline areas listed below (at least two term courses from each discipline area).

Notes for Four-Year Speech Communication Majors Enrolled in Minor Program in Drama
1. DRAMA 102 is required for both the Speech Communication program and the Drama Minor program.
2. In addition to DRAMA 102, students can double count two Drama courses in Approved Cognate Courses list toward their Major in Speech Communication and the Minor program in Drama.

Three-Year General Speech Communication
1. 30 courses overall
2. Overall average of at least 60%; major average 65%
3. Ten term program courses from at least three departments:
   o five term courses in core Speech (DRAMA 102, 223, 224 required)
   o five in the two discipline areas listed below (at least two term courses from each discipline area).

Courses:
Core Speech: DRAMA 102*, 223**, 224**, 225, 323, 324, 326
* DRAMA 102 must be taken after DRAMA 223.
** Students must attain 78% in both DRAMA 223 and 224 to proceed.

Humanities Discipline Area: DRAMA 221, 222, 321, 322, 421, 422, 409; PHIL 145, 200J, 216, 243, 245, 443, 463, 464; WLU courses CS 308/SY 308 (Sociology of Mass Communication), EN 202 (Critical Theory of Mass Media), CS 207 (Media and Society, Part I), CS 208 (Media and Society, Part II)


Notes
The Speech Communication Minor and Option are open to undergraduate students in all faculties of the University. Consultation with the Co-ordinator is highly recommended to ensure that students can fulfill all the course requirements during the terms that they are on campus.

Minor Program in Speech Communication
Students in an Honours Program interested in Speech Communication as a complement to their major field of study will be expected to complete ten term courses: five in Speech Communication and five in the approved Cognate courses concerned with communication from other disciplines.

Required core Speech Communication courses:
DRAMA 223, 224

Three of four optional Speech Communication courses:
DRAMA 225, 323, 324, 326

Plus five approved Cognate courses.

Option in Speech Communication
Students in any degree program interested in Speech Communication as a complement to their studies will be expected to complete eight term courses: four in Speech Communication and four in the approved Cognate courses concerned with communication from other disciplines.

Required core Speech Communication courses:
DRAMA 223, 224

Two of four optional Speech Communication courses.

Plus four approved Cognate courses.

Notes For Minor and Option Programs
1. Students can double count two of the Cognate courses toward their major field of study and the Minor or Option.
2. Students enrol in Cognate courses concerned with communication from other disciplines, either from the following list of recommended courses or in consultation with the Co-ordinator of Speech Communication.

Course Requirements
Limited enrollment in all Speech Communication Courses; early registration advised.

Core Speech Communication Courses
DRAMA 102 Introduction to Acting (Major only)
DRAMA 223 Public Speaking
DRAMA 224 Interpersonal Communication

Optional Speech Communication Courses
DRAMA 225 Interviewing
DRAMA 323 Speech Writing
DRAMA 324 Small Group Communication
DRAMA 326 Voice Technique

Approved Cognate Courses
ACC 131 Management 1/2
ACC 432 Communicating Accounting Information for Decision Makers
ACC 443 Creative Thinking, Problem Solving and Decision Making for Accountants
CS 492 Social Implications of Computers
DRAMA 102 Introduction to Acting
DRAMA 221 Intermediate Acting 1
DRAMA 222 Intermediate Acting 2
DRAMA 321 Advanced Acting 1
DRAMA 322 Advanced Acting 2
ENGL 103A The Nature and Structure of the English Language
ENGL 103B Varieties of English
ENGL 306A-F English Language and Linguistics
ENGL 309A Rhetoric: Principles and Practice 1
ENGL 309B Rhetoric: Principles and Practice 2
ENGL 309C Contemporary Rhetorical Theory
ENGL 309D Approaches to Style
ERS 330 Environmental Journalism
ERS 361 International Communication System and Development
FR 250A Advanced Spoken French 2
FR 300A Advanced Spoken French 3
FR 400A Advanced Spoken French 4
M SCI 211 Organizational Behaviour 1
M SCI 311 Organizational Behaviour 2
PACS 201 Roots of Conflict and Violence
PACS 202 Conflict Resolution
PACS 302A Community Conflict Resolution
PERST 200 Basic Personnel Administration
PERST 300 Concepts and Issues in Personnel Administration
PHIL 145 Critical Thinking
PHIL 200J Intentional Logic
PHIL 216 Rational Behaviour and Decision-Making
PHIL 243 Conflict, Contract and Choice
PHIL 245 Critical Thinking 2
PHIL 443 Critical Thinking, Problem Solving and Decision Making
PHIL 483 Philosophy of Language
PHIL 484 Philosophy as Linguistic Analysis
PSCI 101A Introduction to Politics
PSYCH 253 Social Psychology
PSYCH 334 Theories of Individual Counselling
PSYCH 335 Personality and Behaviour Change
PSYCH 338 Organizational Psychology
PSYCH 339 Personnel Psychology
PSYCH 344 Theories of Group Counselling
PSYCH 354 Interpersonal Relations
PSYCH 440 AB Group and Individual Counselling
SOC 216 Language, Society and Identity
SOC 234 Social Psychology and Everyday Life
SOC 235 Individual and Society
SOC 237 Collective Behaviour
SOC 238 Sociology of Marketing
SOC 243 Occupational Sociology
SOC 245 Interpersonal Communication
SOC 246 Mass Communication
SOC 265 Political Sociology
SOC 310 Seminar in Group Dynamics
SOC 336 Sociology of Professions
SOC 415 Social Network

Economics

It is recommended that students planning to major in Economics have OAC courses in Mathematics, preferably Algebra and Geometry, and Calculus or the equivalent. Students without these courses are encouraged to select MATH 103 and 104 in their first year of study at the University of Waterloo.

Three-Year General Economics
Eligibility for graduation in the General Economics program includes fulfillment of the following requirements:

1. Successful completion of a minimum of 30 term courses including Faculty of Arts Group requirements, and a minimum of 16 term courses beyond the 100 level, with an overall cumulative average of at least 60% and a cumulative major average of at least 65%.

2. At least ten term courses must be in Economics. Four of these ten term courses must be at the 300-level or above. ECON courses must include:
   - 101, 102, 201, 202;
   - 211 or 221.

Four-Year General Economics
Eligibility for graduation in the Four-Year General Economics program includes fulfillment of the following requirements:

1. Successful completion of a minimum of 40 term courses including Faculty of Arts Group requirements, and a minimum of 16 term courses beyond the 100 level, with an overall cumulative average of at least 60% and a cumulative major average of at least 65%.

2. At least 14 term courses must be in Economics. At least six of these 14 ECON term courses must be at the 300-level or above, of which two term courses must be at the 400-level. ECON courses must include 101, 102, 201, 202, 211, 221, 301, 302.

Honours Programs

Honours Economics (Regular Program)
Eligibility for graduation in the Honours Economics program includes fulfillment of the following requirements:

1. Successful completion of a minimum of 40 term courses including Faculty of Arts Group requirements with an overall cumulative average of at least 60% and a cumulative major average of at least 75%.

2. At least 18 term courses must be in Economics, including ECON:
   - 101, 102, 201, 202, 211, 221, 301, 302, 321, 401, 402, 472;
   - Six additional term courses at the 300-level or above. The Economic Theory Specialization outlined below is strongly recommended for students planning to pursue graduate work in Economics.
Recommended Program

Year One
ECON 101 and 102
Eight additional term courses

Year Two
ECON 201, 202, 211, 221
Two additional term courses in Economics
Four additional term courses

Year Three
ECON 301, 302, 321
Three additional courses in Economics
Four additional term courses

Year Four
ECON 401, 402, 472
An additional term course in Economics
Six additional term courses

* ECON 401, 402, need not be taken in the order as listed.

Honours Economics Applied Studies (Co-op)
A student may combine an Honours Economics program with Applied Studies Co-op. The requirements in Economics are identical to the Honours requirements listed above. See Applied Studies for the Applied Studies requirements.

Honours Applied Economics (Co-op)
Eligibility for graduation in the Honours Applied Economics (Co-op) program includes fulfillment of the following requirements:

1. Successful completion of a minimum of 42 term courses including Faculty of Arts Group requirements with an overall cumulative average of at least 60% and a cumulative major average of at least 75%.

2. At least 18 term courses must be in Economics, including ECON:
   - 101, 102, 201, 202, 211, 221, 301, 302, 321, 401, 402, 472;
   - 403 or 421;
   - Five additional term courses at the 300-level or above. The Economic Theory Specialization outlined below is strongly recommended for students planning to pursue graduate work in Economics.

Recommended Program for Honours Applied Economics (Co-op)
This program consists of a minimum of 42 term courses of which 18 are in economics.

<table>
<thead>
<tr>
<th>Yr.</th>
<th>Fall</th>
<th>Winter</th>
<th>Spring</th>
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<tbody>
<tr>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>ECON 101</td>
<td>ECON 102</td>
<td>Registration for Honours Applied Economics in February/March</td>
</tr>
<tr>
<td></td>
<td>Four electives</td>
<td>Four electives</td>
<td>Term 2B ECON 202, 211, 321 Three electives</td>
</tr>
<tr>
<td>2</td>
<td>Term 2A</td>
<td>Term 3A</td>
<td>Third Work Term</td>
</tr>
<tr>
<td></td>
<td>ECON 201, 221</td>
<td>ECON 301, 302</td>
<td>Fourth Work Term</td>
</tr>
<tr>
<td></td>
<td>Four electives</td>
<td>ECON course at 300-level or above Two electives</td>
<td>Term 4A ECON 402 Two ECON courses at 300-level or above Two electives</td>
</tr>
<tr>
<td>3</td>
<td>Second Work Term</td>
<td>Fifth Work Term</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Term 3B</td>
<td>ECON 401, 421</td>
<td>Term 4B ECON 403 ECON 472</td>
</tr>
<tr>
<td></td>
<td>ECON course at 300-level or above Two electives</td>
<td>ECON course at 300-level or above Two electives</td>
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<tr>
<td>4</td>
<td>ECON 403</td>
<td>ECON 472</td>
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<tr>
<td></td>
<td>Four electives</td>
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* If ECON 421 is not selected in Term 3B, ECON 403 should be taken in Term 4B.

Economics Joint Honours Programs
Eligibility for graduation in the Joint Honours Economics program includes fulfillment of the following requirements:

1. Successful completion of a minimum of 42 term courses including Faculty of Arts Group requirements with an overall cumulative average of at least 60% and a cumulative average in Economics of at least 75%.

2. At least 14 term courses must be in Economics including ECON 101, 102, 201, 202, 211, 221, 301, 302, 321, 401, 402, 472. Students in the Joint Honours Mathematics and Economics or Economics and Mathematics program must take at least 12 term courses in Economics including ECON 101, 102, 201, 202, 301, 302, 401, 402, 472, plus three additional ECON courses at the 300-level or above.

Notes For Joint Honours Programs
1. Economics and Geography
   * If majoring in Geography through Arts, the degree requirements of the Faculty of Arts must be met; if majoring in Geography through Environmental Studies, the degree requirements for the Faculty of
Environmental Studies must be met. Students must take ECON 221 or ENV S 178 or ENV S 278.

2. Economics and Mathematics
By the end of the second year students must decide to pursue a Joint Honours Economics and Mathematics through the Faculty of Arts or a Joint Honours Mathematics and Economics through the Faculty of Mathematics. The program must then be approved by the Department of Economics and the appropriate department in the Faculty of Mathematics.

3. Economics and Political Science
ECON 310 must be taken as part of the required 14 term courses in Economics.

4. Economics and Sociology
Students may take either ECON 221 or SOC 280.

SPECIALIZATIONS IN ECONOMICS
Students majoring in the various Honours Economics Programs or the Four-Year General Economics Program can pursue a specialization in a number of areas including Economic Theory, Econometrics, Mathematical-Economics, International Economics, Public Policy, Environmental Economics, Political Economy/Economic History and Finance.

Economic Theory Specialization
Required courses
ECON 311, 481, 482
At least one of
ECON 411, 421, or 422

Econometrics Specialization
Required courses
ECON 403, 421, 422
At least one of
ECON 311, 481, or 482

Mathematical-Economics Specialization
Required courses
ECON 311, 411, 481
At least one of
ECON 403, 421, or 482

International Economics Specialization
Required courses
ECON 331, 332, 431
At least one of
ECON 333, 335, or 341

Public Policy Specialization
Required courses
ECON 341, 361, 441
At least one of
ECON 344, 351, or 363

Environmental Economics Specialization
Required courses
ECON 355, 357, 361
At least one of
ECON 333, 341, or 343

Political Economy/Economic History Specialization
Required courses
ECON 310, 365, 410
At least one of
ECON 363, 420, or 461

Finance Specialization
Required courses
ECON 371, 372, 404
At least one of
ECON 304, 332, or 341

Notes
1. Students may only select one area of specialization.
2. Students selecting a specialization must fulfill the total course and Economics course requirements as well as the cumulative average requirements outlined above under the various Honours Economics Programs and the Four-Year General Economics Program. Each area of specialization requires four Economics courses which represent part of the total 18 Economics courses required for Honours Economics or part of the total 14 Economics courses required for Four-Year General Economics.
3. Students not selecting a specialization must fulfill the requirements described above under the various Honours Economics Programs and the Four-Year General Economics Program.

Minor Program in Economics
Students can obtain a Minor in Economics while majoring in another Honours Program. A total of ten term courses in Economics must be taken with a cumulative average in these courses of at least 65%. Economics courses must include:

1. ECON 101, 102, 201 and 202;
2. ECON 211 or 221*;

* Other courses may be substituted for ECON 221 at the approval of the Department of Economics.

JOINT PROGRAM IN ECONOMIC STUDIES
Honours Biology/Business Economics
An Honours Biology combined with Economic Studies requires:

1. Successful completion of 13 term courses in Economics with a cumulative average of at least 70%. Courses in Economics include:
   - ECON 101, 102, 201, 202, 211, 221, and 355*;
ENVIROMENTAL ECONOMICS OPTION

The Environmental Economics Option is open to students in all University of Waterloo undergraduate programs and may be taken in conjunction with an Honours or General degree. Requirements include:

1. The successful completion of eight term courses with a cumulative average of at least 65%. The courses include:
   - ECON 201, 355, 361, 357*, ERS 218 and GEOG 356;
   - Two courses with no more than one from the same subject area, selected from the following groups of approved courses:
     - ENV S 200, 201
     - PHIL 207, 224
     - GEOG 356
     - PSCI 435
     - SCI 250

2. Economics students may double count no more than two Economics courses toward the Economics degree and the Environmental Economics Option.

* Faculty of Environmental Studies students may take ENV S 220 in place of ECON 357.

English

Students interested in English programs will ordinarily be admitted at the beginning of Year Two. Admission will be based on academic performance in at least ten term courses in Year One, including at least one (preferably) two 100-level English Major courses. Application for admission to English programs is usually made at the time of preregistration for Year Two. Criteria for admission to Honours English programs will normally include an overall Year One average of at least 70% and an English average of at least 75%; to the Four-Year General English program, an overall Year One average of at least 65% and an English average of at least 70%; to the Three-Year General English program, an overall Year One average of at least 65% and an English average of at least 65%. Because of limitations on resources, however, the student's fulfillment of minimum entrance requirements may not guarantee admission to English programs, and higher averages may be required.

Three-Year General English

Eligibility for graduation in the General English program includes fulfillment of the following requirements:

1. Successful completion of a minimum of 30 term courses including Faculty of Arts Group requirements with an overall cumulative average of at least 60% and a cumulative major average of at least 65%.

2. At least 12 term courses must be in English, including:
   - two term courses from 102A, 102B, 103A, 103B, 105A, 105B, 107, 108A-N, 190 (see Note 1);
   - 200A, 200B (Survey of British Literature — see Notes 2 and 3);
   - 251A, 251B (Practice and Theory of Criticism — see Note 3);
   - one term course from 313, 314, 315, 316, 318, 343, 344, 345, 346, 347 (North American Literature);
   - three other English major term courses.

Students in the General program must gain a minimum of 16 term courses beyond the 100-level.

Four-Year General English

Successful completion of a minimum of 40 term courses including Faculty of Arts Group requirements, with specific English requirements the same as for the Joint Honours Program. Students must maintain a minimum average of 70% in their English major courses and an overall cumulative average of 60%.

Honours English -- Literature

Eligibility for graduation in the Honours English program includes fulfillment of the following requirements:

1. Successful completion of a minimum of 40 term courses including Faculty of Arts Group requirements with an overall cumulative average of at least 60% and a cumulative major average of at least 75%.

2. At least 20 term courses must be in English, and these 20 courses are usually divided 2-6-6-8 among the four years. English courses must include:
   - two term courses from 102A, 102B, 103A, 103B, 105A, 105B, 107, 108A-N, 190 (see Note 1);
   - 200A, 200B (Survey of British Literature — see Notes 2 and 3);
   - 251A, 251B (Practice and Theory of Criticism — see Note 3);
   - two term courses from 430A, 430B, 451A, 451B, 460A, 460B, 460C (British Literature since 1800);
   - two term courses from 313, 314, 315, 316, 318, 343, 344, 345, 346, 347 (North American Literature);
   - four other English major term courses.

Arts

English
Honours English – Rhetoric and Professional Writing

The Rhetoric and Professional Writing Option is available only as an Honours program (not as a General program) and may be taken as either a Regular program or a Co-operative program. A student must complete 40 term courses with an average of at least 75% in English courses and 70% in the Intensive Study area. In addition to English courses, good course choices for first year include Arts Group B courses, a language other than English (culture courses do not fulfill this requirement), and Computer Science.

The Intensive Study areas can be made up of courses drawn from all faculties except Engineering. The courses will be taken either from a single department (e.g., Biology, Economics) or closely related disciplines (e.g., Biology and Health Studies, Economics and Accounting, Legal Studies). Lists of approved “packages” for Intensive Study may be obtained from the Undergraduate Officer of the Department of English, who also has lists of recommended courses relevant to the program in History, Philosophy, and Political Science.

Students preparing themselves for teaching careers or graduate studies in English may include further courses in literature as part of their electives.

English Requirements (20 courses)

1. First Year (two term courses): two courses chosen from among 102A, 102B, 103A, 103B, 105A, 105B, 107, 108A-N, 190 (see Note 1);
2. Literature (seven term courses): 200A/B, 251A/B, three further Literature (one from 313, 314, 315, 316, 318, 343, 344, 345, 346, 347; one from 310, 330, 350, 362/363, 410, 430, 451, 460 sequences; one other);
3. 200-level Writing (one term course): one of 210E or 210F;
4. Discipline Core (six term courses): all of 292, 306A, 309A, 309C, 409 (1.0);
5. RPW Electives (four term courses): choose from among the 305 courses, other 306 courses, other 309 courses, 335, 336, 392A, 392B, 470A, 470B, 481/482/492 senior seminars, 495A/B when devoted to projects in linguistics, rhetoric, professional writing, or communication (clear RPW elective choices with English advisor).

Non-English Requirements (20 courses)

1. CS 100 or equivalent;
2. Two courses in a language other than English (Arts Group Aii – culture courses may not be used to fulfill this requirement);
3. Four courses in social sciences (Arts Group B);
4. Five courses in an intensive study concentration;
5. Eight courses in open electives.

Note to RPW students

Because most students who choose RPW also choose the Co-op program, the pattern of RPW course selection is set up to accommodate their needs. Co-op RPW students are strongly advised to follow a fully-alternating schedule of academic and work terms. (For the details of this alternating schedule, see the Work/Study Sequence, as well as the term by term models in the RPW advisory materials available from the English Undergraduate Officer.) Co-op RPW students are also strongly advised not to go off-stream.

Honours English – Literature or RPW Co-operative Program

The program leading to the degree of Bachelor of Arts in Honours English (Co-operative Program) is designed for students who intend to enter careers in business, industry, government, or the communications media. Qualified students will ordinarily be admitted to the program after completion of their first two academic terms at the University of Waterloo and will proceed through the Honours English BA program consisting of six further terms of study on campus and a minimum of four work terms with participating employers in the media, business, government, and industry.

The academic requirements of the Co-operative program are essentially those of the regular Waterloo Honours BA in English (either Literature or RPW). Co-op students must complete, by the start of their 3A term (20 term credits), two term credits in a language other than English (culture courses do not fulfill this requirement) and one term credit in computer science at the university level from any faculty. Students with an interest in doing so are strongly encouraged to take more than one course in computing.

Honours English – Literature or RPW Applied Studies Co-op

Students may combine an Honours English program (either Literature or RPW) with Applied Studies Co-op. The requirements in English are identical to the Honours requirements listed above. Students must complete, by the start of their 3A term (20 term credits), two term credits in a language other than English (culture courses do not fulfill this requirement), and one term credit in computer science at the university level from any faculty. Students with an interest in doing so are strongly encouraged to take more than one course in computing. See Applied Studies requirements.

English Joint Honours Program – Literature

Eligibility for graduation in the Joint Honours English program includes fulfillment of the requirements listed below.

1. Successful completion of a minimum of 42 term courses including Faculty of Arts Group requirements with an overall cumulative average of at least 60% and a cumulative average in English courses of at least 75%.

Arts

English
2. At least 16 term courses must be in English, including:
- two term courses from 102A, 102B, 103A, 103B, 105A, 105B, 107, 108A-N, 190 (see Note 1);
- 200A, 200B (Survey of British Literature – see Notes 2 and 3);
- 251A, 251B (Practice and Theory of Criticism – see Note 3);
- two term courses from each of:
  - 430A, 430B, 451A, 451B, 460A, 460B, 460C (British Literature since 1800);
  - 313, 314, 315, 316, 318, 343, 344, 345, 346, 347 (North American Literature);
- two other English major term courses.

English Joint Honours Program – Rhetoric and Professional Writing
The Joint Honours English Program with Option in Rhetoric and Professional Writing is intended for students who wish to pursue their Intensive Study areas very comprehensively. Students must complete 42 term courses, with an average of at least 75% in English courses.

English requirements (16 courses)
1. Year One (two term courses): two courses chosen from among 102A, 102B, 103A, 103B, 105A, 105B, 107, 108A-N, 190 (see Note 1);
2. Literature (six term courses): 200A/B; 251A/B; one course from among the North American sequences; one course from among the 310, 330, 350, 362/363, 410, 430, 451, 460 sequences;
3. 200-level Writing (one term course): one of 210E or 210F;
4. Discipline Core (five term courses): all of 292, 306A, 306C, 409 (1.0);
5. RPW Electives (two term courses): choose from among the 305 courses, other 306 courses, other 309 courses, 335, 336, 392A, 392B, 481/482/492 senior seminars, 495A/B when devoted to projects in linguistics, rhetoric, professional writing, or communication (clear RPW elective choices with English advisor);

Non-English requirements (26 courses)
1. 14-16 courses in the Joint Honours discipline;
2. CS 100 or equivalent;
3. Two courses in a language other than English (Arts Group Aii – culture courses will not fulfill this requirement);
4. Four courses in social sciences (Arts Group B);
5. Three to seven courses in open electives.

See note to RPW students above.

Minor Program for Students in Other Disciplines
Ten term courses in English are required, as follows:
1. 200A/B (Survey of British Literature);
2. 251A/B (Practice and Theory of Criticism);
3. Two English Major term courses, numbered 300 or above;
4. Four other English Major term courses.

Notes For All Programs
1. Students may use only two English term courses at the 100-level to fulfill the minimum English requirements. Some English courses do not fulfill the English Major requirements for a degree in English (see English Undergraduate Course Descriptions). Students not in the Rhetoric and Professional Writing option may take for English Major credit ENGL 335 and 336 and a maximum of two other writing courses at the 200- and 300-levels.
2. Students who have taken ENGL 101 in 1980/81 or earlier will not be required to take ENGL 200A/B. If taken, it will not count as an English Major credit.
3. ENGL 200A, 200B, 251A, 251B are strongly recommended for second year.

Fine Arts
Admission to Fine Arts Studio Specialization at the end of Year One normally requires successful completion of FINE 110, 111, 120, 121 and the submission of a portfolio of work done in FINE 120, and 121. The Fine Arts Department will make a final selection of students at the end of the winter term. Due to limitations of resources, fulfillment of these minimum entrance requirements does not guarantee admission to Fine Arts studio programs.

Three-Year General Fine Arts
Eligibility for graduation in the General Fine Arts program (Studio Specialization, Art History Specialization or Film Studies Specialization) includes fulfillment of the following requirements:
1. Successful completion of a minimum of 30 term courses including Faculty of Arts Group requirements with an overall cumulative average of at least 60% and a cumulative major average of at least 65%.
2. At least 12 term courses must be in Fine Arts. For the different Specializations, the required courses are as follows:
   - Studio Specialization:
     - FINE 110, 111, 120, 121, 220, 222, 224, 225;
     - four additional Fine Arts courses, two of which must be Art History.
   - Art History Specialization:
     - FINE 110, 111, 120, 121;
     - two additional Studio courses;
     - six additional Art History courses.

Note to RPW students above.
Film Studies Specialization:
- FINE 110, 111, 250, 251, 270W, 470, 471;
- at least three term courses from: FINE 350, 351, 352, 353, 360, 361;
- at least two term courses to be selected in consultation with the Fine Arts Film advisor, from: FINE 252, 253, 255R, 258W, 271W, 359, 380Z, 381Z.

Four-Year General Fine Arts
Eligibility for graduation in the Four-Year General Fine Arts program (Studio Specialization, Art History Specialization, or Film Studies Specialization) includes fulfillment of the following requirements:

1. Successful completion of a minimum of 40 term courses including Faculty of Arts Group requirements with an overall cumulative average of at least 60% and a cumulative major average of at least 65%.

2. At least 16 term courses must be in Fine Arts. For the different Specializations, the required courses are as follows:

   Studio Specialization:
   - FINE 110, 111, 120, 121, 220, 222, 224, 225;
   - four additional Fine Arts courses, two of which must be Art History;
   - four additional term courses in Studio at the third- or fourth-year level.

   Art History Specialization:
   - FINE 110, 111, 120, 121, 210, 211, 212, 213, 219;
   - two additional Studio term courses;
   - five additional term courses in Art History at the third- or fourth-year level, two of which must be 390A and 490A.

   Film Studies Specialization:
   - FINE 110, 111, 250, 251, 270W, 470, 471, 490A;
   - at least four term courses from: FINE 350, 351, 352, 353, 360, 361;
   - at least four term courses to be selected in consultation with the Fine Arts Film advisor, from: FINE 252, 253, 255R, 258W, 271W, 359, 380Z, 381Z.

Honours Fine Arts
Admission to the Honours program is by consent of the department at the end of the winter term. The student must have successfully completed all of the required third-year subjects as outlined below. The student must maintain an average of 75% in the chosen major.

Eligibility for graduation in the Honours Fine Arts program (Studio Specialization, Art History Specialization or Film Studies Specialization) includes fulfillment of the following requirements:

1. Successful completion of a minimum of 40 term courses including Faculty of Arts Group requirements with an overall cumulative average of at least 60% and a cumulative major average of at least 75%.

2. At least 20 term courses must be in Fine Arts. For the different Specializations, the required courses are as follows:

   Studio Specialization:
   - FINE 110, 111, 120, 121, 220, 222, 224, 225, 319;
   - four additional term courses in Fine Arts, three of which must be in Art History;
   - at least one course chosen from: FINE 221, 223, 226A or 226B*
   - four term Studio courses on the third-year level chosen from: FINE 320, 321, 322, 323, 324, 325, 326,*
   - FINE 472, 473.

* In order to take a third-year level course in Studio, it is necessary to complete both the fall and winter of the second year of that course.

Note
Fine Arts Studio majors should bear in mind that their area of concentration in FINE 472, 473 (painting, sculpture, drawing, printmaking, etc.) must be one in which they have completed all lower level (second- and third-year) courses.

Art History Specialization:
- FINE 110, 111, 120, 121, 210, 211, 212, 213, 219, 319;
- two additional Studio term courses;
- six additional Art History term courses on the second- or third-year level, one of which must be 390A;
- FINE 490, 491.

Film Studies Specialization:
- FINE 110, 111, 120, 121, 270W, 470, 471;
- two term courses from: FINE 120, 121, 210, 211;
- at least five term courses from: FINE 350, 351, 352, 353, 360, 361;
- at least four term courses to be selected in consultation with the Fine Arts Film advisor, from: FINE 252, 253, 255R, 258W, 271W, 359, 380Z, 381Z;
- FINE 490, 491.

Joint Honours In Fine Arts
Joint Honours programs are possible in combination with a number of departments within the Faculty of Arts. In order to graduate in the Joint Honours Fine Arts programs, students must successfully complete a minimum of 42 term courses, including the Faculty of Arts Group requirements, with an overall cumulative average of at least 60% and a cumulative average in Fine Arts courses of at least 75%, and fulfill the requirements of the Studio, Art History or Film Studies Specialization, listed below.

Studio Specialization:
- FINE 110, 111, 120, 121, 224, 225;
- at least one of the following pairs of courses: FINE 220/221, 222/223 or 226A/226B;
- two additional term courses in Art History;
- four term Studio courses on the 300-level chosen from: FINE 320, 321, 322, 323, 324, 325, 326A;
- FINE 472, 473.

Art History Specialization:
- FINE 110, 111, 120, 121, 210, 211, 212, 213;
- four additional term courses in Art History, one of which must be 390A;
two additional term Studio courses;
○ FINE 490, 491.

Film Studies Specialization:
FINE 110, 111, 250, 251, 470, 471;
○ five term courses from: FINE 350, 351, 352, 353, 360, 361, 380Z, 381Z;
○ two term courses from: FINE 252, 253, 255R, 258W, 271W, 359;
○ FINE 490, 491.

Honours Fine Arts (Applied Studies Co-op)
A student may combine an Honours Fine Arts program with Applied Studies Co-op. The requirements in Fine Arts are similar to the Joint Honours requirements listed above but differ in important details. Please see the Faculty advisor.

Minor in Fine Arts (Studio, Art History or Film Studies Specialization)
Eligibility for graduation with a Fine Arts Minor (Studio, Art History or Film Studies Specialization) includes fulfillment of the following requirements:

1. Successful completion of a minimum of ten Fine Arts term courses with a cumulative average in these Fine Arts courses of 65%.

2. For the different Specializations, the required Fine Arts courses are:

   Studio Specialization:
   FINE 110/111, 120/121 plus six term courses in Fine Arts, four of which must be in Studio.

   Art History Specialization:
   FINE 110/111, 120/121 plus six term courses in Fine Arts, four of which must be in Art History.

   Film Studies Specialization:
   FINE 110/111, 250/251, 470/471, plus four courses from: 350, 351, 360, 361, 352, 353 or 380Z, 381Z.

Fine Arts Abroad
FINE 394A-D are offered abroad. Locations include France, England and Mexico. Information about current offerings can be obtained from the department.

French Studies/Études françaises

Three-Year General French
Eligibility for graduation in the General French program includes fulfillment of the following requirements:

1. Successful completion of a minimum of 30 term courses including Faculty of Arts Group requirements with an overall cumulative average of at least 60% and a cumulative major average of at least 65%.

2. At least 12 term courses must be in French of which at least five term courses must be at the 300- or 400-level. Required courses: FR 195A, 196A, 200A/B, 300A, 352.

Four-Year General French
Eligibility for graduation in the Four-Year General French program includes fulfillment of the following requirements:

1. Successful completion of a minimum of 40 term courses including Faculty of Arts Group requirements with an overall cumulative average of at least 60% and a cumulative major average of at least 65%.

2. At least 16 term courses must be in French of which eight must be at the 300- or 400-level. Required courses: FR 195A, 196A, 200A/B, 400A, and one of 400 or 452.

Honours French
Eligibility for graduation in the Honours French program includes fulfillment of the following requirements:

1. Successful completion of a minimum of 40 term courses including Faculty of Arts Group requirements with an overall cumulative average of at least 60% and a cumulative major average of at least 75%.

2. At least 20 term courses must be in French of which at least five term courses must be at the 300-level and five at the 400-level. Required courses: FR 195A, 196A, 200A/B, 283, 400A, and one of 400 or 452.

Recommended Program

Year One
FR 195A and 196A – prerequisites for second-year literature courses
FR 192A and 192B – recommended
Additional elective courses

Year Two
FR 200A/B, 251, 252, 253, 283, plus one additional term course in French
Additional elective courses

Year Three
FR 351, 352, plus additional French courses at the 300-level
Additional elective courses

Year Four
FR 400A, one of 400 or 452, plus additional French courses at the 400-level
Additional elective courses

Honours French (Applied Studies Co-op)
Students may combine an Honours French program with Applied Studies Co-op. The requirements in French are identical to the Joint Honours requirements listed below. See Applied Studies for the Applied Studies Requirements.
French Teaching Specialization

There are currently two entry points for the program:

1. Honours French, French Teaching Specialization, Honours Co-op

The student enters after a regular first year in Arts, and must fulfill the following requirements: successful completion of a minimum of 40 term courses including Faculty of Arts Group requirements with an overall cumulative average of at least 60% and a cumulative major average of 75%. At least 20 term courses must be in French with five at the 300-level and five at the 400-level.

Required courses: FR 195A, 196A, 200A/B, 283, 400A, one of 400 or 452, plus two courses in linguistics (from FR 203, 303, 403, 409). Students who do not already have native fluency in French are required to spend two terms (normally in Year Three) at a French-speaking university. Students opting to study in France must include FR 473 in their program. Students will be required to take PSYCH 212 (Educational Psychology) for which PSYCH 101 is a prerequisite. The remainder of the program is offered by Brock University.

Students graduate with an Honours BA degree from the University of Waterloo, a Bachelor of Education degree awarded by Brock University, and receive certification from the Ministry of Education to teach French and a second subject at a secondary level.

Recommended Program: Honours French, F.T.S., HCO Program

Year One
FR 195A and 196A (or 192A/B)
PSYCH 101
Two term courses in a second teaching subject
Five elective term courses

Year Two
FR 200A/B, 251, 252, 283
CO-OP 000 (non-credit seminar)
PSYCH 212
Two term courses in the second teaching subject
Two elective term courses

Year Three
Except in the case of exempted Francophone students, this year is spent at a French-speaking university in France or in Quebec. Students should take the equivalent of: FR 351, 352, one linguistics course (from FR 203, 303, 403, 409), two term courses in the second teachable subject, and other subject electives. Total term courses completed this year should be ten. The courses chosen should be approved by the Department of French and by other departments in whose discipline courses are taken.

Year Four
FR 400A, one of 400 or 452, one linguistics course (from FR 203, 303, 403, 409), and 473 (if the student participated at a French-speaking university in France) Two further term courses in French
Two term courses in the second teaching subject
Two elective term courses
Two term course tutorials in teaching techniques

2. Honours French and Applied Studies, French Teaching Specialization, Honours Co-op

Candidates apply for admission to the Applied Studies Program from high school and apply to the French Teaching Specialization in the first year. The following courses are required in Year One of the Applied Studies Program: ACC 123, 131, one of CS 100, 112; ENGL 109; two courses in a second language (which, for those intending to major in French, will be French); CO-OP 000 (non-credit Co-op seminar); and, for those students intending to pursue the French Teaching Specialization, PSYCH 101. See item 1) above for the French requirements.

Students graduate with an Honours BA and Applied Studies designation on their degree from Waterloo, and a Bachelor of Education degree awarded by Brock University and certification from the Ministry of Education to teach French and a second subject at the secondary level.

Recommended Program: Honours French and Applied Studies, F.T.S., HCO Program

Year One
ACC 123, 131; CS 100 or 112, ENGL 109* (Requirements of the Applied Studies Program)
FR 195A and 196A (or 192A/B)
PSYCH 101
Two term courses in a second teaching subject
Two elective term courses.
* Students may be exempted from this Applied Studies requirement on the basis of their mark on the English Language Proficiency Examination, in which case they may choose a further elective.

Year Two
FR 200A/B, 251, 252, 283
PSYCH 212
Two term courses in the second teaching subject
Two elective term courses

Year Three
Except in the case of exempted Francophone students, this year is spent at a French-speaking university in France or in Quebec. Students should take the equivalent of: FR 351, 352, one linguistics course (from FR 203, 303, 403, 409), two term courses in the second teachable subject, and other subject electives. Total term courses completed this year should be ten. The courses chosen should be approved by the Department of French and by other departments in whose discipline courses are taken.

Year Four
FR 400A, one of 400 or 452, one linguistics course (from FR 203, 303, 403, 409), and 473 (if the student participated at a French-speaking university in France) Two further term courses in French
Two term courses in the second teaching subject
Two elective term courses
Two term course tutorials in teaching techniques
Notes
1. Students who do not already have native fluency in French are required to spend two terms (normally in Year Three) at a French-speaking university.
2. Students at both entry levels must complete all the requirements for the French Honours Degree – Co-op Teaching Specialization Program, as well as the two teaching techniques courses, FR 000A and 000B, offered by Brock University on the University of Waterloo campus.

French Joint Honours Program
The Department of French recognizes combined honours programs with the following disciplines:

- Anthropology
- Classics
- Dance
- Economics
- English
- Environment and Resource Studies
- Fine Arts
- Geography
- German
- History
- Latin
- Mathematics
- Music
- Philosophy
- Political Science
- Psychology
- Recreation and Leisure Studies
- Religious Studies
- Russian
- Social Development
- Studies
- Spanish

Other combinations must be approved on an individual basis with the departments concerned.

Eligibility for graduation in the Joint Honours French program includes fulfillment of the following requirements:

1. Successful completion of a minimum of 42 term courses including Faculty of Arts Group requirements with an overall cumulative average of at least 60% and a cumulative major average of at least 75% in each of the two disciplines.

2. At least 16 term courses must be in French (in the case of Political Science only 14 are required) of which at least four French term courses must be at the 300-level and four French term courses at the 400-level. Required courses: FR 195A, 196A, 200A/B, 283, 400A, and one of 400 or 452.

Recommended Program

**Year One**
FR 195A and 196A
Eight additional term courses

**Year Two**
FR 200A/B, 251, 252, 283
Additional electives

**Year Three**
FR 351, 352, and two or three French courses at the 300-level
Additional electives

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**Arts**
French Studies/Études françaises

**Geography**

**Year Four**
FR 400A, one of 400 or 452, and two or three French courses at the 400-level
Additional electives

**Minor Program in French**
A minor program in French will consist of 10 term courses in French Language and/or Literature. Students must complete FR 351 and 352. The following may not be counted as French credits towards a French Minor: FR 151, 152, 155, 198, 199, 291, and 292.

**Note For All Programs**
Students who wish to major or honour in French are strongly urged to take an appropriate first year level French language course in addition to FR 195A and 196A.

**Third-Year Programs in France and Quebec**
The Department of French Studies offers two programs at the University of Nantes in France, one in conjunction with Trent University and the other as part of Waterloo’s Co-op stream. Study at universities in Paris and in Quebec is also available through exchange programs. Application deadline is the third week in November for studies beginning the following Fall and Winter terms. Please see the Department of French Studies for application information.

**Geography**

Admission to the Geography programs in the Faculty of Arts is gained in second year by approval of the Associate Chair, Undergraduate Studies, Geography. Those interested should take the appropriate Geography courses in first year.

**Three-Year General Geography**
Eligibility for graduation in the Three-Year General Geography program includes fulfillment of the following requirements:

1. Successful completion of a minimum of 30 term courses including Faculty of Arts Group requirements with an overall cumulative average of at least 60% and a cumulative Geography average of at least 65%.

2. A minimum of any 12 term courses in Geography which may include ENV S 178, 195, 200, 276.

**Honours Geography**
Eligibility for graduation in the Honours Geography program includes fulfillment of the following requirements:

1. Successful completion of the equivalent of 40 term courses including Faculty of Arts Group requirements with an overall cumulative average of at least 60% and a cumulative major average of at least 75%.

2. At least 18 term courses in Geography. ENV S 178, 195, 200, 276 can be counted as term courses in
Geography for inclusion in the required 18. These 18 must include at least four Regional Area term courses.

**Required Four-Year Program – Honours**

**Year One**
- GEOG 101 Geography and Human Habitat
- GEOG 102 Geography and our Planetary Environment
- GEOG 165 Introduction to Cartography and Remote Sensing
- GEOG 120 The World Region

Six electives which should include some Arts Faculty Group A requirements

**Year Two**
- GEOG 202A Location of Economic Activities
- GEOG 202B The Geography of Economic Development
- ENV S 178 Introduction to Environmental Research or equivalent basic statistics course (See Note 7 in "Examinations and Standings")

One of:
- ENV S 200 Field Ecology
- GEOG 201 Geomorphology and Soils
- GEOG 208 Applied Climatology
- GEOG 309 Physical Climatology

By the end of second year, one course is required from English Group One (page 16.55): ENGL 109, 129R, 140R or 150 may be taken in Year One; ENGL 209, 210A, or 210C may be taken in Year Two. A term course in English is a requirement, except for a student who obtains greater than an 80% average on the English Language Proficiency Exam who will then be exempt from the English requirement. A student who receives greater than 80% on OAC English is exempt from ELPE and the English requirement.

**Electives**

**Year Three**
- GEOG 393 Professional and Scholarly Practice in Geography

**Electives**

**Year Four**
- GEOG 490A/B Honours Thesis

**Electives**

**Geography Joint Honours**
(See Geography in the Faculty of Environmental Studies).

**Minor Program in Geography**
A total of ten term courses completed in Geography among which may be included ENV S 195 and ENV S 200, and a cumulative Geography average of at least 65%.

**Notes For All Programs**
1. Students are encouraged to take a second year language course and other Arts courses related to a regional specialization or to consider a Minor or Joint Honours program within the Faculty of Arts. In the four-year programs, CS 100 is recommended in Year One for students without computer experience in high school.
2. Students must take one of the following regional courses in years two, three or four:
   - GEOG 204 Geography of Russia and Post-Soviet States
   - GEOG 205 Africa
   - GEOG 206 The World Region and World Issues
   - GEOG 221 The United States
   - GEOG 223 The Geography of Indonesia
   - GEOG 227 Regional Problems of Europe
   - GEOG 229 Political Geography
   - GEOG 322 Geographical Study of Canada
   - GEOG 326 Gender Roles and Development Alternatives in the Third World
   - GEOG 332 Health, Environment and Development in the Third World

   For some courses, extra fees may be required to defray heavy equipment/travel costs. Statements on extra costs will be found with the course description.
3. Students intending to teach in Secondary Schools are advised to take at least four term courses in Regional Geography and at least four term courses in another teachable subject.
4. Up to three term course equivalents may be taken as Independent Study courses in Geography.
5. All fourth-year Geography courses will be restricted to fourth-year Honours students. Other students must have permission of the instructor.

**German**

The Department of Germanic and Slavic Languages and Literatures offers the following programs in German:

- Three-Year General Program in German
- General Program in German Studies
- Honours Program in German
- Honours Program in German Studies
- Honours German (Applied Studies Co-op)
- Joint Honours Program with German
- Joint Honours German Studies
- Minor Program in German
- Minor Program in German Studies

Students entering German programs are normally placed in one of two streams (A or B), depending upon their knowledge of the German language.
Stream A
Students with little or no knowledge of German

First Year
GER 101/102

Second Year
GER 201/202

Stream B
Students with at least Grade 12 standing in German or equivalent

First Year
GER 151A/152A and/or GER 191/192

Second Year
GER 251A/252A

Stream A
GER 101/102
GER 201/202
GER 151A/152A
GER 251A/252A
(or challenge for language competence by passing a departmental language examination at the level of GER 252A. However, 20 term courses in German studies will still be required.)

GER 281/282
GER 291/292
GER 272

Stream B
GER 151A/152A
GER 251A/252A
GER 351A/352A
GER 281/282
GER 291/292
GER 272

Seven electives from GER 300, 371/372, 381, a German Literature or Linguistics course at the 400-level, and elective list below (a minimum of two courses must be at the 400-level)

GER 281/282
GER 291/292
GER 272

Seven electives from GER 300, 371/372, 381, a German Literature or Linguistics course at the 400-level, and elective list below (a minimum of two courses must be at the 400-level)

Honours German
Eligibility for graduation in the Honours German program includes fulfillment of the following requirements:

1. Successful completion of a minimum of 40 term courses including Faculty of Arts Group requirements with an overall cumulative average of at least 60% and a cumulative major average of at least 75%.
2. At least 16 term courses must be in German including a minimum of six term courses in German literature from the list below. See Notes for All Programs.

Honours German Studies
The requirements for the Honours German Studies program are identical to those of the Honours German program, except that the 20 term courses in German Studies will normally be as follows:

Stream A
GER 101/102
GER 201/202
GER 151A/152A
GER 251A/252A
(or challenge for language competence by passing a departmental language examination at the level of GER 252A. However, 20 term courses in German studies will still be required.)

GER 281/282
GER 291/292
GER 272

Stream B
GER 151A/152A
GER 251A/252A
GER 351A/352A
GER 281/282
GER 291/292
GER 272

Seven electives from GER 300, 371/372, 381, a German Literature or Linguistics course at the 400-level, and elective list below (a minimum of two courses must be at the 400-level)

Honours German Studies
The requirements for the Honours German Studies program are identical to those of the Honours German program, except that the 20 term courses in German Studies will normally be as follows:

Stream A
GER 101/102
GER 201/202
GER 151A/152A
GER 251A/252A
(or challenge for language competence by passing a departmental language examination at the level of GER 252A. However, 20 term courses in German studies will still be required.)

GER 281/282
GER 291/292
GER 272

Seven electives from GER 300, 371/372, 381, a German Literature or Linguistics course at the 400-level, and elective list below (a minimum of two courses must be at the 400-level)

Stream B
GER 151A/152A
GER 251A/252A
GER 351A/352A
GER 281/282
GER 291/292
GER 272

Seven electives from GER 300, 371/372, 381, a German Literature or Linguistics course at the 400-level, and elective list below (a minimum of two courses must be at the 400-level)

Honours German (Applied Studies Co-op)
Eligibility for graduation in the Honours German (Applied Studies Co-op) program includes fulfillment of the following requirements:

1. Successful completion of a minimum of 42 term courses including Faculty of Arts Group requirements with an overall cumulative average of at least 60% and a cumulative major average of at least 75%.
2. At least 16 term courses must be in German including a minimum of six term courses in German literature from the list below. See Notes for All Programs.
3. Successful completion of Applied Studies requirements.

German Joint Honours
A Joint Honours program with German may be taken in combination with any other discipline in which an Honours program is offered, subject to approval by the departments concerned.

The following Joint Honours programs have been approved with German:

Anthropology Mathematics
Classical Studies Music
Drama Philosophy
Economics Political Science
English Psychology
French Russian
Geography Sociology
History Spanish

Eligibility for graduation in the German Joint Honours program includes fulfillment of the following requirements:

1. Successful completion of a minimum of 42 (GER/ANTH and GER/DRAMA require 40) term courses including Faculty of Arts Group requirements with an overall cumulative average of at least 60% and a cumulative major average of at least 75%.
2. At least 16 term courses must be in German including a minimum of six term courses in German literature from the list below. See Notes for All Programs.

Joint Honours German Studies
The requirements for the Joint Honours German Studies program are identical to those of the Joint Honours German program, except that the 16 term courses in German Studies will normally be as follows:

Stream A
GER 101/102
GER 201/202
GER 151A/152A
GER 251A/252A
(or challenge for language competence by passing a departmental language examination at the level of GER 252A. However, 16 term courses in German studies will still be required.)

Stream B
GER 151A/152A
GER 251A/252A
Six electives from GER 261/262, 300, 381, a German Literature or Linguistics course at the 400-level, and elective list below (a minimum of two courses must be at the 400-level)

Minor Program in German
Students of all departments may elect German as a Minor field of studies in consultation with the Department of Germanic and Slavic Languages and Literatures. A minor requires the completion of a minimum of ten term courses in German with an overall cumulative average of at least 65% in those courses, of which:

1. not more than four term courses may be chosen from courses at the 100-level, and
2. at least two term courses must be chosen from courses above the 200-level.

Minor Program in German Studies
The requirements of the Minor program in German Studies are identical to those of the Minor program in German, except that the ten term courses in German Studies will normally be as follows:

Stream A
GER 101/102
GER 201/202
GER 151A/152A
(or challenge for language competence by passing a departmental language examination at the level of GER 152A. However, ten term courses in German studies will still be required.)

Stream B
GER 151A/152A
GER 251A/252A
Six electives from GER 261/262, 300, 381, and elective list below

Basic requirements for all German Studies programs in the Department (Honours, Joint Honours, General and Minor)
1. German language competence;
2. Knowledge of the major periods of German literature, particularly modern German literature;
3. Knowledge of the essentials of German history and culture.

List of Elective German Studies Courses from other Departments
ECON 365 Economic Development of Modern Europe 1780-1973
GEOG 227 Regional Problems of Europe
GEOG 421A Western Europe 1
GEOG 423 Central and Eastern Europe
HIST 218 German History 1740-1945
HIST 263 Europe 1789-1945
HIST 340 1789-1914
HIST 358 The History of Modern Germany: From the Weimar Republic to Reconstruction
PSCI 255 The Politics of Western Industrial Nations
PSCI 256 The Politics of Western Industrial Nations 2
PSCI 321 Marxist Theory

Waterloo in Germany Program
The Department offers a yearly program of studies at the University of Mannheim on the Rhine. The program is normally open to students entering third-year courses. In exceptional cases second-year students will also be considered. Students of all disciplines may apply, provided they have an adequate knowledge of German. The application deadline for students who wish to begin studies in Mannheim in the Winter Semester (October 15 to February 15) is April 1. The application deadline for those who wish to begin their studies in the Summer Session (April 15 to July 15) is February 1. Applications should be submitted to "Waterloo in Germany", Department of Germanic and Slavic Languages and Literatures, University of Waterloo, Waterloo, Ontario N2L 3G1.

Notes For All Programs
1. First-year students who wish to major in German are strongly advised to consult the Undergraduate Advisor of the Department.
2. Before graduation all students majoring in German must complete GER 291/292, normally in Year Two.
3. Students of Honours German, Honours German (Applied Studies Co-op), and German Joint Honours programs are required to complete a minimum of four term courses in German literature from the following list: GER 261A/262A, 281/282, 361A/362A, 371/372, 441/442, 462, 471/472.
4. A maximum of two term courses of GER 300A-Z will be counted towards a degree.
Greek

See Classical Studies.

History

The Department of History offers the following programs:

- Three-Year General Program
- Four-Year General Program
- Honours Program
- Honours History Applied Studies Co-op Program
- History Joint Honours
- Program Minor Program

Three-Year General History

Eligibility for graduation in the General History program includes fulfillment of the following requirements:

1. Successful completion of a minimum of 30 term courses including Faculty of Arts Group requirements with an overall cumulative average of at least 60% and a cumulative major average of at least 65%.
2. At least ten term courses must be in History with no more than four History courses below the 250-level and at least four at the 300-level.

Four-Year General History

Eligibility for graduation in the Four-Year General History program includes fulfillment of the following requirements:

1. Successful completion of a minimum of 40 term courses including Faculty of Arts Group requirements with an overall cumulative average of at least 60% and a cumulative major average of at least 65%.
2. At least 14 term courses must be in History with at least four at the 300-level, and no more than four below the 250-level.

Honours History

Eligibility for graduation in the Honours History program includes fulfillment of the following requirements:

1. Successful completion of a minimum of 40 term courses including Faculty of Arts Group requirements with an overall cumulative average of at least 60% and a cumulative major average of at least 75%.
2. At least 20 term courses including at least three and no more than four 400-level senior seminars (credit value 1.0 each) must be in History. Students taking three senior seminars must take one with a B suffix. Students taking four senior seminars must take two with a B suffix. No more than four History courses below the 250-level and at least four at the 300-level. History courses must include:
   - One of 250, 256, 257, 258
   - One of 260, 261, 262, 263, 264
   - One of 253, 254
3. The 20 term courses in History are usually divided 2-5-5-8 among the four years.

Honours History (Applied Studies Co-op)

A student may combine an Honours History program with Applied Studies Co-op. The requirement in History is 18 term courses including at least ten (10) term courses and 3-4 senior seminars (3.0-4.0 course credits). No more than four History courses below the 250-level and at least two at the 300-level. Three senior seminars (one with a B suffix) or four senior seminars (two with a B suffix). History courses must include:

1. 250 or 300
2. One of 260, 261, 262, 263, 264
3. One of 253, 254
4. One of 255, 256, 257, 258

History Joint Honours Programs

Joint Honours programs are currently available between History and the following departments:

- Anthropology
- German
- Classical Studies
- Philosophy
- Drama
- Political Science
- Economics
- Psychology
- English
- Religious Studies
- Fine Arts
- Russian
- French
- Spanish
- Geography
- Sociology

Eligibility for graduation in the Joint Honours History program includes fulfillment of the following requirements:

1. Successful completion of a minimum of 42 term courses including Faculty of Arts Group requirements with an overall cumulative average of at least 60% and a cumulative major average of at least 75%.
2. The requirement in History is ten (10) term courses and two senior seminars (2.0 course credits). At least one senior seminar (1.0) must be a research seminar (with a B suffix). No more than four History courses below the 250-level and at least two at the 300-level. History courses must include:
   - 250 or 300
   - One of 260, 261, 262, 263, 264
   - One of 253, 254
   - One of 255, 256, 257, 258

* 250 must be taken in second year, 300 in third or fourth year of program.
Minor Program
To qualify for a Minor in History, students must complete ten term courses in History, with at least two above the 250-level and no more than two at the 100-level. Students from other departments and faculties who are interested in taking a Minor in History should consult with the Department of History Undergraduate Officer. They must maintain a 65% average in History courses.

Human Resources Management
See Interdisciplinary Programs.

Italian
Minor Program
Students enrolled in Honours programs and four-year General Major programs in Arts, or in Honours programs in other faculties, may elect to pursue a Minor in Italian. The Minor requires the successful completion of at least ten term courses in Italian with a minimum overall cumulative average of 65%. Students are normally required to take the following six term courses:
ITAL 101, 102, 201, 202, 251, 252.

Additional term courses may be chosen from the following:
ITAL 291, 292, 311, 312, 391, 392, 396, 397.

Note
Students who have OAC Italian or whose level of competence in the language precludes them from taking ITAL 101, 102, should substitute these courses with ITAL 291, 292.

Latin
See Classical Studies.

Management Studies
See Interdisciplinary Programs.

Medieval Studies
Students interested in an interdisciplinary approach to university education and to an examination of the Middle Ages may take either a General or an Honours BA in Medieval Studies. Such a degree is designed to provide a general awareness of our cultural heritage. In addition, the program is flexible enough to prepare students for careers in teaching, or for the pursuit of a graduate degree.
The Medieval Studies program is administered jointly by the History Department at St. Jerome’s College.

Honours Medieval Studies
Eligibility for graduation in the Honours Medieval Studies program includes fulfillment of the following requirements:
1. Successful completion of a minimum of 40 term courses including Faculty of Arts Group requirements with an overall cumulative average of at least 60% and a cumulative major average of at least 75%.
2. At least 16 term courses must be from an approved list of Medieval Studies or related courses, including at least two term courses from each of five of the eight subject fields specified below.
3. Successful completion of at least ten term courses (not all of which need be medieval in content) in one of the subject fields specified below.


Honours Medieval Studies (Applied Studies Co-op)
A student may combine an Honours Medieval Studies program with Applied Studies Co-op. The requirements in Medieval Studies are identical to the Honours requirements listed above. See the Applied Studies requirements.

Music
Three-Year General Music
Eligibility for graduation in the General Music program includes fulfillment of the following requirements:
1. Successful completion of a minimum of 30 term courses including Faculty of Arts Group requirements with an overall cumulative average of at least 60% and a cumulative major average of at least 65%.

(2, 6, 20, 25, 39, 49)
2. At least 14 term courses in Music, including MUSIC:
   - 100, 270, 271;
   - at least three of 253, 254, 255, 256.

3. Participation in at least four terms of Music Ensemble.

In addition, students must demonstrate competence on one instrument (or voice) equal to Grade Ten standing at the Royal Conservatory of Music of Toronto. Normally this is attained through taking Music Studio Courses – MUSIC 226, 227, 326, 327.

**Four-Year General Music**

Eligibility for graduation in the Four-Year General program includes fulfillment of the following requirements:

1. Successful completion of a minimum of 40 term courses including Faculty of Arts Group requirements with an overall cumulative average of at least 60% and a cumulative major average of at least 65%.

2. At least 16 term courses in Music, including MUSIC:
   - 100;
   - at least three of 270, 271, 370, 371;
   - at least three of 253, 254, 255, 256;
   - at least two other 300- or 400-level courses.

3. Participation in at least five terms of Music Ensemble.

In addition, students must demonstrate competence on one instrument (or voice) equal to Grade Ten standing at the Royal Conservatory of Music of Toronto. Normally this is attained through taking Music Studio Courses – MUSIC 226, 227, 326, 327.

**Honours Music**

Eligibility for graduation in the Honours Music program includes fulfillment of the following requirements:

1. Successful completion of a minimum of 40 term courses including Faculty of Arts Group requirements with an overall cumulative average of at least 60% and a cumulative major average of at least 65%.

2. At least 20 term courses in Music, including MUSIC:
   - 100, 253, 254, 255, 256, 270, 271, 370, 371, 490A/B;
   - at least two other 300- or 400-level courses.

3. Participation in at least six terms of Music Ensemble.

In addition, students must demonstrate competence on one instrument (or voice) equal to Grade Ten standing at the Royal Conservatory of Music of Toronto. Normally this is attained through taking Music Studio Courses – MUSIC 226, 227, 326, 327.

**Music Joint Honours Program**

A Joint Honours program with Music may be taken in combination with any other discipline in which an Honours program is offered, subject to approval by the departments concerned.

The following Joint Honours programs have already been approved with Music:

| Drama | Mathematics |
| English | Philosophy |
| French | Political Science |
| Geography | Psychology |
| German | Recreation and Leisure Studies |
| Environment and | Religious Studies |
| Resource Studies | Social Development Studies |

Eligibility for graduation in the Music Joint Honours program includes fulfillment of the following requirements:

1. Successful completion of a minimum of 42 term courses including Faculty of Arts Group requirements with an overall cumulative average of at least 60% and a cumulative major average of at least 75%.

2. At least 16 term courses in Music, including MUSIC:
   - 100;
   - at least three of 253, 254, 255, 256;
   - at least three of 270, 271, 370, 371;
   - 490A/B (unless the senior honours essay is written in the other discipline).

3. Participation in at least six terms of Music Ensemble.

In addition, students must demonstrate competence on one instrument (or voice) equal to Grade Ten standing at the Royal Conservatory of Music of Toronto. Normally this is attained through taking Music Studio Courses – MUSIC 226, 227, 326, 327.

**Minor Program**

Eligibility for graduation with a Minor in Music includes fulfillment of the following requirements:

1. At least ten term courses in Music, including MUSIC:
   - 100, 270;
   - eight additional term courses selected in consultation with the Music Department.

2. Participation in at least two terms of Music Ensemble.

**Notes For All Programs**

1. Students electing to take Music Studio must arrange for an audition before the Music Faculty. Normally a level of performance equal to Grade Eight standing at the Royal Conservatory of Music of Toronto is expected for admission to Music Studio. Music Studio courses are available only to Music Majors and Minors.

2. Music Minors may take a maximum of three terms of Music Studio, and may audition for Music Studio only after two other term courses in Music have been completed.

**Honours Music (Applied Studies Co-op)**

A student may combine an Honours Music program with Applied Studies Co-op. The requirements in Music are identical to the Joint Honours requirements listed below. See the Applied Studies requirements.
Philosophy

Three-Year General Philosophy
Eligibility for graduation in the General Philosophy program includes fulfillment of the following requirements:

1. Successful completion of a minimum of 30 term courses including Faculty of Arts Group requirements with an overall cumulative average of at least 60% and a cumulative major average of at least 65%.

2. At least ten term courses must be in Philosophy, including PHIIL:
   - one of 140, 145, 216, 241, 242, or 440A/B;
   - 221;
   - any two of 380 - 387 or 378.

St. Jerome's Philosophy students must meet the basic requirements as listed above, and their PHIIL courses must include:

1. one of 200J, 140, 145, 216, 241, 242, or 440A/B;
2. 218J or 221;
3. any two of 380 - 387 or 378.

Four-Year General Philosophy
Eligibility for graduation in the Four-Year General Philosophy program includes fulfillment of the following requirements:

1. Successful completion of a minimum of 40 term courses including Faculty of Arts Group requirements with an overall cumulative average of at least 60% and a cumulative major average of at least 68%.

2. At least 14 term courses must be in Philosophy, and must include the courses required in the Three-Year General program.

Honours Philosophy
Eligibility for graduation in the Honours Philosophy program includes fulfillment of the following requirements:

1. Successful completion of a minimum of 40 term courses including Faculty of Arts Group requirements with an overall cumulative average of at least 60% and a cumulative major average of at least 75%.

2. At least 18 term courses must be in Philosophy, including PHIIL:
   - one or two of 216, 241, 242, or 440A/B (depending on program);
   - 140, 221, 322;
   - any four of 380 - 387 or 378;
   - a Philosophy course which is relevant to the other subject (e.g. Aesthetics for Philosophy and English);
   - a Senior Honours essay in PHIIL 499A/B or in the other subject, if applicable.

St. Jerome's Philosophy students must meet the basic requirements as listed above, and their PHIIL courses must include:

1. one of 216, 241, 242, or 440A/B;
2. 218J or 221;
3. 140, 322, 499A/B;
4. any four of 380 - 387 or 378;

College students are also expected to take 450J.

Honours Philosophy (Applied Studies Co-op)
A student may combine an Honours Philosophy program with Applied Studies Co-op. The requirements in Philosophy are identical to the Honours requirements listed above except that only 16 term courses in Philosophy are required. See the Applied Studies requirements.

Philosophy Joint Honours Program
A Joint Honours program with Philosophy may be taken in combination with any other discipline in which an Honours program is offered, subject to approval by the Departments concerned. Joint Honours programs have been approved with:

- Economics
- Political Science
- English
- Psychology
- Fine Arts
- Religious Studies
- French
- Russian
- Geography
- Social Development
- German
- Studies
- History
- Latin
- Sociology
- Mathematics
- Spanish

Eligibility for graduation in the Joint Honours Philosophy program includes fulfillment of the following requirements:

1. Successful completion of a minimum of 42 term courses including Faculty of Arts Group requirements with an overall cumulative average of at least 60% and a cumulative major average of at least 75%.

2. At least 14 term courses must be in Philosophy, including PHIIL:
   - one or two of 216, 241, 242, or 440A/B (depending on program);
   - 140, 221, 322;
   - any four of 380 - 387 or 378;
   - a Philosophy course which is relevant to the other subject (e.g. Aesthetics for Philosophy and English);
   - a Senior Honours essay in PHIIL 499A/B or in the other subject, if applicable.

Students registered at St. Jerome's in a Philosophy Joint Honours program may substitute St. Jerome's Philosophy courses in the same way as for the Philosophy Honours program.

Minor Program in Philosophy
To be eligible for a Minor in Philosophy, students must successfully complete ten term courses in Philosophy, including no more than three at the 100-level.
Political Science

The Department of Political Science offers a series of undergraduate programs designed to meet the needs of students with varying interests. Requirements for each program are restricted to the completion of a specified number of courses in different fields of the discipline before graduation. For these purposes Political Science courses above the 100-level are numbered according to the field within which they fall.

The key to this scheme is the second digit of the course number as follows:

1. methodology
2. normative theory
3. public administration, public law, and public policy
4. local and regional politics
5. comparative politics (more than one country)
6. comparative politics (specific countries)
7. the political process
8. international politics

with the number 9 reserved for special courses which are not regarded as dealing with a particular field of the discipline. PSCI 291 and 292 are non-program courses (see Note).

Three-Year General Political Science
Eligibility for graduation in the General Political Science program includes fulfillment of the following requirements:

1. Successful completion of a minimum of 30 term courses including Faculty of Arts Group requirements with an overall cumulative average of at least 60% and a cumulative major average of at least 65%.
2. At least 12 term courses must be in Political Science. Ten of these 12 courses must be above the 100-level, of which at least one term course from each of four different fields of the discipline as listed above must be taken. At least four term courses must be taken at the 300-level or higher.

Four-Year General Political Science
Eligibility for graduation in the Four-Year General Political Science program includes fulfillment of the following requirements:

1. Successful completion of a minimum of 40 term courses including Faculty of Arts Group requirements with an overall cumulative average of at least 60% and a cumulative major average of at least 70%.
2. At least 18 term courses must be in Political Science. Sixteen of these 18 courses must be above the 100-level, of which at least two term courses from each of four different fields of the discipline as listed above must be taken. At least four term courses must be taken at the 300-level or higher.

Honours Political Science
Eligibility for graduation in the Honours Political Science program includes fulfillment of the following requirements:

1. Successful completion of a minimum of 40 term courses including Faculty of Arts Group requirements with an overall cumulative average of at least 60% and a cumulative major average of at least 75%.
2. At least 20 term courses must be in Political Science. Eighteen of these 20 courses must be above the 100-level, of which at least two term courses from each of four different fields of the discipline as listed above must be taken. At least four term courses must be taken at the 400-level.

Recommended Program

Year One
PSCI 101/102
Eight other term courses

Year Two
Six term courses in Political Science (see Note)
Four other term courses

Year Three
Six term courses in Political Science (see Note)
Four other term courses

Year Four
Six term courses in Political Science at least four of which must be at the 400-level (see Note)
Four other term courses

Honours Political Science (Administrative Studies)
Eligibility for graduation in Honours Political Science with an Administrative Studies Option includes fulfillment of the following requirements:

1. Successful completion of a minimum of 40 term courses including Faculty of Arts Group requirements with an overall cumulative average of at least 60% and a cumulative major average (including Administrative Studies courses) of at least 75%.
2. At least 20 term courses must be in Political Science and 14 term courses must be in Administrative Studies. The requirements for an Honours Political Science degree apply for Honours Political Science with an Administrative Studies Option. The following courses must also be taken:
   - ECON 101, 102, PSCI 260A/B, 331;
   - one of PSCI 332 or 333;
   - four term courses in Political Science beyond the 100-level which have been designated as Administrative Studies courses by the Department of Political Science;
   - four term courses not in Political Science, selected from courses which have been designated as Administrative Studies courses by the Department of Political Science.
Other Options
The following study Options are also open to students in Honours Political Science: Women's Studies, Iberoamerican Studies, Legal Studies, Peace and Conflict Studies, Human Resources Management, Canadian Studies.

Co-operative Program in Honours Political Science
The program leading to the Degree of Bachelor of Arts in Honours Political Science (Co-operative program) is designed for students who intend to enter careers in government, the mass media, business, political parties, or public opinion organizations. Qualified students will ordinarily be admitted to the program after completion of their first three academic terms with a minimum mark of 78% in at least two Political Science term courses. The program consists of five further academic terms and a minimum of four paid work terms with participating employers.

The academic requirements of the Co-operative program are identical with those of the Regular Honours program in Political Science. The program is open to students enrolled in either the Regular Honours Political Science program or Honours Political Science (Administrative Studies Option).

The first work term of the Co-operative program occurs after the successful completion of Year Two courses. At the beginning of the fourth year students may have the option of either continuing the pattern of alternating work terms or working for a full year before returning to campus for the last two academic terms.

Interested students should apply to the program in November of Year Two. Ordinarily qualified students are admitted in January of Year Two. The minimum requirement for admission to the program is a 75% average in three Political Science courses. Admissions decisions are made by the Co-op Officer in consultation with the Undergraduate Affairs Committee.

Honours Political Science (Applied Studies Co-op)
A student may combine an Honours Political Science program with Applied Studies Co-op. The requirements for Political Science are a minimum of 16 term courses, with at least 14 beyond the 100-level. There must be at least one term course from each of four different fields of the discipline as defined above. At least 4 term courses must be taken at the 400-level. See the Applied Studies requirements for details. Students planning to enrol in Honours Political Science (Applied Studies Co-op) should consult the Department's Co-op Officer.

Political Science Joint Honours Program
Students who wish to combine a study of Political Science with a broad training in a related discipline such as Sociology or History, or in fact in any other discipline in which they are interested, can do so in a Joint Honours program.

Joint Honours programs have been approved between Political Science and:

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Anthropology    Geography
Drama          History
Economics      Mathematics
English        Music
Environment and Philosophy
Resourse Studies
French         Sociology

Eligibility for graduation in the Political Science Joint Honours program includes fulfillment of the following requirements:

1. Successful completion of a minimum of 42 term courses including Faculty of Arts Group requirements with an overall cumulative average of at least 60% and a cumulative major average of at least 75%.

2. At least 14 term courses must be in Political Science. Twelve of the 14 courses must be beyond the 100-level, of which there must be at least one term course from each of four different fields of the discipline as defined above. Two term courses must be at the 400-level.

Recommended Program

<table>
<thead>
<tr>
<th>Year One</th>
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<tbody>
<tr>
<td>PSCI 101/102</td>
<td>Two introductory term courses in the other discipline</td>
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<tr>
<td>Six other term courses</td>
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<thead>
<tr>
<th>Year Two</th>
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<tbody>
<tr>
<td>Four term courses in Political Science (see Note)</td>
<td>Four term courses in the other discipline</td>
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<tr>
<td>Four other term courses</td>
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<tr>
<th>Year Three</th>
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<tbody>
<tr>
<td>Four term courses in Political Science (see Note)</td>
<td>Four term courses in the other discipline</td>
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<tr>
<td>Three other term courses</td>
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<tr>
<th>Year Four</th>
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<tbody>
<tr>
<td>Four term courses in Political Science, at least two of which must be at the 400-level (see Note)</td>
<td>Four term courses in the other discipline</td>
</tr>
<tr>
<td>Three other term courses</td>
<td></td>
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</tbody>
</table>

Minor Program
Any student in an Honours program or a Four-Year General Major program may qualify for a Minor in Political Science by completing ten term courses in Political Science before graduation with a cumulative average of 65% or better. Courses must be selected to meet the following requirements:

1. at least one term course in each of three different fields of the discipline;

2. the equivalent of at least two term courses above the 200-level.

Note For All Programs
No student in a General, Honours, Joint Honours or Minor program in Political Science may use PSCI 291 or 292 to meet program requirements.
Applying for a Psychology Major

Application for admission to a Psychology major is made at the time of preregistration for Year 2; this normally occurs during Preregistration Week in March. Following Reading Week in February, there will be an orientation session for students intending to apply for a Psychology major. Application/preregistration packages will be available at the session as well as at the Psychology Undergraduate Office following the session. Included in the packages will be a copy of the Psychology Undergraduate Handbook which contains information, such as, research interests of the Psychology faculty, potential co-op placements for students in the co-op program, preparing for statistics courses, career information, and answers to commonly asked questions. The Handbook is also available on the World Wide Web at the following location:

http://arts.uwaterloo.ca/PSYC/bee/gradprog/handbook.html

Admission decisions are normally made in May after Winter term grades are available. To be considered for a Psychology BA major, students must have completed a minimum of 10 term courses including PSYCH 101 and preferably one of PSYCH 207, 211, 253, 257, or 261. The admission cutoffs for the various programs are as follows:

- **Three-Year General Psychology**: 60% overall and 65% in Psychology
- **Four-Year General Psychology**: 60% overall and 70% in Psychology
- **Honours Psychology**: 70% overall and 75% in Psychology
- **Joint Honours with Psychology**: 70% overall, 75% in Psychology, and a 75% joint major average (if both majors are in the Faculty of Arts)
- **Honours Psychology and Applied Studies Co-op**: 70% overall, 75% in Psychology, and 75% in Applied Studies

**Note**

Because of resource limitations, fulfillment of the minimum entrance average requirements will not guarantee students admission to Honours Psychology and higher averages may be required for admission.

For information regarding admission to the Honours Psychology BSc program, refer to the Faculty of Science.

Students who have already completed a research methods course and/or a statistics course should consult the list of overlapping courses (Item #7 under Examinations and Standings), and seek advice at the Psychology Undergraduate Office when application for the major is made.

**Conditional Standing in Psychology Programs**

Psychology majors must maintain the minimum averages specified below for graduation. Conditional standing for one academic term may be granted to students who fall below these criteria.

**Three-Year General Psychology**

The Three-Year General Psychology program provides students with a general overview of the field of Psychology. Please refer to the Applying for a Psychology Major and the Conditional Standing in Psychology Programs sections above.

Eligibility for graduation in the Three-Year General Psychology program includes fulfillment of the following requirements:

1. Successful completion of a minimum of 30 term courses including the Faculty of Arts Group A and B requirements with a cumulative overall average of at least 60% and a cumulative Psychology average of at least 65%.

2. At least ten term courses must be in Psychology, including:
   - PSYCH 101;
   - PSYCH 292;
   - Three of the following Discipline Core:
     - PSYCH 207, 211, 253, 257, 261 including at least one of PSYCH 207 or 261;
   - One Advanced PSYCH course*;
   - Four PSYCH electives.

It is recommended that PSYCH 101, 292, and the Discipline Core requirements be completed by the end of Year Two.

* Advanced PSYCH courses are those not used to fulfill other Psychology requirements and which have prerequisites beyond the 100-level. Courses that qualify as Advanced Psychology courses are specified accordingly in the course descriptions. A list is also provided at the beginning of the Psychology course offerings section.

**Four-Year General Psychology**

The Four-Year General Psychology program will be of particular interest to those who require a four-year degree in order to pursue further studies that do not require an Honours degree for admission. Please refer to the Applying for a Psychology Major and the Conditional Standing in Psychology Programs sections above.

Eligibility for graduation in the Four-Year General Psychology program requires successful completion of the following requirements:

1. Successful completion of a minimum of 40 term courses including the Faculty of Arts Group A and B requirements with a cumulative overall average of at least 60% and a cumulative Psychology average of at least 70%.

2. At least 14 term courses must be in Psychology, including:
   - PSYCH 101;
   - PSYCH 292;
   - Four of the following Discipline Core: PSYCH 207, 211, 253, 257, 261;
Four Advanced Psychology Courses over third and fourth year including:
- two Advanced PSYCH Courses from the Natural Science Area
- two Advanced PSYCH Courses from the Social Science Area;
- Four PSYCH electives.

Notes
1. For those students who successfully completed PSYCH 200 before being accepted to the Four-Year General Psychology program, the PSYCH 292 requirement will be waived.
2. Advanced Psychology courses are those not used to fulfill other Psychology requirements and which have prerequisites beyond the 100-level. Advanced PSYCH courses are designated as Natural Science or Social Science courses in the course descriptions. A list is also provided at the beginning of the Psychology course offerings section.

Honours Psychology
The Honours Psychology program provides students with greater methodological and statistical experience than the Three-Year or Four-Year General Psychology programs, and provides opportunities for in-depth study of psychological theory and research. The Honours program is designed to give students a broad background in the diverse sub-areas of psychology, namely behavioural neuroscience, clinical, cognitive, developmental, and social, as well as a variety of specialized fields. The program is designed to prepare students for specialization in the major areas of psychology at the graduate level.

Please refer to the Applying for a Psychology Major and the Conditional Standing in Psychology Programs sections above.

Eligibility for graduation in the Honours Psychology Program includes fulfillment of the following requirements:

1. Successful completion of a minimum of 40 term courses including the Faculty of Arts Group A and B requirements with a cumulative overall average of at least 60% and a cumulative Psychology average of at least 75%.
2. At least 17 term courses must be in Psychology, including:
   - PSYCH 101;
   - Methodology Core – PSYCH 291, 292, 391;
   - Discipline Core – PSYCH 207, 211, 253, 257, 281;
   - Two Research Courses1 including:
     - one Natural Science Research Course from PSYCH 392, 394, 396, 398
     - one Social Science Research Course from PSYCH 392, 393, 395, 397
   - Two Advanced Psychology Courses2 including:
     - one Advanced PSYCH course from the Natural Science area
     - one Advanced PSYCH course from the Social Science area;
   - One Honours Psychology Seminar;
   - Three PSYCH electives.

Notes
1. Normally, students will take no more than one Research Course per term. Students may not use PSYCH 392 to satisfy both the Natural Science and Social Science Research requirements. Students not doing an Honours Thesis may substitute PSYCH 465 (Applied Apprenticeship) or PSYCH 466 (Education Apprenticeship) for one of the third-year Research requirements.
2. Advanced PSYCH courses are those not used to fulfill other Psychology requirements and which have prerequisites beyond the 100-level. Advanced PSYCH courses are designated as Natural Science or Social Science in the course descriptions. A list is also provided at the beginning of the Psychology course offerings section.
3. Students entering the Honours Psychology Program in Year Three should consult the Psychology Undergraduate Office for further information.

Thesis
An Honours Thesis (PSYCH 499A/B/C) is recommended for students who are 1) considering graduate or professional programs that may require a completed honours thesis for admission, or 2) who have a strong interest in, and commitment to, conducting original research. PSYCH 499A/B/C may substitute for the three PSYCH electives listed in Item #2 above. Students doing an Honours thesis may not substitute PSYCH 465 (Applied Apprenticeship) or PSYCH 466 (Education Apprenticeship) for one of the third-year Research requirements.

Honours Psychology (BSc)
An Honours Psychology degree program is also available through the Faculty of Science on both a Regular and Co-operative basis. The Psychology course requirements...
for the Honours BA and BSc degrees are the same. Each program consists of the Psychology course requirements, electives that may be taken within or outside the home Faculty, and courses required by the home Faculty.

Science students are required to take courses in the maths and sciences whereas Arts students are required to take courses in the humanities and social sciences (i.e., the Faculty of Arts Group A and B requirements). The BSc degree is particularly appropriate for students interested in behavioural neuroscience, neuropsychology, psychophysiology, or cognitive psychology. For further details about the Honours Psychology BSc program, please refer to the Honours Psychology section in the Faculty of Science.

Honours Psychology Co-operative Program
Students who have been accepted to the Honours Psychology BA or BSc programs may apply for admission to the Co-op program in November of the second year. Admission decisions are made the first week of January after Fall term grades are available. Admission is limited and is based on academic standing and space availability. Typically, only 10-15 students are admitted. For those accepted, the first work term will be at the end of second year. Students then alternate between academic terms and paid work terms to the end of the degree program. Please refer to the Psychology Undergraduate Handbook for further details about the Co-op program, such as, a listing of potential co-op placements.

Honours Psychology (Applied Studies Co-op)
This program combines the requirements of the Applied Studies Co-op program with those of the Honours Psychology program. At the end of the program, students will have completed four to six four-month work terms in addition to their academic studies.

Students who have completed Year One of the Applied Studies Co-op program may apply for the Psychology major. Please refer to the Applying for a Psychology Major and the Conditional Standing in Psychology Programs sections above for further details.

Eligibility for graduation in the Honours Psychology and Applied Studies Co-op program includes successful completion of a minimum of 42 term courses including 16 term courses in Psychology, the Faculty of Arts Group A and B Requirements, and the Applied Studies requirements.

The Psychology course requirements are as given for the Honours Psychology program above except that two rather than three PSYCH electives are required. See the Applied Studies course requirements in the Applied Studies Co-op section. The minimum cumulative average requirements are as follows: 60% overall, 75% in Psychology, and 75% in Applied Studies.

Thesis
See Thesis in the Honours Psychology section above.

For students doing an Honours Thesis in Psychology, the Honours Psychology Seminar requirement may be fulfilled by a fourth-year honours seminar in a discipline other than Psychology. A seminar taken in another discipline must be approved as a substitute for the Honours Psychology Seminar by the Psychology Undergraduate Office. Thus, students choosing to take a seminar in another discipline, will require only 16 term courses in Psychology.

Psychology Joint Honours Programs
Joint Honours programs exist with the following departments:

- Anthropology
- Classical Studies
- Dance
- Drama
- Economics
- English
- Environment and Resource Studies
- Fine Arts
- French
- Geography
- German
- History
- Fine Arts
- German
- History

Kinesiology
Mathematics
Music
Philosophy
Political Science
Recreation
Religious Studies
Russian
Social Development
Studies
Sociology
Spanish

Please refer to the Applying for a Psychology Major and the Conditional Standing in Psychology Programs sections above.

Eligibility for graduation in the Joint Honours Psychology program requires successful completion of the following requirements:

1. A minimum of 40 term courses will be required. In practice, depending on the number of term courses required by the second discipline (e.g., overall and for the major) and the number of electives that students choose to take, more than 40 term courses may be necessary for graduation.

2. At least 16 term courses in Psychology are required. The Psychology requirements are the same as those for the Honours Psychology program except that one term course in Psychology will be waived. The Psychology requirement to be waived will be determined by the Psychology Undergraduate Office.

3. The Faculty of Arts Group A and B requirements (if the first major is in the Faculty of Arts).

4. The course requirements of the second discipline.

5. The minimum cumulative average requirements are as follows:
   - 75% in Psychology
   - 60% overall
   - the minimum major average requirement for the second discipline
   - 75% joint major average (if both majors are in the Faculty of Arts)

Thesis
See Thesis in the Honours Psychology section above.

Minor Program in Psychology
Students enrolled in Honours Arts programs, Four-Year General Arts programs, or Honours programs in other faculties, may choose to minor in Psychology. Ten term
courses in Psychology are required with a minimum cumulative Psychology average of at least 65%. The course requirements for the Minor are the same as the Psychology course requirements for the Three-Year General Psychology program except that students will replace the PSYCH 292 requirement with one Psychology elective.

Religious Studies

Purpose of the Program in Religious Studies:
1. to expose students to the issues and problems involved in, and to the nature of the questions raised by, the study of religious phenomena and ideas;
2. to enable students to approach, in a methodical way, the study of the major religious traditions living today for the purpose of encountering and understanding the life and the expression of religion through the various religions of the world;
3. to introduce them to the distinctive features of one or more religious traditions and to the methods for their systematic study.

The course offerings of the Religious Studies Department fall into the following five areas:
1. World Religions
2. History of the Christian Tradition
3. Biblical Studies
4. Theology – Philosophy – Ethics
5. Religion, Society and Culture.

Areas of Religious Studies to which courses belong are indicated by the area number below the course description.

Three-Year General Religious Studies
Eligibility for graduation in the General Religious Studies program includes fulfillment of the following requirements:
1. Successful completion of a minimum of 30 term courses including Faculty of Arts Group requirements with an overall cumulative average of at least 60% and a cumulative major average of at least 65%.
2. At least ten term courses must be in Religious Studies including RS:
   - 100A, 200, 230 or 231;
   - one other course from the 100A-K sequence;
   - two term courses at the 300- or 400-level.

Four-Year General Religious Studies
Eligibility for graduation in the Four-Year Religious Studies program includes fulfillment of the following requirements:
1. Successful completion of a minimum of 40 term courses including Faculty of Arts Group requirements with an overall cumulative average of at least 60% and a cumulative major average of at least 65%.
2. At least 14 term courses must be in Religious Studies including RS:
   - 100A, 200, 230 or 231;
   - one other course from the 100A-K sequence;
   - four term courses at the 300- or 400-level.

Honours Religious Studies
Eligibility for graduation in the Honours Religious Studies program includes fulfillment of the following requirements:
1. Successful completion of a minimum of 40 term courses including Faculty of Arts Group requirements with an overall cumulative average of at least 60% and a cumulative major average of at least 75%.
2. At least 20 term courses must be in Religious Studies including RS:
   - 100A, 200, 230 or 231;
   - one other course from the 100A-K sequence;
   - one term course from each of the five RS areas;
   - at least five term courses at or above the 300-level;
   - 490A/B or two additional upper level courses. RS 490A/B is recommended for those considering future graduate studies.

Honours Religious Studies (Applied Studies Co-op)
A student may combine an Honours Religious Studies program with Applied Studies Co-op. The requirements in Religious Studies are identical to the Honours requirements listed above except the overall number of term courses in Religious Studies is 16 rather than 20. See the Applied Studies requirements.

Religious Studies Joint Honours Program
The Religious Studies Department offers Joint Honours programs with the following Departments:
- Anthropology
- History
- Classical Studies
- Music
- English
- Philosophy
- Environment and
- Psychology
- Resource Studies
- Social Development
- French
- Studies
- Germanic and Slavic
- Sociology

The requirements in Joint Honours programs are the same as the Honours program, except the overall number of Religious Studies courses is 14 rather than 20. The RS 490 requirements may be waived for students who choose to do their senior honours essay in the other Department. There will be consultation between the Undergraduate Officers of the two Departments.

Minor Program in Religious Studies
Successful completion (65% average) of a minimum of ten term courses from at least four of the five areas of Religious Studies. The sequence of courses is to be determined in consultation with the Undergraduate Advisor of the Department.

Note For All Programs
Students at the University of Waterloo and Wilfrid Laurier University may, with the permission of their advisor, take courses in Religious Studies at either University. For
Russian and Slavic Studies

The Department of Germanic and Slavic Languages and Literatures offers the following programs in Russian and Slavic Studies:

- Three-Year General Program in Russian
- Honours Program in Russian
- Honours Russian (Applied Studies Co-op)
- Honours Program in Slavic Studies
- Honours Slavic Studies (Applied Studies Co-op)
- Joint Honours Program with Russian
- Minor Program in Russian
- Minor Program in Croatian

Three-Year General Russian
Eligibility for graduation in the General Russian program includes fulfillment of the following requirements:

1. Successful completion of a minimum of 30 term courses including Faculty of Arts Group requirements with an overall cumulative average of at least 60% and a cumulative major average of at least 65%.

2. At least 12 term courses must be in Russian.

Honours Russian
Eligibility for graduation in the Honours Russian program includes fulfillment of the following requirements:

1. Successful completion of a minimum of 40 term courses including Faculty of Arts Group requirements with an overall cumulative average of at least 60% and a cumulative major average of at least 75%.

2. At least 20 term courses must be in Russian including a minimum of six term courses in Russian literature from the list below. See Notes for All Programs.

Honours Russian (Applied Studies Co-op)
Eligibility for graduation in the Honours Russian (Applied Studies Co-op) program includes fulfillment of the following requirements:

1. Successful completion of a minimum of 42 term courses including Faculty of Arts Group requirements with an overall cumulative average of at least 60% and a cumulative major average of at least 75%.

2. At least 16 term courses must be in Russian including a minimum of six term courses in Russian literature from the list below. See Notes for All Programs.

3. Successful completion of Applied Studies requirements.

Honours Slavic Studies
Eligibility for graduation in the Honours Slavic Studies program includes fulfillment of the following requirements:

1. Successful completion of a minimum of 40 term courses including Faculty of Arts Group requirements with an overall cumulative average of at least 60% and a cumulative major average of at least 75%.

2. At least 20 term courses must be in Slavic Studies. Of these 20 term courses, 12 will normally be in Russian and eight in Ukrainian, Polish, and Croatian.

Honours Slavic Studies (Applied Studies Co-op)
A student may combine an Honours Russian program with Applied Studies Co-op. This program includes the following requirements:

1. Successful completion of a minimum of 42 term courses including Faculty of Arts Group requirements with an overall cumulative average of at least 60% and a cumulative major average of at least 75%.

2. At least 16 term courses must be in Slavic Studies, of which ten term courses will normally be in Russian and six in the other Slavic languages.

3. Successful completion of Applied Studies requirements.

Russian Joint Honours Program
A Joint Honours program with Russian may be taken in combination with any other discipline in which an Honours program is offered, subject to approval by the departments concerned. Listed below are approved combinations with Russian:

Drama
Economics
English
Environment and Resource Studies
French
Geography
German
History
Mathematics
Philosophy
Political Science
Psychology
Sociology
Spanish

Eligibility for graduation in the Russian Joint Honours program includes fulfillment of the following requirements:

1. Successful completion of a minimum of 42 (RUSS/DRAMA requires 40) term courses including Faculty of Arts Group requirements with an overall cumulative average of at least 60% and a cumulative major average of at least 75%.

2. At least 16 term courses must be in Russian including a minimum of six term courses in Russian literature from the list below. See Notes for All Programs.

Minor Program in Russian
Students of all departments may elect Russian as a Minor field of studies in consultation with the Department of Germanic and Slavic Languages and Literatures. A Minor requires the completion of a minimum of ten term courses in Russian with an overall cumulative average of at least 65% in those courses, of which:

1. not more than four term courses may be chosen from courses at the 100-level, and
2. at least two term courses must be chosen from courses above the 200-level.

Russian Workshop in the USSR
For details see Russian Study in Moscow.

Notes for All Programs
1. First-year students who wish to major in Russian are strongly advised to consult the Undergraduate Advisor of the Department.
2. Before graduation all students majoring in Russian must complete RUSS 261/262, normally in Year Two.
3. Students of Honours Russian, Honours Russian (Applied Studies Co-op), and Russian Joint Honours programs are required to complete a minimum of four term courses in Russian literature from the following list: RUSS 341/342, 361/362, 371, 391/392, 441/442, 461/462, 481/482, 485/486.

Minor Program in Croatian
The Department of Germanic and Slavic Languages and Literature offers a Minor in Croatian which requires the completion of a minimum of ten term courses in Croatian with an overall average of at least 65%.

Waterloo in Zagreb
The Department, in conjunction with the Chair of Croatian Language and Culture, offers a yearly program of studies at the University of Zagreb in Croatia. Students in various disciplines may apply, provided they have an adequate knowledge of the Croatian language (at least CROAT 102 or equivalent). The application deadline for students who wish to begin studies in Zagreb in October (Fall semester) is May 1. The application should be forwarded to "Waterloo in Zagreb Program", Department of Germanic and Slavic Languages and Literatures, University of Waterloo, Waterloo, Ontario N2L 3G1.
This program has been suspended until hostilities in Croatia cease and implementation of the program has been approved by the University of Waterloo.

Social Development Studies
Social Development Studies, administered by Renison College, is an integrated multidisciplinary program providing a liberal education with concentration in certain pure and applied social sciences. The interrelated courses of this Major allow students to develop an appreciation of the interdependence of the social sciences and a facility in applying material and perspectives from one discipline to questions in other areas of study. The College offers its own courses for the Major in Interdisciplinary Social Science, Psychology, Social Work and Sociology. Students select their remaining courses from any of the colleges or departments of the University according to their particular needs and interests.
In the program, particular attention is given to the development of human personality in the context of the major social institutions and our cultural traditions and to the study of the development of certain contemporary social problems. Courses in Social Work provide an opportunity to study various types of social intervention. The College assists students to find places as volunteers in local agencies. Through this volunteer work students are given an opportunity to increase the experience which they can bring to their studies and to test and apply their theoretical understanding in practical settings. In the case of those following the Diploma in Social Work, a program co-ordinator assists the students and the agencies to fulfill placement expectations.
The Social Development Studies program provides an excellent background for further study in Social Work, Education, Theology, Law and Journalism, and for work in various helping professions, communications, and community and international service organizations.

Major Courses
Listed below are courses from the four subject areas which combine in the Social Development Studies Major.

<table>
<thead>
<tr>
<th>Interdisciplinary</th>
<th>Social Work</th>
<th>Sociology</th>
<th>Psychology</th>
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<td>PSYCH 120R</td>
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<tr>
<td>150R</td>
<td>121R</td>
<td>121R</td>
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</tr>
<tr>
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<td>SOCWK 220R</td>
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<td>PSYCH 220R</td>
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<td>SOCWK 320R</td>
<td>SOC 327R</td>
<td>PSYCH 322R</td>
</tr>
<tr>
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<td>398R</td>
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<td>367R</td>
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<td>326R</td>
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<td>398R</td>
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<tr>
<td>490A/B</td>
<td>360(A-L)</td>
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<td>399R</td>
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Three-Year General Social Development Studies
Eligibility for graduation in the Three-Year General Social Development Studies program includes completion of the following requirements:
1. A minimum of 30 term courses, including Faculty of Arts Group requirements, with an overall cumulative average of at least 60% and a cumulative Major average of at least 65%.
2. At least 14 term courses from the Major. These courses must be distributed over the four subject areas of the program using a maximum of six term courses from a single subject area. (Additional Social Development Studies courses may be from any of the subject areas.)
Recommended Program, including required courses

Year One
- ISS 150R, PSYCH 120R, SOCWK 120R (Fall)
- ISS 131R, PSYCH 121R, SOC 120R (Winter)
- Four additional term courses

Year Two
- ISS 250R, 251R
- Two other term courses from the Major
- Six additional term courses

Year Three
- Four term courses from the Major
- Six additional term courses

Four-Year General Social Development Studies
Eligibility for graduation in the Four-Year General Social Development Studies program includes completion of the following requirements:

1. A minimum of 40 term courses, including the Faculty of Arts Group requirements, with an overall cumulative average of at least 60% and a cumulative Major average of at least 65%.

2. Two options are available for completing the Major requirements:
   - The completion of at least 18 term courses from the Major (i.e. four term courses in addition to those required for the Three-Year General program), or
   - The completion of the 14 term courses required for the Three-Year General program plus four term courses, selected with College approval, which thematically link Social Development studies to other disciplines.

Honours Social Development Studies
Eligibility for graduation in the Honours Social Development Studies program includes completion of the following requirements:

1. A minimum of 40 term courses including Faculty of Arts Group requirements with an overall cumulative average of at least 60% and a cumulative Major average of at least 75%.

2. Two options are available for completing the Major requirements:
   - The completion of at least 18 term courses from the Major (i.e. four term courses in addition to those required for the Three-Year General program), or
   - The completion of the 14 term courses required for the Three-Year General program plus four term courses, selected with College approval, which thematically link Social Development studies to other disciplines.

3. At least 14 term courses from the Major in Social Development Studies with an overall average of at least 75%. These courses will typically include:
   - four introductory courses from: ISS 131R, 150R, PSYCH 120R, SOC 120R, SOCWK 120R;
   - ISS 250R, 251R;
   - ISS 320R;
   - five term courses above the 100 level;
   - ISS 499A/B (Senior Honours Essay);

4. Four term courses, selected in consultation with Renison's Associate Dean, to explore in depth a topic related to the students' interests (i.e., Theme Area).

Social Development Studies Joint Honours Program
Joint Honours programs are currently available with:
- English
- Psychology
- French
- Recreation
- Music
- Religious Studies
- Philosophy
- Sociology

Eligibility for graduation in the Social Development Studies Joint Honours program typically includes completion of the following requirements (variations may occur depending on the other discipline being considered):

1. Forty to 42 term courses including Faculty of Arts Group requirements with an overall cumulative average of at least 60% and a cumulative Major average of at least 75%. (The total number of courses will vary according to the number of courses required for the
Social Development Studies

Major being combined with Social Development Studies.

2. At least 14 term courses from Social Development Studies including:
   - four term courses from ISS 131R, 150R, PSYCH 120R, SOC 120R, SOCKW 120R;
   - ISS 250R, 251R;
   - ISS 320R, plus five term courses beyond the first-year level;
   - ISS 499A/B (Senior Honours Essay).

   The equivalent courses to ISS 250R/251R and 499A/B may be taken in the other discipline, subject to approval by both departments. If such replacement occurs, sufficient Social Development Studies electives must be taken to meet the 14 term course minimum requirement.

3. At least four term courses, selected in consultation with Renison’s Associate Dean, to explore in depth a topic related to the students’ interests (i.e., “Theme Area”).

Course selection for a Joint Honours program with Social Development Studies should only be made after consultation with Renison’s Associate Dean.

The Social Work Stream

Within the Social Development Studies program, a Social Work stream has been developed for students who plan to pursue graduate studies in Social Work or to follow vocations in Social Work or the related helping professions. The courses in this stream meet the Faculty of Arts requirements for the BA and the College’s requirements for the Major (see details in Renison College calendar). Course selection should be made in consultation with a Renison academic advisor.

Diploma in Social Work

At the end of Year One, students following the Social Work Stream within the Social Development Studies program may apply and be considered for admission to the Diploma in Social Work. During the two years they follow the program, Diploma students are required to complete approximately 400 hours of supervised and evaluated practical field placement and the following courses: SOCKW 001R, 326R, 350D, 350E, and ISS 399R (independent study during which students produce a major paper synthesizing their field work with their studies).

An additional fee of $100.00 is assessed in each of the two years of the Diploma program to cover costs of placement not provided for in the operating grants received from the Government.

Minor Program

A Minor in Social Development Studies requires the completion of ten term courses from the Major with an overall cumulative average of at least 65%. Courses may be selected to fill the needs of the individual student, but course selection should only be made after consultation with a Renison academic advisor. The following Social Development Studies courses are required for the Minor:

1. ISS 131R, 150R, SOCKW 120R;
2. Seven Social Development Studies term courses beyond the first-year level including two from any two of the four subject areas which make up the Major (i.e., ISS, PSYCH, SOCKW, SOC). The remaining three courses may be selected from any of the four subject areas.

Of the ten term courses required for the Minor, no more than six may be taken in any one subject area.

CERTIFICATE PROGRAMS

Renison College offers three Certificate programs. Courses which make up these programs can also be used for a degree. Certificates will be issued by the College to those students who satisfy program requirements and notify the College upon completion.

The Certificate of Study in General Social Work

Eligibility for this certificate includes the successful completion of ten term courses, with an overall cumulative average of at least 65%, as follows:

Seven core courses: PSYCH 120R, PSYCH 121R or ISS 160R; SOC 120R; SOCKW 120R, 220R, 221R, 222R;

Three further term courses from the following, including:
   1. At least one but not more than two of: SOCKW 320R, 321R, 322R;
   2. At least one but not more than two of: ISS 220R, 350H; PSYCH 322R, 323R, 334(R); SOCKW 355R, 356R, 367R.

This certificate will not be awarded concurrently with or following the receipt of the Social Work Stream Certificate.

The Certificate of Study in Social Work (Child Abuse)

Eligibility for this Certificate includes the successful completion of ten term courses, with an overall cumulative average of at least 65%, as follows:

SOCKW 120R or 350C; ISS 220R; SOCKW 220R, 221R, 320R, 321R, 355R; PSYCH 211; PHIL 220 or ISS 350F; SOCKW 357R or 350B.

Students who have completed the requirements for the Certificate of Study in General Social Work will be eligible for the Certificate of Study in Social Work (Child Abuse) with the successful completion of a further five term courses with a cumulative average of at least 65% as follows:

ISS 220R; SOCKW 350R, PSYCH 211, PHIL 220 or ISS 350F, SOCKW 357R or 350B.

Note

For this certificate, SOCKW 390A/B may be substituted for any two of: PSYCH 211, PHIL 220, ISS 220.
The Certificate of Associate in Arts
Eligibility for this Certificate includes completion of the requirements for one of the Social Work certificate programs as well as an additional five term courses, three of which must meet Group A requirements of the Faculty of Arts, with a cumulative overall average of at least 65%.
This certificate must be requested within 12 months of completing the 15th course. It will not be awarded concurrently with or following receipt of a degree.

Notes
1. For students in Minor programs who do not have at least one term course in statistics and one term course in research, and especially those considering graduate studies in Social Work, ISS 250R and ISS 251R are strongly recommended.
2. For further information regarding any of the programs, consult the Registrar's Office, Renison College, Waterloo, Ontario N2L 3G4, Phone: (519) 894-4404, ext. 627.

Sociology
Three-Year General Sociology
Eligibility for graduation in the General Sociology (three-year degree) program includes fulfillment of the following requirements:
1. Successful completion of a minimum of 30 term courses including Faculty of Arts Group requirements with an overall cumulative average of 60% and a cumulative major average of at least 65%.
2. At least ten term courses must be in Sociology, including SOC:
   - 101 (introductory course);
   - 321 (sociological methods course);
   - 365 (sociological theory);
   students are strongly encouraged to select SOC 280 (sociological statistics), although this is not required.

Four-Year General Sociology
The requirements for the Four-Year General degree are parallel to those for the Honours degree (see below) with two exceptions. 499A/B is not required, but may be elected, and the minimum required average for all sociology courses is 68%.

Honours Sociology
Eligibility for graduation in the Honours Sociology program includes fulfillment of the following requirements:
1. Successful completion of a minimum of 40 term courses including Faculty of Arts Group requirements with an overall cumulative average of at least 60% and a cumulative major average of at least 75%.
2. At least 19 term courses must be in Sociology, including SOC 101, 280, 305, 321, 322, 499A/B and one additional theory course from among 401, 404, 405, 406, 407, 408. Students are also strongly encouraged to take at least two seminar courses in Sociology.

Recommended Program

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<td>Three term courses in Sociology</td>
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<td>401, 404, 405, 406, 407, 408</td>
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<td>Four term course equivalent electives</td>
<td></td>
</tr>
</tbody>
</table>

Honours Sociology Co-operative Program
The Department of Sociology is a participating Department in the Co-operative program in the Behavioural Sciences. This is an Honours program into which students may be admitted at the start of the winter term of their second year. Students interested in applying for admission to this program should consult with the Department's Co-op advisor sometime in their first year so that they may select their courses to maximum advantage.

Honours Sociology (Applied Studies Co-op)
A student may combine an Honours Sociology program with Applied Studies Co-op. The requirements in Sociology are identical to the Honours requirements listed above except only 16 term courses in Sociology are required. See the Applied Studies requirements.

Sociology Joint Honours Programs
Sociology has Joint Honours programs with the following:

- Anthropology
- Economics
- English
- Fine Arts
- French
- Geography
- History
- Mathematics
- Philosophy
- Political Science
- Psychology
- Recreation and Leisure
- Studies
- Social Development
- Spanish
- Studies

Eligibility for graduation in the Joint Honours Sociology program includes fulfillment of the following requirements:
1. Successful completion of a minimum of 40 term courses including Faculty of Arts Group requirements with an overall cumulative average of at least 60% and a cumulative major average in each major of at least 75%. In practice, depending on the number of term
9~48

Courses required by the second discipline (e.g. overall and for the major) and the number of electives that students choose to take, more than 40 term courses may be necessary for graduation.

2. At least 15 term courses must be in Sociology, and these courses are usually distributed as follows:
   - A term course in Introductory Sociology (101);
   - A term course in Statistics (280);
   - Two term courses in research methods (321/322);
   - Two term courses in sociological theory (305 and one of 401, 404, 405, 406, 407, 408);
   - The equivalent of seven term courses of electives in Sociology plus 499A/B or the equivalent of nine term courses of electives in Sociology plus the equivalent of 499A/B in the related department.

Note For Joint Honours Program
In the Joint Honours program with French, SOC 280 may be replaced by an elective in Sociology.

Minor Program
Students electing a Minor program in Sociology must complete the requirements for a Three-Year General BA degree in Sociology (see above).

Spanish and Latin American Studies
(Offered jointly with Wilfrid Laurier University)

Three-Year General Spanish
Eligibility for graduation in the General Spanish program includes fulfillment of the following requirements:

1. Successful completion of a minimum of 30 term courses including Faculty of Arts Group requirements with an overall cumulative average of at least 60% and a cumulative major average of at least 85%.
2. At least 12 term courses must be in Spanish of which:
   - six term courses are language;
   - two term courses are Survey of Spanish Literature.

Four-Year General Spanish
Eligibility for graduation in the Four-Year General Spanish program includes fulfillment of the following requirements:

1. Successful completion of a minimum of 40 term courses including Faculty of Arts Group requirements with an overall cumulative average of at least 60% and a cumulative major average of at least 70%.
2. At least 12 term courses must be in Spanish of which:
   - six term courses are language above the 100-level;
   - two term courses are Survey of Spanish Literature;
   - two term courses are Survey of Latin American Literature;
   - one term course in Golden Age.

Honours Spanish
Eligibility for graduation in the Honours Spanish program includes fulfillment of the following requirements:

1. Successful completion of a minimum of 40 term courses including Faculty of Arts Group requirements with an overall cumulative average of at least 60% and a cumulative major average of at least 75%.
2. At least 20 term courses must be in Spanish, and ten of these 20 term courses must be in courses as outlined above under the Four-Year General program.

Recommended Program

Year One
SPAN 201 A/B (Students with little or no Spanish will take SPAN 101/102 in the first year and SPAN 201A/B in the second year).
Eight additional term courses.

Year Two
A minimum of six term courses in Spanish, including SPAN 251A/B. (or 201A/B) and 205/206.
Four additional term courses.

Year Three
A minimum of six term courses in Spanish, including SPAN 351A/B, (or 251A/S), 227/228 and 326 or 327.
Four additional term courses.

Year Four
A minimum of six term courses in Spanish.
Four additional term courses.

Honours Spanish (Applied Studies Co-op)
A student may combine an Honours Spanish program with Applied Studies Co-op. The requirements in Spanish are identical to the Joint Honours requirements listed below. See the Applied Studies requirements.

Spanish Joint Honours Program
The Department of Spanish recognizes combined Honours programs in Spanish and the following:

Classical Studies History
English Latin
Fine Arts Philosophy
French Psychology
German Sociology

Other combinations must be approved on an individual basis with the departments concerned.

Eligibility for graduation in the Joint Honours Spanish program includes fulfillment of the following requirements:

1. Successful completion of a minimum of 42 term courses including Faculty of Arts Group requirements with an overall cumulative average of at least 60% and a cumulative major average of at least 75%.
2. At least 16 term courses must be in Spanish, and ten of these 16 term courses must be in courses as outlined above under the Four-Year General program.
Recommended Program

Year One
SPAN 201A/B (Students with little or no Spanish will take SPAN 101/102 in the first year and 201A/B in the second year.)
Eight additional term courses.

Year Two
A minimum of four term courses in Spanish, including SPAN 251A/B, (or 201A/B), and 205/206.
Six additional term courses.

Year Three
A minimum of six term courses in Spanish, including SPAN 351A/B, (or 251A/B), 227/228 and 326 or 327.
Six additional term courses.

Year Four
A minimum of four term courses in Spanish.
Six additional term courses.

Minor Program in Spanish
Students in an Honours program interested in Spanish as a complement to the major field of study will be expected to complete ten term courses in Spanish. Please consult the Undergraduate Officer in Spanish for Minor in Spanish.

Notes For All Programs
1. By agreement, students at the University of Waterloo and Wilfrid Laurier University can be expected to take courses in Spanish at either university. While most language courses are taught concurrently every year at both universities, most other courses are taught either at one university or the other, and a few courses may rotate from year to year.
2. With the permission of the Department, students may spend the third year enrolled in an acceptable university in Spain or Latin America.
3. Students in Years Three and Four must have the permission of the home department to enrol in Spanish courses at the 100- or 200-level.

Speech Communication
See Drama and Speech Communication.

Women's Studies

Students interested in the Women's Studies Three-Year General Program will ordinarily be admitted at the beginning of Year Two. Admission will be based on academic performance in at least ten term courses in Year One including at least one course listed as a Women's Studies Approved course.

Application for admission to the program is usually made at the time of preregistration for Year Two or after completion of ten term courses. Criteria for admission will normally include an overall Year One average of at least 65% and an average of at least 70% in Women's Studies Approved courses.

Because of the limitations on resources, however, the student's fulfillment of minimum entrance requirements may not guarantee admission to the Women's Studies Three-Year Major. Decisions on admission will be based upon a consideration of academic record and other relevant experience.

Three-Year General Women's Studies
Eligibility for graduation in the Three-Year General Women's Studies program includes fulfillment of the following requirements.

1. Successful completion of a minimum of 30 term courses including Faculty of Arts Group requirements with an overall cumulative average of at least 60% and an overall average of at least 65% in Women's Studies and Women's Studies Approved courses.

2. 14 required courses including:
   ○ W S 200, 300, 365 or 475, SOC 101 and 206;
   ○ nine other courses from the Women's Studies Approved List which must include:
      ☐ at least one of the following Social Science courses: PSYCH 236, SMF 204, 205, 206, 207, 304, 305, 306, 307, SOC 378 or 401;
      ☐ at least one of the following courses with significant Cross-Cultural Content: ANTH 210/310, 350, 404, GEOG 326 or SPAN 387.

3. 16 elective courses to be chosen in consultation with advisors.
Notes

1. It is strongly recommended that students take both ENGL 108E and HIST 215.
2. W S 365 or 475 may count as social science, humanities or cross-cultural content courses, according to the subject matter, with the approval of the Director.
3. If SPAN 387 is counted as both a "Humanities" and "Cross-Cultural Content" course, one additional Women's Studies Approved Course must be taken.
4. Students may substitute courses from Wilfrid Laurier University which are listed in the Calendar as equivalent courses to UW courses. They may also use Wilfrid Laurier courses from the Approved List of Women's Studies courses as "humanities", "social science", and "cross-cultural content" courses as follows:
   - WLU Humanities Courses: CL 218, EN 225, 226, 325, FI 310, 311, HI 325, 326, PY 233, RE 103, 224, 346, 348, 372, WS 201;
   - WLU Social Science Courses: SL 201, 202, 302, SY 201, 204, 233, 234, 403, 452;
   - WLU Cross-Cultural Content Courses: AN 221, EN 325, SY 338.
Faculty of Engineering

Team “Waterluge”: Winners of the 1995 Great Northern Concrete Toboggan Race in Montreal.
The Co-operative Engineering Program

The preparation for an engineering career includes both formal academic studies at a university and intensive training in the practice of engineering. A similar pattern is to be found in preparation for careers in medicine or law, and is characteristic of any development of professional competence. The Co-operative Engineering program at the University of Waterloo provides a completely integrated pattern of academic study and industrial experience in various phases of engineering with ultimate graduation requiring satisfactory performance in both areas. The degree program covers almost five calendar years, comprising eight terms each of about four months' duration of university work on campus which are pursued alternately with six four-month terms of supervised training in the practical experiences fundamental to the development of the graduate engineer. The total time spent in study is the same as that encountered in the usual course of four "academic years".

The Engineering curricula at the University of Waterloo provide a sound basis in Mathematics and pure Science and in Engineering Science and Design. A substantial part of the work of the first and second years is common to all programs. Students elect one of the seven principal programs of Engineering starting with the first year. The curriculum for each of the seven basic programs combines required "core" subjects essential to the field, and "elective" subjects permitting considerable diversity in individual programs of study. An important part of the curriculum is a series of electives in Complementary Studies. A more detailed explanation of the Co-operative program is given in "Co-operative Education and Career Services", as well as specific requirements as noted under the examinations and promotions section of this chapter.

Change of Term Sequence

Term sequence changes are considered by the Faculty in which the student is enrolled. Application, in the form of a letter from the student (supported by an employer and/or a Co-ordinator) must be made to the appropriate Assistant Registrar. For some Faculties, an appropriate application form must be completed. Normally the request should be made within the first two weeks of the term preceding the switch point. In addition, the student's academic performance must be "in good standing". It should be noted that the student's academic program may be restricted due to lack of choice of core or elective subjects during particular terms.

Degrees

The Degree of Bachelor of Applied Science (BASc) is awarded by the University in the following undergraduate programs:

- Chemical Engineering
- Civil Engineering
- Computer Engineering
- Electrical Engineering
- Environmental Engineering (Chemical Branch)

Environmental Engineering (Civil Branch)
- Geological Engineering
- Mechanical Engineering
- Systems Design Engineering

The Degrees of Master of Applied Science (MASc) and Doctor of Philosophy (PhD) are also awarded in Engineering. For further details, consult the Graduate Studies Calendar and the list of the particular courses in graduate work in the various departments.

Admission

All Year One students enrol in September. Those students spend the Fall term together at the University, after which they are divided into two groups. They also complete the last term of the program and graduate together. Both groups have the same total time on campus and in industry, one group having two academic terms in sequence at the start of the program and the other having two academic terms in sequence at the end of the program. Precise dates for the beginning and end of the various terms are shown in the Academic Calendar.

Environmental Engineering (both Chemical and Civil branches), Geological Engineering and Systems Design Engineering students start in September with four months of school (Stream 4) before going out on the first work term in January. Computer Engineering students start in September with eight months of school (Stream 8) before their first work term which starts in May. Chemical, Civil, Electrical and Mechanical Engineering students may be either Stream 4 or Stream 8.

The admission categories, requirements and procedures for all programs are outlined in the "Admissions" section of this Calendar. The following emphasize some of the admission requirements which relate specifically to the Faculty of Engineering.

Applicants from Ontario Secondary Schools

Applicants must present six Ontario Academic Course credits, five of which are required courses. See the Admission Requirements chart in "Admissions" for information about admission requirements. Applicants with high overall standing who are missing any of the required courses must contact the Director of Admissions for Engineering no later than December (for the next September admission). Applicants will be evaluated and advised on possible courses of action required to meet the specific requirements.

Admission as an Adult Student

Applicants must obtain standing in the Ontario Academic Courses: Calculus, Algebra & Geometry, Physics, Chemistry and English 1 or their equivalent. The University has developed special pre-university mathematics, physics and chemistry courses which can be taken by distance education and which are recommended for Adult Students. To discuss admissibility and appropriate qualifying studies, applicants are advised to contact the Director of Admissions.
for the Faculty of Engineering in the fall of the year prior to entering Year One.

Admission to Advanced Standing

Admission beyond 1A is limited to applicants who have an academic and work experience background that is judged equivalent to the particular class he or she would join. Due to the co-operative nature of the Engineering program, no student will be admitted above year three, term A level. Any student thus admitted will be required to register in the January term and to complete satisfactorily the final four academic terms and the final three University of Waterloo work terms and work reports.

Credit for previous work experience can be applied only to those work terms preceding the level of admission and cannot exceed three work terms.

WHMIS Requirements

All students in the Faculty of Engineering, indeed all students taking courses offered by the Faculty of Engineering, must have appropriate instruction on issues of safety. The Workplace Hazardous Material Information System (WHMIS) training satisfies this requirement. For students in the 1A term registered in the Faculty of Engineering, this requirement must be satisfied by the end of the first week of lectures of the term, or the registration of the student in Engineering courses will be cancelled. The requirement is satisfied by obtaining a credit for WHMIS training, which only need be obtained once. Credit may be granted upon producing evidence that appropriate training has been undertaken elsewhere. For those who do not have a WHMIS credit, they must arrange for the necessary instruction and evaluation.

For students in their 1A term in an Engineering program, the WHMIS requirement will normally be met as part of their instruction during the 1A term. It is the student’s responsibility, however, to obtain this training. For students who are admitted at an advanced level, a condition of admission will be that the WHMIS credit be obtained by the end of the first week of lectures of the term for those courses decided on the students progress in the program are as follows:

1. Promoted - proceed to next term.
2. Proceed on Probation - proceed to next term, but subsequent progress is contingent upon clearing pending conditions. Normally, Proceed on Probation will not be awarded for two terms in succession.
3. Conditionally Promoted - student must clear failed courses before the beginning of the second succeeding academic term.
4. Academic Decision Deferred - may not proceed until conditions cleared.
5. Required to Repeat Term - must stay out two terms before repeating.
6. Required to Withdraw from Engineering - readmission possible only through application to Admissions Committee after at least three terms out and with new evidence of ability to succeed. (Except in 1A term - see rule #7 in the next section)
7. Recommended for BASc Degree at Spring/Fall Convocation - program successfully completed.
8. Promoted (Aegrotat) - student has adequate understanding of the material, but due to illness or other extenuating circumstances, normal evaluation was not possible; proceed to next term.

At the end of each term, the examining Faculty members submit grades for that term’s courses. Each department then reviews the performance of students registered in that department and makes recommendations to the Examinations and Promotions Committee. The Examinations and Promotions Committee then considers the evidence on which the departments have made their recommendations and assigns the official academic decision. An appeal or petition relating to an assigned
academic decision, grade, or other evaluation, or relating to other decisions based on University policies, may be made by following the procedures outlined in the Appeals and Petitions section of these regulations. All academic decisions and grades are reported to the student through the Registrar's Office. All recommendations to award degrees must be approved by the Senate of the University.

The rules which are applied when the student's performance is assessed are as follows:

1. To be Promoted in the program, a student must have a term average of 60% or better, with no course below 50%. Students who fail to meet this requirement will be Conditionally Promoted, Required to Repeat the Term, Required to Withdraw from Engineering, allowed to Proceed on Probation, granted Aegrotat Standing, or have the Academic Decision Deferred, according to the conditions identified below.

2. To remain in the program, a student must have a term average of 50% or better. Students who fail to meet this requirement will be Required to Withdraw from Engineering. Except in 1A, a student receiving an average below 50% who has never before had an average below 60% will have the Academic Decision Deferred for two months to allow the student an opportunity to bring forward evidence of extenuating circumstances which affected the term performance.

3. A student who achieves a term average of 60% or better, but who has one or two courses below 50%, will be Conditionally Promoted. The condition may be satisfied, and the promotion confirmed, in one of the following ways, as determined by the student's Department of registration.

   a) A Department may require a student to repeat a course in which a grade of less than 50% was received, and to obtain a grade of at least 50% in such a course. The grade received upon repetition would not affect the student's original term average.

   b) If a subject is failed with a grade of at least 39%, the failure may be considered cleared if the student's performance in the immediate next academic term results in an average of at least 60% with no course failures. A credit will then be entered on the student's record for that subject, although the original failing grade does not change. If the following academic term does not clear the failure in this way, then the student will be required to repeat that term.

   c) If the failed subject has a grade of 39% or more, a department may require the failure to be cleared by supplementary work. Satisfactory completion of the supplementary work will result in a "Credit" for the failed course, and there is a non-refundable fee for such supplementary work.

   d) For a failed subject with a grade of 39% or more, the department may require a formal re-examination of the subject by written examination held at a time specified by the department. Such re-examination will not affect the student's term average. To clear the failure, a grade of at least 50% must be obtained on the supplemental examination within eight months from the original failure, and will be recorded on the Grade Report. There is a non-refundable re-examination fee for each such supplemental examination.

   e) A student who fails a subject with a grade of 38% or less, may, with the permission of the department of registration, replace that subject during the first available academic term, as a condition of promotion. This is done by obtaining at least 50% in an extra course as assigned by the Department. The extra course will not be included in the student's term average.

   f) A student who does not clear a failed course according to (a), (b), (c), (d) or (e) on the first attempt or who does not have departmental permission as required under (e), will be required to register for a non-degree term. The subjects and standings required in the non-degree term are to be specified by the department in advance with the objective of correcting deficiencies in preparation and preparing the student to proceed in the program with reduced chances of further difficulties.

A student who fails to satisfy these conditions may not proceed further in the program, and no student may obtain the BASc degree without satisfying these conditions for all courses beyond 1A in which a grade of at least 50% has not been achieved.

4. A student who achieves a term average of 50% or better, but less than 60%, or a student who achieves a term average of 60% or better, but who has more than two courses below 50%, will be Required to Repeat the Term.

5. The term No Penalty may be appended to the decision to repeat a term. In this case, the requirement to stay out for two terms before repeating the term is waived and the term is not counted as a repeat term with regard to the number of times a term can be repeated or in the calculation of the total number of terms of full-time study in the program. This condition is normally applied as a result of extenuating circumstances which affected the student's performance in the failed term.

6. Students repeating a term must achieve an average of 60% or better with no course below 50% or they will be Required to Withdraw from Engineering. Only two repeated terms are permitted in total, with no single term being repeated more than once; otherwise the student will be Required to Withdraw from Engineering. While repeating a term, a student may be excused from repeating individual courses in which a grade of 70% or better has been achieved. If this is permitted, however, other appropriate courses, at the Department's discretion must be taken, such that a full course load is maintained. In all cases, the program must be completed in no more than ten terms of full-time study.
7. In the 1A term only, students are promoted if they achieve an average of 60%, with no more than two courses having a grade of less than 50%. Students may Proceed on Probation if their term average is 50% or better (but less than 60%) with no more than two courses below 50%. Students who do not satisfy these requirements and are required to withdraw, may request a Qualifying Program for Readmission, and may apply for readmission without waiting the three terms normally required.

8. A student may withdraw voluntarily from the program at any time prior to four weeks before the commencement of the final examination period in the term by giving written notification of withdrawal. IN 1A ONLY, a student may withdraw voluntarily from the program at any time prior to the commencement of the final examination period by giving written notification of withdrawal. Students who voluntarily withdraw prior to or during the full refund period will not have the term recorded on their academic record. Students who voluntarily withdraw from their studies after the first three weeks of classes and before any deadlines set by their faculty, will have this noted on their transcripts with the statement "Voluntary Withdrawal from Term (effective date) - No Academic Penalty". Should students who have voluntarily withdrawn wish to re-enter the program, they may re-apply to the program directly through application to the Admissions Committee of the Faculty. See "Fees and Registration" for details.

9. A student may be Required to Withdraw from Engineering at any time if, in the opinion of the Faculty, the student is unlikely to benefit from further participation in the program or if the student leaves the program without notification and fails to write examinations.

10. Courses taken by students during work terms will not be included in the average for any term. The grades for courses taken at the University of Waterloo or at another university on Letter of Permission, however, will be reported on the student's transcript. Normally, such courses are considered as enrichment to the student's program; when the material of such a course is deemed to cover a subsequent course in the program, the student may receive permission to replace the subsequent course by a free elective (technical or non-technical) approved by the Department Associate Chair. Courses taken during work terms may not be used to reduce the number of courses taken in any subsequent term. Normally, all students will be expected to register in the minimum number of courses specified in the Calendar for each term of the program.

11. Grades for courses that are in addition to the degree requirements will not be included in the term average but will be reported on the student's transcript. The Faculty of Engineering does not permit students to register in any of its courses on an audit basis.

12. Students who have successfully met all of the requirements of the program and have been recommended for the BASc degree will have First, Second, or Third Class Honours standing designated according to the cumulative 3A-4B average as follows:

- First Class Honours: Average 80-100%
- Second Class Honours: Average 70-79%
- Third Class Honours: Average 60-69%

13. Individual departments may designate additional minimum grade requirements in certain courses. Also, there are individual department rules regarding the grading and averaging of Complementary Studies elective courses.

14. All courses in the Faculty are assigned a numerical grade (between 0 and 100) by the examiners. The following exceptions are permitted:

- **AEG** - Aegrotat. The student was ill according to medical evidence but has satisfactory understanding of the course.
- **CR** - Credit granted. Performance was satisfactory.
- **NCR** - No credit granted. Performance was unsatisfactory.
- **INC** - Incomplete. The course work is incomplete and the student has permission to extend the work beyond the term. If the work is not completed within six months from the end of the term, a grade will be submitted based on the available information.
- **DNW** - Did not write. The student did not withdraw from the course and was not eligible for an Incomplete grade. The student did not complete a sufficient proportion of the assignments, tests, and examinations for an evaluation to be made.

In cases where students take courses in a Faculty where letter grades are assigned, the letter grades will be converted for the purposes of reporting and averaging according to the following table:

<table>
<thead>
<tr>
<th>Letter Grade</th>
<th>Numerical Grade</th>
</tr>
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<tbody>
<tr>
<td>A+</td>
<td>95</td>
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<tr>
<td>A</td>
<td>89</td>
</tr>
<tr>
<td>A-</td>
<td>83</td>
</tr>
<tr>
<td>B+</td>
<td>78</td>
</tr>
<tr>
<td>B</td>
<td>75</td>
</tr>
<tr>
<td>B-</td>
<td>72</td>
</tr>
<tr>
<td>C+</td>
<td>68</td>
</tr>
<tr>
<td>C</td>
<td>65</td>
</tr>
<tr>
<td>C-</td>
<td>62</td>
</tr>
<tr>
<td>D+</td>
<td>58</td>
</tr>
<tr>
<td>D</td>
<td>55</td>
</tr>
<tr>
<td>D-</td>
<td>52</td>
</tr>
<tr>
<td>F+</td>
<td>48</td>
</tr>
<tr>
<td>F</td>
<td>46</td>
</tr>
</tbody>
</table>

15. Changes to the set of courses which a student is taking in a particular term may be permitted at the discretion of the student's department. Such changes must normally be arranged and approved before the end of the normal "Drop/Add" period, which is a period of two weeks at the beginning of each term. After this period, only exceptional cases will be considered.

16. Students must demonstrate consistent satisfactory performance during their work term employment. They must also submit the required number of satisfactory work term reports (see booklet entitled Regulations and Procedures for Co-operative Programs).
Appeals and Petitions

Two distinct situations in which a student may wish to appeal the Faculty with a request are the following: an appeal of an academic grade or decision, and a petition for special consideration. In the case of an appeal, the student is disputing the grade or decision for reasons which must be provided; in the case of a petition, the student agrees that the rules have been applied fairly and is not disputing grades but, rather, is requesting special consideration because of extenuating circumstances. The procedure by which such requests will be considered is described in the following paragraphs. The University policy on student grievances and associated procedures is summarized in Policy #70 and copies of the complete Student Grievance Policy, UW Policy #70, are available from the Associate Deans, the Registrar's Office, the University Graduate Office, the University Secretariat, and the Ombudsperson.

Petitions

Petitions apply in those instances where a student acknowledges that the rules and regulations of the University have been applied fairly but is requesting that an exception to the regulations be made because of special circumstances. A petition is launched by submitting a Petition for Exception to Academic Regulations form to the Assistant Registrar for Engineering, Registrar's Office, University of Waterloo. Reasons for such requests for special treatment as well as supporting documentation, including medical certificates and similar documents, must be provided with the petition. If a successful petition would reverse an academic decision, the petition must be received prior to four weeks after the date of issue of the marks for the corresponding term in order to facilitate entry into the immediately following term if so desired by the student. Petitions which are launched later than six months after the end of the term for which the decision would be affected normally will not be considered.

All petitions are considered by the Faculty Examinations and Promotions Committee. This committee will also acquire and consider the recommendation made by the student's home department, and by the Department of Co-operative Education and Career Services if the petition concerns work term considerations, before making its decision. Students normally do not appear in person before the committee at the meeting at which the case will be considered; only if such an appearance will provide relevant information that cannot be communicated through the written petition and supporting documents will such an appearance be granted. Requests for personal appearances will be considered by the Associate Dean of Engineering for Undergraduate Studies.

Since a Petition for Exception to Academic Regulations does not dispute an academic evaluation or application of the rules and regulations of the University, the decision of the Examinations and Promotions Committee with regard to petitions is final; there is no appeal of an unsuccessful petition. The Assistant Registrar for Engineering shall notify the student in writing of the outcome of the petition within two weeks of the Examinations and Promotions Committee meeting at which the petition was considered.

Appeals

If the student believes that a decision or action is unfair, or that the student has been otherwise treated unfairly, or if the student believes that an academic evaluation or judgment is incorrect, that student may launch an Appeal. All appeals normally must be launched within two months either of being notified of an adverse decision or from the end of the term in which the alleged event(s) occurred. The first step of an appeal is always an informal inquiry. This may be followed by a formal review, which may be followed by a hearing, if warranted.

A student shall initiate an informal inquiry by going directly to the appropriate instructor, officer, or University authority. The appeal will proceed beyond the informal inquiry stage only after evidence has been presented to the Associate Dean that a direct discussion between the student and the instructor, officer, or University authority has failed to produce agreement.

Within 10 working days of receiving the response to the informal inquiry, or if there is no timely response, the student may submit a Request for a Formal Review form to the Associate Dean for Undergraduate Studies. The Request for a Formal Review is used both to appeal decisions and actions and to request a Formal Re-Read of a piece of work (e.g. an examination, thesis, project, work term report, course assignment, essay, laboratory report, etc.) in which the mark or assessment is questioned.

The Associate Dean shall submit a copy of the Request for a Formal Review form to the Associate Chair of the department involved who shall conduct an investigation and submit a written report to the Associate Dean. The Associate Dean shall communicate the results of the Formal Review to the student. In the case of a Formal Re-Read, the Associate Chair shall select a qualified new reader or readers who shall provide an assessment of the work using the marking scheme of the original instructor. The Associate Chair may decide that a re-read is not appropriate and shall so inform the Associate Dean, with reasons; otherwise, the Associate Chair shall determine from the evidence available, including the results of the re-read, the assessment that will be given to the work. The result can be a raising, lowering, or maintaining of the student's grade. The Associate Dean shall notify the student of the decision in writing and with reasons.

The next step, and the final one for appeals concerning academic judgment or assessment of a student's work, is the Hearing. Within 10 working days of receipt of the decision of the Formal Review, the student shall submit a Request for a Hearing form to the University Committee on Student Appeals Chair or the appropriate Faculty Committee on Student Appeals Chair. For details, the student is directed to the University Student Grievance Policy, UW Policy #70.

English Language Proficiency Requirement

1. All students with an initial registration in the Faculty of Engineering in the Fall term of 1990 or later must satisfy the English Language Proficiency Requirement by the end of their 2A academic term or, if admission to the program occurs after the 2A term, before the end of their first academic term in the program.
2. The English Language Proficiency Requirement may be satisfied by one of the following:
   - writing and obtaining a grade of 60% or better in the English Language Proficiency Examination (ELPE).
   - taking an approved English course and obtaining a grade of 60% (C-) or better. A list of approved courses is provided below.
   - in the case of admission to the program after the 2A term, providing evidence of proficiency in the form of courses successfully taken elsewhere, etc. that is acceptable to the home department in which the student is enrolled.
   - Students who have not satisfied the English Language Proficiency Requirement by the end of the appropriate term as specified in item 1 above will have their Academic Decision Deferred for that term. Continuation in the program is then contingent upon first satisfying this requirement.

3. Students who obtain a grade of less than 60% in the ELPE must, at the first available opportunity after their unsuccessful attempt at the ELPE, either attend the Writing Clinic or take one of the approved English courses:
   - English 109 Introduction to Essay Writing FWS
   - English 129R Introduction to Written English FW
   - English 210C Report Writing FWS

   The entry ARTS 000 will appear on both the Student Examination Report and the student's transcript with a CR grade if the student completes the requirement by passing the ELPE examination, or successfully fulfilling the requirements of the Writing Clinic or an approved English course.

Note
Students who arrange a special sitting of the ELPE outside the scheduled dates will be assessed an administrative charge.

Challenge for Credit
When students are able in their own time, or through experience in a work term job, to study the material of a course that they would normally be required to take in their program, they may show evidence as to why they should be excused from taking the course and demonstrate their competence in a manner acceptable to the department offering the course. This process is known as "Challenge for Credit". Additional information may be obtained from the student's department.

Undergraduate Co-operative Work-Term Reports
Satisfactory work reports and work terms are recognized formally as part of the requirements for the Bachelor's degree. The regulations related to work term reports are:

1. Prior to graduation each Engineering student is required to submit a minimum of four satisfactory work reports which must be related to the work of the term reported and must have identifiable analytic content. For those students admitted to advanced standing into 2B or 3A with only three work terms remaining, only three satisfactory work reports would be required.
2. Work reports are due seven days after the first official day of lectures of the academic term directly following the work term on which the report is based. Reports submitted after the deadline may be carried forward to the following calendar term for evaluation, and are not eligible for prizes.
3. Work reports are compulsory for all students in their first work term. The reports and evaluation forms shall be returned to the students and copies of the evaluation forms shall be placed in the students' files in the Department of Co-operative Education and Career Services.
4. Three additional work reports shall be submitted for the remaining five work terms. Students are encouraged to reserve a report for their final work term. If students wish, they may submit additional reports and the evaluations of these reports will be added to their work term record.
5. Work reports, other than those completed by first year students, shall be evaluated by the Engineering Faculty following the same procedure suggested in Item 3. This shall include reports marked by employers.
6. Work reports rated as unsatisfactory may be rewritten and re-submitted during the academic term. Students with unsatisfactory work reports may be required to take formal instruction in technical report writing.
7. Students who receive an 'NCR' designation for any work report on their Student Examination Report will not be promoted until they have cleared the condition. In addition, their registration for the next academic term will be cancelled, until this condition is cleared, unless the next academic term is 4A (Fall) or 4B (Winter) (see Faculty of Engineering Supplement to Guidelines for Writing Your Work Term Report).
8. All required work-term reports must be submitted within seven days of the first official day of lectures for the corresponding term. This includes students for which late submission will result in a delay in their graduation. Exception will only be considered where extenuating circumstances exist and will be made at the discretion of the student's departmental Associate Chair for Undergraduate Studies.

Dean's Honours List
To recognize outstanding academic achievement each term, the designation 'Dean's Honours List' will be awarded to exceptional undergraduate Engineering students. To achieve this standing, a student must be unconditionally promoted, and be either in the top 5% of the class or obtain a term average of at least 85%. This designation will be reflected on the student's mark report and official university transcript. Students not in the top 10% of the class, or not having a term average of at least 80% are normally not eligible.
Students with outstanding records throughout their undergraduate careers in Engineering will "Graduate on the Dean’s Honours List" if they have been on the "Dean’s Honours List" for at least two terms of the six academic terms preceding graduation, and have a cumulative average over these last six terms of their program of at least 80%. An appropriate notation will appear on the student’s official university transcript.

An Alumni Gold medal is awarded annually to recognize the academic excellence of the top undergraduate in Engineering.

Complementary Studies Requirements for Engineering Students

The professional engineer requires in addition to technical knowledge and skill, an understanding of society, its needs, and the engineer’s role in society. An ability to make intelligent judgements that encompass human and social values, as well as technical values, is inherent in that role. Such areas form an essential complement to technical studies in the education of an engineer. The Complementary Studies component of the curricula in the Faculty of Engineering requires that all students in the Faculty receive instruction in the humanities and social sciences, engineering economics, communication, and the impact of technology on society.

The aim of complementary studies is to provide an understanding of our heritage and social environment, and of the way in which science and engineering interact with them. These studies should develop sufficient interest to encourage further individual study.

Further objectives are that the engineering student develop a broader intellectual outlook, a broader understanding of moral, ethical and social values, and an improved ability to communicate.

REQUIREMENTS

The Complementary Studies component of the student’s program must satisfy the following:

1. At least one course must be taken that deals with the Impact of Technology on Society. Courses which satisfy this requirement appear in List A – Impact Courses.

2. At least one course must be taken in Engineering Economics. Courses which satisfy this requirement appear in List B – Engineering Economics Courses. (Note that core programs contain a course from this list.)

3. At least two courses must be taken that deal with the central issues, methodologies and thought processes of the Humanities and Social Sciences. Courses that satisfy this requirement appear in List C – Humanities and Social Sciences Courses.

4. A minimum number of courses must be taken as required by individual programs. The exact requirements vary according to program; for details, see individual departmental regulations. Courses which appear in Lists A, B, C and D may be used to meet these requirements.

5. Provision must be made to develop the student’s ability to communicate adequately both orally and in writing. The exact manner in which this requirement is satisfied varies according to program; for details, see individual departmental regulations.

COMPLEMENTARY STUDIES COURSE LISTS

List A – Impact Courses

- ANTH 102 (F,W) Introduction to Social and Cultural Anthropology
- ERS 231 (W) Environmental Issues in a Global Perspective
- ERS 241K (F,W) Introduction to Environmental and Social Impact Assessment
- ERS 339 (F) Biophysical and Socio-economic Impact Assessment
- GEOG 368 (F) Conservation/Resource Management of the Built Environment
- M SCI 442 (W) Impact of Information Systems on Organizations and Society
- PHIL 207 (F) Science, Technology and Society
- SCI 219 (F) Chemistry in Modern Society
- SCI 263 (F) Science and Society
- SCI 270 (W) Nuclear Science
- SOC 232 Technology and Social Change
- STV 100 (F,W,S) Society, Technology and Values: Introduction
- STV 202 (F,W) Design and Society
- STV 204 (W,S) Society, Technology and Risk
- STV 404 Design and Technological Choice in Canada

Other courses may be acceptable for this requirement. Prior approval is required from your department Associate Chair.

List B – Engineering Economics

- CH E 044 (F,S) Economics for Chemical Engineering
- CIV E 292 (F,W) Engineering Economics
- M SCI 261 (W,S) Managerial and Engineering Economics 1
- SY DE 331 (S) Engineering Economics

List C – Humanities and Social Sciences Courses

1. Pre-scheduled Humanities and Social Sciences Courses

Attempts have been made to schedule the following Humanities and Social Sciences courses in order to minimize conflicts. They will normally be given at 11:30 MWF, 7-10 M, or 7-10 T. (F) indicates Fall, (W) indicates Winter, (S) indicates Spring.

Social Sciences-based Courses

Economics: ECON 102 (F,W,S); ECON 202 (F,W,S)
Management Sciences: M SCI 211(F,W,S); M SCI 311 (F,W)
Political Science: PSCI 102M (W,S); PSCI 260A (F,S); PSCI 260B (W,S)
Psychology: PSYCH 101 (F,W,S); plus one term course to be announced (F,W)
Sociology: SOC 101 (F,W,S)

Humanities-based Courses

English: ENGL 105A (F,W,S)
French: FR 195A (F,W); FR 196A (W)
History: HIST 130 (W,S); HIST 253 (F); HIST 254 (W,S)
Philosophy: PHIL 200A (F,S); PHIL 2008 ON); PHIL 300 (W); PHIL 315 (GEN E 412) (W)

2. Non-pre-scheduled Humanities and Social Sciences Courses

The following Humanities and Social Sciences courses are permissible but will not be pre-scheduled. In general, all literature and civilization courses in language departments are approved as Humanities and Social Sciences courses. Anthropology (ANTH): All
Canadian Studies (CDN ST): All
Classical Studies (CLAS): All
Drama (DRAM): 101A, 101B, 251
East Asian Studies (EASIA): 201R
Economics (ECON): All except 211, 221, 311, 321, 404, 411, 421, 422, 471
Environmental St. (ENV S): 195
Fine Arts (FINE): * see home dept. Assoc. Chair
General Engineering (GEN E): 412
Geography (GEOG): 101, 120, 202A, 206, 221, 225, 227, 368
Gerontology (GERON): 100, 208, 344
Health Studies (HLTH): 220, 346, 349
History (HIST): All except 400-level courses
Human Resources Management (HRM): All (cannot be taken if M SCI 211 or 311 taken)
Kinesiology (KIN): 103, 348, 349, 352, 354
Management Sciences (M SCI): 211, 311
Middle East Studies (MES): All
Music (MUSIC): 140, 245, 253, 256, 334, 355, 363
Peace and Conflict Studies (PACS): All
Personality and Religion (S/PAR): All
Philosophy (PHIL): All except 140, 145, 200, 216, 241, 243, 245, 256, 359, 440A/B, 441/442, 443, 456
Planning (PLAN): 190, 225
Political Science (PSCI): All except 214, 291, 315
Recreation (REC): 201, 204, 205, 230, 250, 300, 304, 425
Religious Studies (RS): All except 105A/B, 106A/B, 201, 305A/B, 306A/B
Science (SCI): 263
Sexuality, Marriage and the Family (SMF): All

Engineering

Complementary Studies Requirements

Society, Technology and Values (STV): All
Sociology (SOC): All except 200, 321, 322, 362, 410, 421, 498A-X, 499A/B
Women's Studies (WS): All except 365A-D, 475A-D (may be acceptable at the discretion of the Associate Chair when a course outline is shown)

List D – Other Permissible Complementary Studies Courses

While the following courses may not be used to satisfy Requirements A, B, or C, they may be used to satisfy Requirement D. For details, see your Departmental regulations.
Accounting (ACC): 131, 132 but not with M SCI option, 371
Civil Engineering (CIV E): 491
Dance (DANCE): * see home department Associate Chair but not 242, 342
Environmental Studies (ENV S): 201, 401, 500
Fine Arts (FINE): * see home department Associate Chair
General Engineering (GEN E): 315, 411, 415, 452
Kinesiology (KIN): 255
Management Sciences (M SCI): 461
Mechanical Engineering (M E): 401
Music (MUSIC): (100 or 150/151), 142, 231, 240, 254, 255, 260, 356, 361
Philosophy (PHIL): 145, 200, 216, 241, 243, 245, 256, 359, 456
Political Science (PSCI): 291
Psychology (PSYCH): 256, 271, 305, 307, 312, 317
Recreation (REC): 100

Notes

1. Some courses are available by UW distance education and may be taken during a student's work terms. Also, courses taken at another university during a work term may be eligible for a "transfer of credit" if approved by the student's Associate Chair for Undergraduate Studies.

2. Students who decide their preferred choices at pre-registration time are most likely to get their choice.

3. For descriptions of the content of courses, see Chapter 16 of the UW Undergraduate Calendar under the program prefix of the course, e.g. CIV E – Civil Engineering, PHIL – Philosophy, etc.

4. Students who wish to take linguistic and grammar courses must have their choices approved by their home department Associate Chair for Undergraduate Studies and, if approved, students must also be assessed by the language department to determine their facility with the language. Such courses may only be used to satisfy requirement D above.
5. **Courses approved for the English Language Proficiency requirements are not acceptable for the Complementary Studies program.**

6. **Students are responsible for ensuring they have the necessary prerequisites.**

7. **Associate Chairs for Undergraduate Studies may change the course category for the program of individual students who are special cases.**

**OPTIONS AND ELECTIVES FOR ENGINEERING STUDENTS**

1. Each of the Engineering undergraduate programs consists of two course groupings:
   - The compulsory core program within the department which prepares the student for practice in that particular branch of engineering and comprises 70 to 80 percent of the course load.
   - Elective courses which comprise 20 to 30 percent of the course load. Of these elective courses a minimum of five must be chosen from subjects that complement the engineering curriculum. This Complementary Studies requirement gives students some breadth of studies related to their role as educated professionals in society. (See Complementary Studies Requirement section.)

   In the elective courses, students with special interests may, with the approval of their department Associate Chair, structure individual groupings. However, for reasons of academic continuity and scheduling, particular course groupings have been identified and are recommended to students. Some of these course groupings are pre-scheduled to ensure that courses in the group will not conflict with core courses.

2. The remaining elective courses are usually chosen from engineering department courses which will give some depth in a particular technical discipline appropriate to a student's branch of engineering. (See Engineering Departments' program descriptions for listings of suggested elective course groupings of this type.)

3. **Designated Options.** Certain elective course groupings have been recognized by the Faculty of Engineering or the University as DESIGNATED OPTIONS. Students who complete the requirements of these options will have a designation of completion of the option recorded on their transcripts. At present the available options and the corresponding option co-ordinators are the following:

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<th>Option</th>
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<td>Mathematics</td>
<td>G. Heppler, Systems Design Engineering</td>
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<td>Physics</td>
<td>C.R. Selvakumar, Electrical and Computer Engineering</td>
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<td>Computer Engineer</td>
<td>B.R. Preiss, Electrical and Computer Engineering</td>
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<tr>
<td>Statistics</td>
<td>C. Young, Stat. and Actuarial Science or K. Hipel, Systems Design Engineering</td>
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   Because designated Options can require up to eight courses, it may be necessary for students to take extra courses to complete the required work in some options. To carry extra courses, a student's academic standing must be such that the extra load will not lead to a high risk of failure, and permission of the Department Associate Chair must be obtained.

   For a designation to appear on the transcript a student must achieve an average of 60% in the option courses and a grade of 50% in each of the courses in the option. Details follow later in this section.

4. Although Engineering does not offer “MINORS” in its departments many other departments of the University do. A Minor requires a minimum of ten courses chosen from lists prepared by the departments. Engineering students who choose a Minor must take extra courses. However, often courses in a Minor can also be used to satisfy some of the requirements of the technical elective or complementary studies course groups.

5. **It is possible for a graduate with a BASc degree in Engineering to complete the requirements for a non-major General BA in a further two terms of study.** Assuming satisfactory grades and the appropriate choice of Complementary Studies Electives, credit for liberal Arts and Science courses (including mathematics and science subjects in Engineering) may be transferred to meet up to two-thirds of the General BA requirement. Students interested in pursuing such a program should consult with their Department Associate Chair or the Director of General Studies for Engineering, and the Associate Dean of the Faculty of Arts for Undergraduate Affairs.

6. The Faculty of Engineering, University of Waterloo, has student exchange programs with Engineering schools in other countries. These permit Waterloo students to experience study in different cultural environments, and to receive academic credit towards their program requirements. Such exchanges are currently active with:

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Institut National des Sciences Appliquées de Lyon
Université de Technologie de Compiègne
Université de Nantes
Ontario/Phône-Alpes [Grenoble; Lyon]

Germany
Technische Universität Braunschweig
Technische Universität Hamburg-Harburg
Universität Karlsruhe
Universität Gesamthochschule Paderborn
Ontario/Baden-Württemberg [Stuttgart; Karlsruhe]

Holland
Delft University of Technology

Japan
Kyoto University
Tottori University

Poland
Warsaw University of Technology

Northern Ireland
University of Ulster

Singapore
National University of Singapore

South Korea
Pohang University of Science and Technology

Switzerland
École Polytechnique Fédérale de Lausanne

Ukraine
Dnipropetrovsk Institutions

Notes
1. Options and Electives available to engineering students are subject to change and development. Students are advised to obtain the latest information from their department Undergraduate Office or the Faculty of Engineering Associate Dean's Office before making final decisions.

2. Students who decide their preferred choices at preregistration time are most likely to get their choice. Changes made at the beginning of a term may cause timetable conflicts and thus may not be possible.

3. For descriptions of the content of courses see course descriptions under the program prefix of the course e.g. CIV E – Civil Engineering, PHIL – Philosophy, GEN E – General Engineering, etc.

Option in Mathematics
The aim of the Mathematics Option is to provide the student with a broad background in either pure or applied mathematics with an opportunity to take some courses in an area of specialization.

There are six required courses:
- MATH 211 Advanced Calculus 1 (or equivalent)
- MATH 212 Advanced Calculus 2 (or equivalent)
- E&CE 316 Probability and Statistics (or equivalent)
- MATH 235 Linear Algebra 2

Option in Physics
The Physics Option is intended for students who want to have a better background in the fundamentals of physical science than is available in the regular program.

There are five required courses:
- PHYS 115 Mechanics
- PHYS 125 Physics for Engineers
- PHYS 234 Quantum Physics 1
- PHYS 334 Quantum Physics 2
- M E 250 Thermodynamics

A student must additionally take three electives from Group A or three electives from group B, subject to availability and timetable constraints.

Group A
- PHYS 259 Crystallography and X-Ray Diffraction
- PHYS 359 Statistical Mechanics
- PHYS 364 Mathematical Physics 1
- PHYS 365 Mathematical Physics 2
- PHYS 434 Quantum Physics 3
- PHYS 435 Solid State Physics
- PHYS 443 Continuum Mechanics
- PHYS 444 Modern Particle Physics
- PHYS 454 Quantum Physics 4
Group B
PHYS 364 Mathematical Physics 1
PHYS 365 Mathematical Physics 2
PHYS 375 Astrophysics 2
AM 475 Introduction to General Relativity
PHYS 445 Modern Optics
PHYS 476A-Z Special Topics in Astrophysics

The list of courses in Groups A and B will be subject to change from time to time. For further information, contact the Option Co-ordinator.

Option in Computer Engineering
This is a Designated Faculty Option which is available to students in Electrical Engineering and Systems Design Engineering to give greater training in software and to augment digital hardware capabilities. For details of this option students are referred to the Electrical and Computer Engineering and Systems Design Engineering sections of this calendar.

Option in Statistics
The aim of the Statistics Option is to provide the student with a broad background in applied statistics, especially in the areas of multiple regression, quality control, experimental design and applied probability.

There are four required courses:
STAT 231 Statistics (or equivalent, e.g. SY DE 214, M E 202, CH E 022, CIV E 224)
STAT 331 Applied Linear Models (or equivalent, e.g. SY DE 334)
STAT 333 Applied Probability or STAT 430 Experimental Design
STAT 335 Statistical Process Control

Because of the overlap of STAT 335 with STAT 430 and SY DE 214 or ME 202, students who have taken these courses should check with the program advisors for useful alternatives.

A student must take three additional courses from those listed below.
STAT 230 Probability (or equivalent, e.g. SY DE 213)
STAT 332 Sampling
STAT 333 Applied Probability
STAT 371 Stochastic OR Models (SY DE 511 or M SCI 431 may be substituted)
STAT 430 Experimental Design
STAT 431 Applications of Linear Models
STAT 433 Stochastic Processes
STAT 443 Forecasting
CH E 037 Applied Mathematics 2
CH E 041 Introduction to Process Control
CH E 522 Advanced Process Dynamics and Control
CH E 524 Process Control Laboratory
CIV E 342 Transport Principles and Applications
CIV E 343 Traffic Engineering
CIV E 344 Urban Transport Planning
CIV E 375 Water Quality Engineering
CIV E 440 Transport Systems Analysis
CIV E 473 Contaminant Transport
CIV E 486 Hydrology
M E 340 Manufacturing Processes
M SCI 432 Introduction to Production Management
M SCI 452 Decision Making Under Uncertainty
SY DE 372 Pattern Recognition
SY DE 434 Random Process in the Environment
SY DE 533 Conflict Analysis

For further information contact the Option Co-ordinators, Keith W. Hipel – Department of Systems Design Engineering
Clif Young – Department of Statistics and Actuarial Science

Option in Water Resources
This Option is for students interested in the development, management and protection of water resources. Students are prepared for careers with consulting firms or regulatory agencies. They acquire the background to design and evaluate hydraulic structures, pollution control schemes and water management systems. They are also exposed to the social and environmental aspects of use of water resources. A minimum of seven courses is required. However most students in Civil Engineering will probably wish to take more.

There are four required courses:
CIV E 280 (or equivalent) Fluid Mechanics
CIV E 375 Water Quality Engineering
CIV E 381 Hydraulics
CIV E 486 Hydrology

A minimum of three elective courses is required to be taken from the following list, subject to timetable constraints.

Surface Water
CIV E 473 (W) Contaminant Transport
CIV E 483 (W) Design of Urban Water Systems

Treatment
CIV E 472 (F,S) Waste Water Treatment
CH E 032 (W,S) Introductory Biotechnology
CH E 574 (W) Treatment of Aqueous Inorganic Wastes

Groundwater
EARTH 458 (FS) Physical Hydrogeology
EARTH 459 (W) Chemical Hydrogeology
EARTH 358 (W) Environmental Geology

Management
ENV E 320 (W,S) Environmental Resource Management
SY DE 533 (F) Conflict Analysis

Mathematics
CIV E 422 (W) Finite Element Analysis
SY DE 554 (W) Modelling of Continuum Systems
M E 559 (F,S) Finite Element Methods
EARTH 456 (F) Numerical Methods in Geoscience
M E 304 (W,S) Numerical Analysis
SY DE 312 (S) Numerical Analysis and Computer Methods
For further information see the Management Sciences section in this chapter of the calendar or contact the Associate Chair of the Management Sciences Department, who is the Option Co-ordinator.

Option in International Studies in Engineering
The Option in International Studies in Engineering provides an enriched educational program by focusing on the global nature of engineering. It provides a background in the engineering aspects of international trade and a wider appreciation of cultural diversity. It includes work abroad, or study abroad, or both to achieve a result that is not possible in the classroom alone. The Faculty Option will probably require extra academic material on campus, in addition to an overseas experience of work or study or both. It will result in a life-long benefit for those students who are inclined and able to seek enrichment in their education.

The Option consists of academic requirements on the UW campus, together with study terms or work terms, or both, at overseas locations, for at least eight months. To be accepted for the Option designation of International Studies in Engineering, the complete program must be approved by the Co-ordinator of the Option.

- Academic requirements on the UW campus: this component may involve language and cultural studies (history and literature) as part of an integrated program for the individual student.

The subjects that are studied before the overseas experience would normally be related to the language, literature, and culture of the country of destination. The students studied upon return would normally be directed towards integrating the experience into the broader perspective through courses in international economics, history, or politics.

- Study terms, or work terms, or both, in overseas institutions and industries; normally, at least two terms will be spent abroad. In the case of overseas study terms, credit may be transferred to the student's UW program on a course by course basis, as approved by the Department of the student's registration.

Program
1. Designation of the Option requires the approval of the Option Co-ordinator, and normally will be limited to students who maintain at least a 70% average. The requirements of the Option are GEN E 303 (see (3) below), and six other courses as specified in (2), (4) and (5) below. Some of the courses may also count as Complementary Studies Electives at the discretion of the student's home department.

2. Three UW courses will normally be required before leaving for abroad, which normally will not occur before the 3A term is complete. These subjects will be specified according to the country of destination, and will include literature, history, and regional studies, as well as language preparation.

3. The second part of the program is an overseas experience of at least two terms, including study terms or
work terms, or both. An acceptable written report is required, and would earn the equivalent of a course credit towards the requirements of the Option under GEN E 303. The student would register in GEN E 303 in the first academic term upon return, although this does not count towards the normal academic load, nor does it earn credit towards a degree.

4. The final part of the program is at least three UW courses, or the equivalent, from an approved list that complete the requirements of the International Studies Option. These must be approved by the Option Coordinator, and would be directed towards integrating the overseas experience into the broader perspective through courses in international economics, history or politics.

5. There is considerable flexibility permitted in the scheduling of the six courses beyond that outlined in (2) and (4) above. In particular, suitable subjects taken when abroad may be approved by the Option Coordinator for credit towards the course requirement.

For further information regarding this Option, contact the Faculty of Engineering, Exchange Program Office, CPH 1320E.

**Option in Environmental Engineering**

This Option is for students who wish to pursue their education with an emphasis on environmental concerns, assessment of the environmental impact of new or existing products or processes, methods for solving problems resulting from pollution in the air, in the water, or in the earth, and on the management of resources in order to minimize pollution in the environment. This is a Faculty option and includes course material related to all the disciplines but applied specifically to environmental concerns.

The Option consists of a set of five required courses and a two-term project course. The project course will normally be taken in the 4A and 4B academic terms. The courses are:

- ERS 241* Introduction to Environmental and Social Impact Assessment
- BIOL 250+ Ecology
- ENV E 220 Environmental Chemistry and Ecotoxicology
- ENV E 320 Environmental Resource Management
- ENV E 420 Modelling of the Environment
- ENV E 430 Environmental Engineering Project 1
- ENV E 431 Environmental Engineering Project 2

* ERS 241 satisfies the Impact of Technology on Society requirement as part of the Complementary Studies complement of courses required of Engineering students.
+ ENV S 200 is an acceptable equivalent for BIOL 250.

Substitution of other courses, if applicable, require the approval of the Option Coordinator, the Associate Dean of Engineering, Undergraduate Studies. In the case of the project course, use of this course for departmental program requirements will also require the approval of the Associate Chair for Undergraduate Studies of the student’s home department.

**Software Engineering Components**

Software engineering is comprised of several related components. These components involve both the technical aspect of the discipline as well as aspects that link the practitioner to the environment of software development.

The technical component consists of three sub categories: the central concepts of the discipline, the foundations of software engineering, and the applications for which software engineering techniques are to be used. The table below summarizes the technical aspects of software engineering as they relate to Engineering and Mathematics students.

The second component of this discipline is linkage. It is clearly important for the software professional to be able to adapt to the environment often associated with software engineering. As a result of this need, four areas of study have been included in the requirements: Societal Issues, Business Issues, Reasoning Methodologies, and Communications. The first three areas of study can be satisfied by taking courses from the lists of courses in the
Linkage Summary. Communication skills, both written and verbal, are very important aspects of software engineering, and are a significant component of the foundation technical courses as well as some of the linkage courses. Each student will have different needs in this area, and students are encouraged to consider taking courses from the suggested list of Communications courses below.

Technical Summary
The table below summarizes the various technical courses required by the Software Engineering Option.

<table>
<thead>
<tr>
<th>Central Concepts</th>
<th>Basc All Required</th>
<th>Foundations All Required</th>
<th>Applications Two chosen to also meet Degree Requirements</th>
</tr>
</thead>
<tbody>
<tr>
<td>Basc</td>
<td>CS 241</td>
<td>E&amp;CE 451/CS 445</td>
<td>E&amp;CE 428</td>
</tr>
<tr>
<td>E&amp;CE 203</td>
<td>CS 246</td>
<td>E&amp;CE 452/CS 446</td>
<td>E&amp;CE 429</td>
</tr>
<tr>
<td>E&amp;CE 222</td>
<td>CS 340</td>
<td>E&amp;CE 453/CS 447</td>
<td>E&amp;CE 457</td>
</tr>
<tr>
<td>E&amp;CE 233</td>
<td>CS 342</td>
<td>E&amp;CE 458</td>
<td>CS 486</td>
</tr>
<tr>
<td>E&amp;CE 324</td>
<td>CS 351</td>
<td>CS 444</td>
<td>CS 488</td>
</tr>
<tr>
<td>E&amp;CE 354</td>
<td>CS 354</td>
<td>CS 448</td>
<td></td>
</tr>
<tr>
<td>E&amp;CE 380</td>
<td>CS 360</td>
<td></td>
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<tr>
<td>E&amp;CE 390</td>
<td>CS 370</td>
<td></td>
<td></td>
</tr>
<tr>
<td>E&amp;CE 456</td>
<td>CS 448</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Degree requirements must be met. In many cases the Software Engineering Option courses may satisfy some portion of degree requirements.

Linkage Summary
The student must take four courses from the following lists, with at least one course selected from each list. If a student wishes to improve his or her communication skills by taking a course from the Suggested Communication Courses List (or some other communications course that has been approved by the student's undergraduate advisor), then only three linkage courses (one from each list) are required.

<table>
<thead>
<tr>
<th>Linkage Area</th>
<th>Courses</th>
</tr>
</thead>
<tbody>
<tr>
<td>Business Issues</td>
<td>BUS 111, 121, GEN E 452, PERST 200, M SCI 211, 311</td>
</tr>
<tr>
<td>Societal Issues</td>
<td>CS 492, 494, M E 401, GEN E 411, PHIL 207, 215, 315, STV 100, 202, 402</td>
</tr>
<tr>
<td>Reasoning</td>
<td>PHIL 145, 200J, 241, 242, 243, 245</td>
</tr>
<tr>
<td>Methodologies</td>
<td>443, P MATH 330</td>
</tr>
</tbody>
</table>

Suggested Communications Courses
Suggested Communications Courses

Joint Honours Program in Engineering
Engineering does not offer joint honours programs to non-engineering students. However, engineering students may undertake a joint honours program with non-engineering departments.

A joint honours program requires meeting all requirements of both departments. Engineering students who choose a joint honours program in conjunction with another faculty or department may require extra courses. However, often courses required by the other departments can be used to satisfy some of the requirements of the technical electives or complementary studies course groups.

Combined Bachelor's - Master's Program in Engineering
The Faculty of Engineering offers a combined Bachelor's - Master's Program. The program is a response to a number of needs among which are:
- recognition of outstanding students and provision of academic enrichment for them;
- provision of an introduction to the postgraduate milieu for good undergraduate students who might otherwise overlook the opportunity of graduate studies;
- provision of a reasonably firm time horizon for the completion of the MASc program.

This program provides a mechanism for the institution of a quicker route to the MASc degree, for outstanding students, on a Faculty-wide basis. The framework is a minimum requirement and departments may add to, but not delete from the requirements of the program.

GENERAL PRINCIPLES OF COMBINED BACHELOR'S - MASTER'S PROGRAMS
A combined Bachelor's - Master's program is one in which it is deemed academically advantageous to treat the educational process leading through the BASc to the MASc degree as a single continuous integrated whole, while at the same time satisfying the requirements for both degrees. This stands in contradistinction to treatment of the Bachelor's and Master's degree programs each as terminal activities. Such structured programs, starting at the undergraduate level and terminating with a MASc degree in the Faculty of Engineering provide an alternative means, complementary to the existing undergraduate and graduate programs, for the attainment of the MASc degree.

The following are some general conditions that all such combined Bachelor's - Master's degree programs should satisfy:

Engineering
Complementary Studies Requirements
Joint Honours Programs in Engineering
Combined Bachelor's - Master's Program
1. Students who elect to enter and pursue the combined Bachelor's - Master's programs will fulfill the degree requirements of both the BASc program and the MASc program. This implies that:
   - eight terms of full-time registration at the undergraduate level and at least two terms of full-time registration (or equivalent) at the graduate level are mandatory;
   - the graduate program must include at least four (graduate) courses and a thesis, or eight courses and an MASc project.
   - the Co-operative work term requirements of the BASc program must be met.
2. There must be complete freedom of transferability from the combined programs to the regular programs.
3. Admission to the combined program is on the basis of merit, as is continuity in the program. Students who fail to maintain sufficiently high standing will be required to revert to the regular program, or if circumstances so warrant, to withdraw from the University.
4. The culmination of the combined program is the Master's degree; this may be attained either through the completion of a Master's degree project or research thesis.
5. A combined program normally functions on the Co-operative basis.
6. Recruitment into a combined Bachelor's - Master's degree program must have the flexibility to satisfy the requirements of individual students; at the same time it must have coherence – each student’s program must be addressed toward a well-defined area of specialization.

ORGANIZATIONAL STRUCTURE FOR THE COMBINED BACHELOR'S - MASTER'S PROGRAM

Application and Admission
Admission to the combined Bachelor's - Master's degree program is normally restricted to students with a consistently good academic record at the end of the 3A term who would be granted “conditional admission to the MASc program.” The condition to be fulfilled is “satisfactory completion of the requirements of the BASc degree with at least a B average.”

Students who are granted this admission would be notified at the start of the academic term preceding their 6th work term. As in any program culminating in a Master's degree, a Faculty Supervisor is appointed on admission.

Academic and Administrative Responsibility
Although the Supervisor advises students, all course selections and other academic administrative matters concerning each student are subject to the approval of the Department Associate Chair for Undergraduate and Graduate Studies.

Course Programs
The courses chosen by the student (with the advice of the Supervisor and approval of the Associate Chair) in the 4A, 4B, 5A, and 5B terms should form a coherent series which (together with the MASc project or thesis) complete the requirements of the Bachelor's and, ultimately, the Master's degree.

In each of the 4A and 4B terms one course (normally 600 level) should be chosen for credit to the MASc degree. In some departments this course may replace one of the technical electives in each of those terms. Technically, it is necessary for students to register for these courses as “extras” in order to avoid counting them towards the requirements of both degrees.

If a student is proceeding to an MASc with a research thesis, the balance of courses (two courses numbered 500 or above) will normally be taken in the 5A (Fall) term. There will be no course requirement for the 5B (Winter) term.

A student who is proceeding to an MASc with a Master's degree project, would normally select three courses in each of the 5A and 5B terms (with the advice of the Supervisor and approval of the Associate Chair).

Co-operative Work Terms
The combined Bachelor's - Master's program includes two work terms. These may take two forms:

1. “Special” Off-Campus Work Terms
   It is expected that most of the students proceeding to the MASc degree by course work and project will be involved in off-campus work terms. Because of the calibre of these students it should be possible to make special arrangements for significant projects to be completed in these terms, so that they form a coherent pair, and that the students have special supervision in industry. The “work reports” generated on the “special” work terms will form the basis for the MASc project report. The Faculty Supervisor will be expected to maintain liaison with the off-campus organization in which the student works during these terms.

2. “Special” On-Campus Work Terms
   It is expected that most of the students proceeding to the MASc degree with a research thesis will be involved in on-campus work terms. During these work terms they will not be registered students; they may be hired as associate researchers for the purposes of various research grants, without the restriction of student salaries. They may also work as teaching assistants during these terms. This combination can be attractive from the various points of view of available research time, income generation for the student, total research cost from a grant and effective teaching assistantships.

Fourth-Year Projects
All Departments have some requirement or opportunity for projects in the 4A/4B terms. For students in the combined Bachelor's - Master's program these projects may be integrated with their special work term projects as well as their work in 5A and 5B.
Granting of Degrees

The BASc degree will be granted at the normal time i.e. at the Spring Convocation following the 4B term. The program, however, culminates in the MASc, which is normally granted at the Convocation following the 5B term. In some cases, additional time may be required to complete the thesis or project.

Graduate Scholarships

Students in the combined Bachelor's - Master's program may apply for NSERC, OGS, CMHC scholarships, etc. at the same time as their colleagues in the Regular programs. They are also eligible for FOE scholarships during the 5A and 5B terms.

Withdrawal or Failure

Students may remain in the combined Bachelor's - Master's program provided they maintain sufficiently high academic standards. The minimum is a cumulative B average (73% to the end of 4B, 70% thereafter). A student who fails to maintain this standard will be required to withdraw from the combined degree program. In such a case, all courses taken up to the end of 4B, including those originally intended to fulfill part of the Master's degree requirements, will be counted towards the Bachelor's degree program and marks therefrom included in the 4A and 4B averages as appropriate. Should the student have then satisfied the requirements for the BASc degree, it will be granted at the next convocation. Such a student will not be permitted to enter the regular MASc program.

If a student does maintain at least the minimum standard mentioned above, but decides to withdraw voluntarily from the combined Bachelor's - Master's program, the 4A and 4B results will be calculated including the courses originally intended to fulfill part of the Master's degree requirements, and if the requirements for the Bachelor's degree are then satisfied, the BASc will be granted at the next Convocation. Such a student will be allowed, at a later date, to enter the regular MASc program, but the graduate courses taken in the final undergraduate year may not be applied to the Master's degree.

First-Year Engineering Programs

Students enrolling in First-Year Engineering will be registered in one of the following programs:

- Chemical Engineering
- Civil Engineering
- Computer Engineering
- Electrical Engineering
- Environmental Engineering (Chemical Branch)
- Environmental Engineering (Civil Branch)
- Geotechnical Engineering
- Mechanical Engineering
- Systems Design Engineering

Students enrolling in a First-Year Engineering program (other than Systems Design) must register in the courses indicated in the following table.

<table>
<thead>
<tr>
<th>Program</th>
<th>Courses</th>
<th>Term 1A</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chemical</td>
<td>CH E 100</td>
<td>MATH 115</td>
</tr>
<tr>
<td>Civil</td>
<td>GEN E 170</td>
<td>MATH 115</td>
</tr>
<tr>
<td>Computer and Electrical</td>
<td>GEN E 170</td>
<td>MATH 115</td>
</tr>
<tr>
<td>Environmental (Chemical)</td>
<td>ENV E 100</td>
<td>MATH 115</td>
</tr>
<tr>
<td>Environmental (Civil)</td>
<td>GEN E 170</td>
<td>MATH 115</td>
</tr>
<tr>
<td>Geotechnical</td>
<td>GEN E 170</td>
<td>MATH 115</td>
</tr>
<tr>
<td>Chemical</td>
<td>GEN E 121</td>
<td>MATH 118</td>
</tr>
<tr>
<td>Civil</td>
<td>GEN E 121</td>
<td>MATH 118</td>
</tr>
<tr>
<td>Computer and Electrical</td>
<td>E&amp;CE 150</td>
<td>MATH 118</td>
</tr>
<tr>
<td>Environmental (Chemical)</td>
<td>GEN E 121</td>
<td>MATH 118</td>
</tr>
<tr>
<td>Geotechnical</td>
<td>GEN E 121</td>
<td>MATH 118</td>
</tr>
<tr>
<td>Chemical</td>
<td>GEN E 121</td>
<td>MATH 118</td>
</tr>
<tr>
<td>Civil</td>
<td>GEN E 121</td>
<td>MATH 118</td>
</tr>
<tr>
<td>Computer and Electrical</td>
<td>E&amp;CE 100</td>
<td>MATH 118</td>
</tr>
<tr>
<td>Environmental (Chemical)</td>
<td>GEN E 121</td>
<td>MATH 118</td>
</tr>
<tr>
<td>Geotechnical</td>
<td>GEN E 121</td>
<td>MATH 118</td>
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<td>MATH 118</td>
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<tr>
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<td>GEN E 121</td>
<td>MATH 118</td>
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<tr>
<td>Computer and Electrical</td>
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<td>MATH 118</td>
</tr>
<tr>
<td>Civil</td>
<td>GEN E 121</td>
<td>MATH 118</td>
</tr>
</tbody>
</table>

* CSE means Complementary Studies elective
* Stream 4 only
Chemical Engineering

Chemical Engineering is the responsible application of science to develop processes or systems for the economic production and distribution of beneficial materials through the physical, chemical, or biochemical transformation of matter.

Chemical Engineers combine a sound background in fundamental understanding of science and mathematics with highly-developed problem-solving skills to improve existing processes or methods, or to implement new ones. The principles of economic production and distribution differentiate engineering activities from those of science. Chemical engineers will be required for many exciting new developments during the next few decades.

Chemical engineers design, analyse, optimize and control processing operations, or guide others who perform these functions, in industry, government, universities or private practice.

Activity areas include:

Energy: conservation; improved production and use of renewable and non-renewable resources.

Materials: minerals; fertilizers; petrochemicals; biochemicals; processed foods; paints; pulp and paper; polymers; textiles; etc.

Environment: pollution control; recycling; environmental safety and regulations; etc.

People: management functions; group leader, plant manager, research director, president; etc.

In a world faced with growing shortages of non-renewable resources and a finite limit on the amounts of renewable resources, persons wishing to use their talents to optimize the recovery or utilization of matter and energy will find Chemical Engineering a challenging and satisfying career, one which will place them in enviable positions with respect to the availability of employment opportunities.

In recent years, significant numbers of women are entering the engineering profession and this trend is increasing as they become more aware of the career opportunities available. More women now enter Chemical Engineering than any other branch of engineering.

Waterloo offers the student a first-rate opportunity to obtain a sound, relevant background in the discipline of Chemical Engineering. The Department of Chemical Engineering at the University of Waterloo is one of the largest and most active departments in North America. There are over 25 full-time faculty, each of whom specializes in a particular sub-field through research and consulting activities, thereby bringing depth as well as breadth to the instruction and professional development of students.

Chemical Engineering at Waterloo is a co-operative education program and offers many advantages:

- an opportunity through work terms to gain exposure to a variety of job-related experiences within Chemical Engineering
- work term salaries effectively reduce the costs associated with university education
- Waterloo graduates receive favourable recognition from employers for their work term experiences
- work terms can offer an opportunity to travel through a worldwide network of co-op employers
- academic terms become more meaningful and relevant against a background of work term related experience

THE WATERLOO CHEMICAL ENGINEERING CURRICULUM

The main emphasis in the first and second year is on courses in science and mathematics which provide the foundations upon which engineering skills can be built. The upper-year core and elective courses assume and require this background.

Engineering is both a quantitative and an applied discipline, requiring the skill to be able to both set up the mathematical equations which describe a process and then to solve the equations to analyse and predict its behaviour. This requires a strong mathematical ability. Courses in Calculus, Algebra, Computer Science, Differential Equations, and Statistics help develop this ability. More specialized Engineering Mathematics courses extend into the third year.

To perform successfully, the Chemical Engineer must be able to design, analyse, and control processes to produce useful and desirable products from less valuable raw materials in an efficient, economic, and socially responsible way. The knowledge and skills essential for achieving these goals are developed in the core Chemical Engineering courses taken mainly in the third and fourth years (e.g., in fluid mechanics, process flowsheeting, heat and mass transfer, thermodynamics, reactor design, biotechnology, process control, process and equipment design, engineering economics). Most of these courses are a mixture of theory and practice. Detailed computer simulations are used in several courses to reinforce the theoretical principles.

All students in the fourth year do either an individual research or design project, or a group process design project in direct collaboration with one of their professors. Numerous Canadian companies also sponsor projects.

The range of subject matter within Chemical Engineering is much too extensive to be mastered by any one student during the four-year program. Consequently, in the fourth year, a student may select several technical elective courses to further develop her/his understanding of, and ability to use, engineering principles applied to important Canadian industrial sectors.

Many of these electives are grouped within a common specialty theme which is covered in some depth. Students are required to take at least two of the elective theme courses which are described briefly below. The remaining, technical elective requirements can be met by taking additional packages, or approved courses of interest either within the Department or elsewhere in the University.

An important component of the development of a professional engineer, which receives emphasis throughout the
entire four-year curriculum, is frequent practice in learning to communicate technical results clearly, accurately and effectively to others. Written practice is provided in the requirement for co-op work term reports which are graded by faculty. Written and oral report requirements in laboratory and other courses provide additional practice opportunities.

Many courses are common core courses for both the Environmental Engineering and Chemical Engineering students, so there is a significant environmental focus in much of the core Chemical Engineering curriculum.

COMBINED BACHELOR’S - MASTER’S PROGRAM IN CHEMICAL ENGINEERING

Provision is made for outstanding students to pursue a combined Bachelor's - Master's Program. This program provides a quicker route to the MASc degree. Admission is normally granted to qualified students possessing a consistently good cumulative academic record at the end of the 3A term. See "Combined Bachelor's - Master's Program in Engineering" for more details.

AREAS OF SPECIALIZATION AVAILABLE IN CHEMICAL ENGINEERING

Transport Processes
As an extension of the core curriculum, this covers advanced aspects and industrial applications of fluid flow, heat transfer, mass transfer, reaction kinetics and petroleum engineering.

Mathematical Analysis, Statistics and Control
This also deals with the further development of a core area of Chemical Engineering. It involves studies in optimal control, economic and process optimization, simulation, and statistics. Dedicated computer process laboratory and state-of-the-art industrial software systems provide excellent vehicles for learning.

Polymer Science and Engineering
This elective theme has a wide scope, but special emphasis is placed on the physics and physical chemistry of polymers, and on the modifications of polymer structure by physical or chemical means.

Biochemical Engineering (Industrial Biotechnology)
This theme deals with the processing of systems where biochemical phenomena are important. It is concerned with fermentation operations and equipment which manufacture products such as alcoholic beverages, yeasts, antibiotics, therapeutics, vitamins and enzymes, often using genetically-engineered organisms, and with waste treatment and food processing.

Pollution Control Engineering
This elective package presents aspects of industrial waste treatment and pollution abatement techniques which are becoming increasingly important for the proper use of technology in a quality conscious society.

COMPLEMENTARY STUDIES ELECTIVES (CSE’S)

Five one-term courses in non-technical areas (that is, outside the engineering, sciences and mathematics disciplines) plus a core course in engineering economics must be taken. This requirement is organized on a Faculty basis and is detailed elsewhere in this Engineering Chapter. If some Complementary Studies Electives are satisfied by distance education or from other institutions on Letters of Permission, each term's minimum course load must be maintained by substituting an approved "free" elective (technical or non-technical).

OPTIONS AND MINORS

A number of Faculty or University Designated Options available to Engineering students are listed and described elsewhere in this Engineering Chapter. Students who satisfy the option requirements (usually seven or eight courses) will have the appropriate designation shown on their transcript.

Minors are sequences of courses, usually totalling ten, which are arranged in conjunction with another department such as Economics, Biology, Psychology, etc. and lead to an appropriately designated degree. Approval from both Chemical Engineering and the other department is required.

Usually students must take extra courses to complete a Minor or a Designated Option.

Students interested in the Management Sciences Option should review the material described in the Management Sciences section of this Engineering Chapter. Information on sequencing can be found in the Chemical Engineering Undergraduate Office (E1-2509).
# Academic Program

## Term 1A (Fall)
- **CHE 100** Chemical Engineering Concepts 1 (units and mass balances, graphics)
- **CHE 102** Chemistry for Engineers (stoichiometry to kinetics)
- **MATH 115** Linear Algebra for Engineering (formerly MATH 114)
- **MATH 117** Calculus 1 for Engineering (derivatives to applications of integration)
- **PHYS 115** Mechanics (statics, kinematics to angular momentum)

## Term 1B (Winter and Spring)
- **CHE 101** Chemical Engineering Concepts II (units and energy balances)
- **GEN E 121** Digital Computation (computers and Fortran programs)
- **GEN E 123** Electrical Engineering (electricity and circuits)
- **PHYS 125** Mechanics (statics, kinematics to angular momentum)
- **CHEM 028** Organic Chemistry 1
- **CHEM 028L** Organic Chemistry 1 Laboratory
- **MATH 118** Calculus 2 for Engineering (power series, O.D.E.'s and multiple integrals)
- **PHYS 125** Physics for Engineers (oscillations, optics and quantum physics)

## Term 2A (Fall and Winter)
- **CHE 021** Transport Processes 1 (separation processes)
- **CHE 022** Applied Mathematics 1 (statistics)
- **CHE 023** Physical Chemistry 1 (thermodynamics to phase equilibria)
- **CHEM 028** Organic Chemistry 1
- **CHEM 028L** Organic Chemistry 1 Laboratory
- **MATH 217** Calculus 3 for Chemical Engineering (gradients to integral theorems)

## Term 2B (Spring and Fall)
- **CHE 025** Transport Processes 2 (fluid mechanics)
- **CHE 026** Physical Chemistry 2 (thermodynamics to kinetics)
- **ENV E 231** Inorganic Environmental Process Principles
- **MATH 218** Differential Equations (O.D.E.'s and Laplace transforms)
- **CSE XX1** Approved Complementary Studies Elective

## Term 3A (Winter and Spring)
- **CHE 030** Transport Processes 3 (heat transfer)
- **CHE 033** Chemical Engineering Thermodynamics (applications)
- **CHEM 038** Organic Chemistry 2
- **CH E 034** Inorganic Process Principles 2 (electrolysis to corrosion)
- **CSE XX2** Approved Complementary Studies Elective

## Term 3B (Fall and Winter)
- **CHE 035** Transport Processes 4 (mass transfer)
- **CHE 036** Chemical Reaction Engineering (theory of reactor design)
- **CHE 038** Inorganic Process Principles 2 (electrolysis to corrosion)
- **CSE XX3** Approved Complementary Studies Elective

## Term 4A (Spring and Fall)
- **CHE 040** Unit Operations Laboratory (separators and reactors)
- **CHE 041** Introduction to Process Control (transfer fns. to computer control)
- **CHE 043** Individual Research Project begins (optional; followed by CHEM 048 instead of CHEM 047)
- **CHE 044** Engineering Economics (money value to optimal analysis)
- **CHE 045** Process Equipment Sizing and Selection
- **CSE XX4** Approved Complementary Studies Elective

## Term 4B (Winter)
- **CHE 047** Team Design Project (those taking CHE 043 in 4A take CHE 048 instead)
- **CHE 051** Industrial Elective from one area of specialization below
- **CHE 053** Technical elective from one area of specialization below
- **CSE XX5** Approved Complementary Studies Elective

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1. **Transport Processes**
   - **CHE 512** Separation Processes
   - **CHE 514** Fundamentals of Petroleum Production

2. **Mathematical Analysis and Control**
   - **CHE 522** Advanced Process Control
   - **CHE 524** Process Control Laboratory

3. **Polymer Science and Engineering**
   - **CHE 542** Polymerization and Polymer Properties (2 term course credits)

4. **Industrial Biochemical Technology**
   - **CHE 562** Fermentation Engineering
   - **CHE 564** Food Process Engineering

5. **Pollution Control Engineering**
   - **CHE 572** Air Pollution Control
   - **CHE 574** Aqueous Inorganic Wastes

* For 2B, stream 8 students in the Spring 1996 term will take CHEM 036 instead of ENV E 231. They are on the old curriculum (see the 1995-96 Calendar).

† For 3A, stream 4 students in the Spring 1996 term and stream 8 students in the Winter 1997 term will take CHEM 034 (old listing for ENV E 231) instead of CHEM 038. They are on the old curriculum (see the 1995-96 Calendar).

‡ For 3B, stream 8 students in the Fall 1996 term will take CHEM 037 instead of CHEM 031. They are on the old curriculum (see the 1995-96 Calendar).
Civil Engineering

The complex problems and needs of current and future societies have created challenges for Engineering unparalleled in our history. To interpret and satisfy these needs, Civil Engineers currently direct the spending of more than one tenth of Canada's gross national product - more than any other professional group. The Civil Engineer must deal with the human impact of engineering - the social, moral and legal issues - to a far greater degree than ever before.

Historically, Civil Engineering is the oldest branch of engineering and goes back at least 5,000 years to the profession of “master builder” involving pyramids, temples and irrigation projects. Civil Engineering has become an extremely diverse field with opportunities for graduates in many areas of application. Furthermore, the introduction of new electronic data collection methods and the use of microcomputers has revolutionized the practice of Civil Engineering. Consequently, our curriculum is being constantly reviewed in order to produce graduate engineers who can use advanced aids to solve complex problems.

The Civil Engineering program is designed to provide the necessary fundamentals of mathematics and the natural sciences but also provides perspectives from the fields of the social sciences and humanities. The emphasis is on “problem-solving”.

The Department of Civil Engineering at Waterloo is one of the largest in Canada; therefore, elective courses are available in each of the following areas.

Structural Engineering
Deals with the design and construction of all types of structures. Emphasis is placed on a broad foundation in mechanics and behaviour of materials.

Construction Engineering and Management
Courses in this area are intended for students interested in project management, construction materials and construction engineering.

Water and Waste Management Engineering
Addresses water and waste water treatment, surface and ground water pollution and control, solid and hazardous waste management, contaminant transport and behaviour in the environment. Support areas involving aquatic chemistry, computer modelling, simulation and laboratory experimentation as examples are also stressed.

Transportation Engineering
Deals with the planning, design, construction, traffic operation and evaluation of streets, highways, airports, and transit systems. Emphasis is placed on planning, design, operation and evaluation, particularly as related to demands.

Geotechnical Engineering
Familiarizes the student with the engineering properties of soils, the fundamentals of soil mechanics, and the application of geotechnical data and fundamentals to the design of foundation elements, earth-retaining structures, excavations, earth embankments and highway pavements.

Engineering Mechanics
For students with a strong interest in a rigorous study of mechanics, applied mathematics and related fields, leading to an understanding of advanced analysis and serving as a preparation for graduate study in structural engineering, hydraulics, mechanics of solids and fluids, or properties of materials.

Water Resources Engineering
Deals with the planning, management, design and operation of water supply and distribution systems, in flood control and flood hazard mapping, in the hydrologic and hydraulic aspects of environmental issues, and in the application of remotely-sensed data to hydrologic and environmental problems.

Experimental Mechanics
Intended for students with an interest in experimental investigations of the static and dynamic response of structures and machines, and in the development of improved techniques to obtain and analyse experimental data.

Materials
Courses in this area are intended to provide the student interested in structural engineering, mechanics or properties of materials with a background in materials science.

Additional Areas of Study
Alternatively, the student can choose a more general pattern of study involving courses from several topic areas, or a program outside the traditional Civil Engineering field. For instance, with the approval of the Associate Chair for Undergraduate Studies, the student may augment Civil Engineering course programs with elective courses from:

- Public Administration
- Planning
- Management Science
- Business Administration
- Bioengineering
- Environmental Health, and others.

To this end, the Civil Engineering Curriculum has been designed to allow the maximum possible flexibility while still meeting the requirements for the professional degree.

The profession of Civil Engineering is principally involved with the creation, operation and maintenance of structures associated with water resources, transportation, power generation, and a wide range of industrial, commercial and institutional buildings and complexes including whole urban structures. The activities include investigation, planning design, construction and evaluation.

Vocationally, a Civil Engineer may specialize in one of the following areas: biomechanics, solid mechanics, fracture mechanics, elasticity, building structures, bridges, hydrology, hydraulics, sanitation (public health), industrial wastes, water resource structures, irrigation and drainage.
inland waterways, harbours, aerospace, highways (roads and streets), railroads, pipelines, geology, meteorology, soil mechanics, foundations, tunnelling (rock mechanics), surveying and cartography, urban and regional planning and overall project planning. The list is by no means complete. For example, some of our graduates become involved in aquaculture. A Civil Engineering education may also be combined to advantage with another discipline or profession, such as Economics, Law, Medicine or Biology.

The Civil Engineer, regardless of whether he or she is a generalist or a specialist, draws heavily upon the work of the physical and social sciences, other professions and other branches of engineering. Moreover, as engineers have become involved in many interdisciplinary activities over the last decade, the job demarcation between boundaries of engineering has become much less restrictive. Certainly one of the advantages of completing a Civil Engineering program is that it allows professional registration while simultaneously providing a basis for further study and professional development in a large variety of specialized fields.

1. Core Program
   ○ Credit Courses
     CIV E 126 Civil Engineering Concepts
     CIV E 127 Statics
     CIV E 204 Mechanics of Solids 1
     CIV E 205 Mechanics of Solids 2
     CIV E 221 Advanced Calculus
     CIV E 222 Differential Equations
     CIV E 224 Probability and Statistics
     CIV E 253 Geology for Engineers
     CIV E 265 Structure and Properties of Materials
     CIV E 280 Fluid Mechanics and Thermal Sciences
     CIV E 291 Survey Camp
     CIV E 292 Engineering Economics
     CIV E 300 Civil Engineering Project 1
     CIV E 303 Structural Analysis 1
     CIV E 342 Transport Principles and Applications
     CIV E 353 Geotechnical Engineering 1
     CIV E 375 Water Quality Engineering
     CIV E 400 Civil Engineering Project 2
     CIV E 491 Engineering Law
     Plus one of:
     CIV E 313 Structural Concrete Design 1
     CIV E 413 Structural Steel Design
   ○ Non-Credit Courses
     CIV E 298 Civil Engineering Seminars
     CIV E 299 Civil Engineering Seminars
     CIV E 398 Civil Engineering Seminars
     CIV E 399 Civil Engineering Seminars
     CIV E 498 Civil Engineering Seminars
     CIV E 499 Civil Engineering Seminars

Civil Engineering Seminar
   These seminars are designed to enrich the undergraduate program by providing guest lectures, informal lectures, mock trials and films relating to principles, methods and practice of Civil Engineering and the role of the engineer in society.

2. Electives
   Each student is responsible for selecting his or her own program of electives, in keeping with the ultimate career objectives after graduation. The program must satisfy the requirements of the Department of Civil Engineering. This includes having to meet minimum requirements in:
   - Mathematical Foundations
   - Basic Sciences
   - Engineering Sciences
   - Engineering Design
   - Complementary Studies

   ○ Technical Electives*
     Elective courses may be selected from the following list, in accordance with the academic program for the term, and in consultation with the Faculty Advisor.
     A number of elective courses may be taken from the offerings of other departments including Wilfrid Laurier University.
     CIV E 306 Mechanics of Solids 3
     CIV E 313 Structural Concrete Design 2
     CIV E 343 Traffic Engineering
     CIV E 344 Urban Transport Planning
     CIV E 354 Geotechnical Engineering 2
     CIV E 381 Hydraulics
     CIV E 401 Civil Engineering Project 3
     CIV E 403 Structural Analysis 2
     CIV E 404 Structural Analysis 3
     CIV E 405 Structural Dynamics
     CIV E 407 Building Science & Technology
     CIV E 413 Structural Steel Design
     CIV E 414 Structural Concrete Design 2
     CIV E 415 Structural Systems
     CIV E 422 Finite Element Analysis
     CIV E 440 Transport Systems Analysis
     CIV E 442 Pavement Structural Design
     CIV E 454 Geotechnical Engineering 3
     CIV E 460 Orthopaedic-Bioengineering
     CIV E 472 Waste Water Treatment
     CIV E 473 Contaminant Transport
     CIV E 483 Design of Urban Water Systems
     CIV E 486 Hydrology
     CIV E 493 Engineering in the Canadian North
     CIV E 496 Construction Engineering

* With the exception of CIV E 313 and CIV E 413, the offering of these courses is contingent upon sufficient demand and/or available teaching resources.

○ Complementary Studies Electives
   Four elective courses in approved non-technical subjects, must be taken. The marks obtained in these courses will be included in the calculation of term averages. These courses are organized on a Faculty basis and detailed in this Calendar under the section "Complementary Studies in the Faculty of Engineering."
Civil Engineering with an Option in Water Resources

This is a designated Engineering Faculty Option available to Civil Engineering students interested in the development, management and protection of our water resources. Students may choose from the water and waste management elective courses or the water resources engineering elective courses as well as from a list of approved courses from other departments. Students who complete the Option will have both a Water Resources and a Civil Engineering designation on their transcript. The Option is described earlier in this chapter within the "Complementary Studies Requirements for Engineering Students" section.

Civil Engineering with an Option in Management Sciences

This Option provides an understanding of the issues, concepts and techniques related to the management of technology. The Option consists of a sequence of seven courses. A student who wishes to follow the Management Sciences Option must declare his or her intent before starting the 2B term. For further details see the "Engineering Management Sciences" section.

Combined Bachelor's - Master's Program in Engineering

The Faculty of Engineering offers a combined Bachelor's - Master's Program. See "Engineering Combined Bachelor's - Master's Program" section for more details.

Computer Engineering

The Computer Engineering program is controlled and administered by the Department of Electrical and Computer Engineering.

Computer Engineering is a branch of engineering that deals with the design, development and application of computer systems and emphasizes such factors as functions, performance, cost, size, power requirements, reliability, maintainability and societal impact. Intrinsic to Computer Engineering is the concept of design as it applies to all aspects of a computer system (the hardware, the software and the algorithms used) and the application for which it is intended. As with engineers in other disciplines, the goal of computer engineers is implementation, here to build a computer system for an application environment.

The curriculum in Computer Engineering encompasses the study of mathematics, physics and basic electrical engineering and computer science disciplines. This study is complemented by a thorough education in computer hardware and software.

After the Year One program in Engineering, the program in Computer Engineering consists of prescribed core courses in Years Two and Three. In Year Four, the student takes one prescribed technical course and six technical elective courses. These include the possibility of a design or research project.

In addition, there are seven elective courses (one in 2A, 2B, 3A, 3B and three in fourth year). Five of these elec-
The normal recommended program shown below involves a course load (excluding seminars) of five courses (except six in 1B) per term. Laboratory exercises are compulsory where they form part of a course. Departmental permission at the time of registration will be required for departures from the normal load in any one term. The normal rules of the Co-operative program will apply. By special permission the number of Co-operative work terms may be reduced, but a student must complete at least five work terms (including that done in Year One), unless admitted to advanced standing, as defined in the Calendar.

Permission to carry more than the normal load in any one term normally will be given only if the student holds an 80% average or better in the previous term.

The promotion criteria are as laid down in the Faculty rules.

Technical Presentation Proficiency Exam
All students registering in Electrical Engineering or Computer Engineering are required to satisfy the Technical Presentation Proficiency Exam (TPPE) requirement during the 2A term or if admission to the program occurs after 2A, before the end of their first academic term in the program. The details of this requirement are provided during the first year so that the student may prepare a suitable technical presentation during a work term, to be given during the 2A term.

Complementary Studies Electives
Five elective courses must be chosen in addition to the core course M SCI 261 to satisfy the Complementary Studies Program.

AVAILABLE OPTIONS
The normal Computer Engineering program shown has been designed to offer a well-balanced and rewarding education. Students wishing to enrich their education further may elect to take one of the four options available. These options are described below. Students should be aware of the option they may require additional courses, and may constrain the choice of elective courses. An 80% average is required to enter the Mathematics or Physics Option.

Management Sciences Option
This is a sequence of seven courses (see "Option in Management Sciences") designed for those students with an interest in the management of technology. Further details are made available from the department.

The successful completion of these courses results in a designation on the transcript "Option in Management Sciences".

Mathematics Option
This is a sequence of eight courses (see "Option in Mathematics") designed to give students a broad background in either pure or applied mathematics. Further details are available from the department.

Physics Option
This is a sequence of eight courses (see "Option in Physics") designed to give students an enriched background in the fundamentals of physical science. Further details are available from the department.

Software Engineering Option
The Software Engineering Option described under Designated Options in the Faculty of Engineering section is available to Computer Engineering students who have a 70% average. Further information on this Option is available from the Associate Chair or the Option Co-ordinator.

The successful completion of the required courses results in a designation on the transcript "Option in Software Engineering".

Environmental Engineering Option
This is a sequence of five required courses and a two-term project course (see "Option in Environmental Engineering") designed to give students an enriched background in environmental engineering issues.

The successful completion of these courses results in a designation on the transcript "Option in Environmental Engineering."

ACADEMIC PROGRAM
Notes
1. The laboratory hours shown are approximate indications of the average time the student will spend in the laboratory.
2. In the program there are seven elective courses. These are composed of five Complementary Studies Elective (CSE) courses. The two remaining elective courses are to be chosen from the following list of Technical Breadth Electives (TBE): E&CE 221, 261, 332, 362, 370 and 471. In making a selection, all prerequisite constraints must be satisfied. If a prerequisite is required that is not part of the program see the Associate Chair. The selection of Technical Breadth Electives will impact the selection of fourth-year electives. Please see the Associate Chair for suggested combinations.
3. With the approval of the Department in terms 4A and 4B, students may take technical courses offered by other departments. The normal load in fourth year is E&CE 455, three TBE's or CSE's (as described in Note 2 above) and six technical electives. At least four of these technical electives must be from the Electrical and Computer Engineering Department. To be treated
and Computer Engineering Department. To be treated as fourth year technical electives, any courses taken from outside of the department must have a significant engineering component. See the Department for further information.

The 1A term is as described in "First-Year Engineering Programs".

### Term 1B (Winter)

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<td>MATH 118 Calculus 1B</td>
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<td>E&amp;CE 150 Introduction to Computing</td>
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<td>E&amp;CE 100 Fundamentals of Electrical Engineering</td>
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<td>PHYS 125 Physics for Engineers</td>
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<td>M SCI 261 Managerial and Engineering Economics 1</td>
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### Term 2A (Fall)

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<td>E&amp;CE 201 Seminar</td>
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<tr>
<td>MATH 211 (E&amp;CE 205) Advanced Calculus 1 (For Computer Engineers)</td>
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<tr>
<td>E&amp;CE 209 Electronic and Electrical Properties of Materials</td>
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<td>E&amp;CE 223 Digital Circuits and Systems</td>
<td>3</td>
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<td>3*</td>
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<tr>
<td>E&amp;CE 250 Algorithms and Data Structures</td>
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### Term 2B (Spring)

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<td>E&amp;CE 202 Seminar</td>
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<td>E&amp;CE 203 Discrete Mathematics</td>
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<td>E&amp;CE 222 Digital Computers</td>
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<td>E&amp;CE 241 Circuit Analysis and Design</td>
<td>3</td>
<td>1</td>
<td>3*</td>
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<tr>
<td>E&amp;CE 251 Programming Languages and Translators</td>
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### Term 3A (Winter)

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<td>E&amp;CE 316 Introduction to Probability Theory</td>
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<td>E&amp;CE 324 Microprocessor Systems and Interfacing</td>
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<td>E&amp;CE 342 Signals and Systems</td>
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<td>E&amp;CE 354 Real-time Operating Systems</td>
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<td>E&amp;CE 304 Numerical Methods</td>
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<td>E&amp;CE 318 Communication Systems</td>
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<td>E&amp;CE 380 Analog Control Systems</td>
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<td>E&amp;CE 455 Software Engineering</td>
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### Term 4A (Spring)

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<td>E&amp;CE 401 Seminar</td>
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<tr>
<td>E&amp;CE 427 Digital Systems Engineering</td>
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<tr>
<td>TBE or CSE</td>
<td>3</td>
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Two Technical Electives from the following:

- E&CE 411 Digital Communications 1 3 1 -
- E&CE 428 Computer Communications Networks 3 1 -
- E&CE 435 Semiconductor Devices 3 1 -
- E&CE 438 Digital Integrated Circuits 2 1 3*+
- E&CE 446 Linear Systems 3 1 -
- E&CE 457 Applied Artificial Intelligence 3 1 3*+
- E&CE 463 Power Electronics 2 1 3*+
- E&CE 471 Electromagnetic Waves++ 3 1 3*+
- E&CE 481 Design of Digital Control Systems 2 1 3*+
- E&CE 499A Project - - 9

### Term 4B (Winter)

<table>
<thead>
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<tr>
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Four Technical Electives from the following:

- E&CE 309 Introduction to Thermodynamics and Heat Transfer++ 3 1 -
- E&CE 332 Electronic Circuits++ 3 1 3*+
- E&CE 362 Energy Systems and Components 2++ 3 1 3*+
- E&CE 412 Digital Communications 2 3 1 -
- E&CE 413 Digital Signal Processing 3 1 -
- E&CE 428 Computer Structures 3 1 -
- E&CE 436 Design of Integrated Circuits and Devices 2 1 3*+
- E&CE 437 Integrated VLSI Systems 2 1 3*+
- E&CE 439 Analog Integrated Circuits 2 1 3*+
- E&CE 443 Electrical Networks 2 1 -
- E&CE 456 Database Systems 3 1 3*+
- E&CE 464 Insulation and High Voltage Engineering 2 1 3*+
- E&CE 465 Power Systems 3 1 -
- E&CE 473 Microwave Engineering 2 1 3*+
- E&CE 475 Guided Wave Photonics Engineering 3 1 3*+
- E&CE 482 Multivariable Control Systems 2 1 3*+
- E&CE 485 Computer Control Applications 2 1 3*+
- E&CE 486 Robot Dynamics and Control 3 1 3*+
- E&CE 499B Project - - 9

* Indicates laboratory every second or third week, or open lab. See Course Descriptions.
+ If a TBE is chosen, the laboratory and tutorial component will vary.
++ If this course has already been taken as a TBE, it cannot be counted as a TE.
Electrical Engineering

The Electrical Engineering program is controlled and administered by the Department of Electrical and Computer Engineering. Students are divided into two streams, 8 and 4. The 8 stream has a continuous first year, with the first work term in the Spring term, while the 4 stream has a work term in the Winter term, between 1A and 1B.

The curriculum in Electrical Engineering is designed to teach those fundamental physical and engineering sciences which form the basis of the work of electrical engineers. After the Year One program in Engineering, the program in Electrical Engineering consists of prescribed core courses complemented by the technical and Complementary Studies electives.

The normal recommended program shown below involves a course load (excluding seminars) of five courses per term (except six in 1B). Laboratory exercises are compulsory where they form part of a course. Departmental permission will be required for departures from the normal load in any one term.

The normal rules of the Co-operative program will apply. By special permission the number of Co-operative work terms may be reduced, but a student must complete at least five work terms (including that done in Year One), unless admitted to advanced standing, as defined in the Calendar.

Permission to carry more than the normal load in any one term will normally be given only if the student holds an 80% average or better in the previous term.

The promotion criteria are as laid down in the Faculty rules.

**Technical Presentation Proficiency Exam**

All students registering in Electrical Engineering or Computer Engineering are required to satisfy the Technical Presentation Proficiency Exam (TPPE) requirement during the 2A term or if admission to the program occurs after 2A, before the end of their first academic term in the program. The details of this requirement are provided during the first year so that the student may prepare a suitable technical presentation during a work term, to be given during the 2A term.

**Complementary Studies Electives**

Five elective courses must be chosen in addition to the core course M SCI 261 to satisfy the Complementary Studies program.

**AVAILABLE OPTIONS**

The normal Electrical Engineering program shown has been designed to offer a well-balanced and rewarding education. Students wishing to enrich their education further may elect to take one of the six options available. These options are described below. Students should be aware that an option may require additional courses, and may constrain the choice of elective courses. An 80% average is required to enter the Computer Engineering, Mathematics, Physics, or Software Engineering Options.

**Computer Engineering Option**

The aim of the Computer Engineering Option is to provide the Electrical Engineering student with a broad background in software, to augment the student's capabilities in digital hardware, and to provide the opportunity to take some courses in an area of specialization.

The successful completion of these courses results in a designation on the transcript "Option in Computer Engineering".

The option package is comprised of eight courses two of which are extra courses. There are six required courses:

`E&CE 203` Discrete Mathematics Extra

`E&CE 222` Digital Computers Core

`E&CE 223` Digital Circuits and Systems Core

`E&CE 250` Algorithms and Data Structures Core

`E&CE 251` Programming Languages and Translators Extra

`E&CE 354` Real Time Operating Systems Technical

A student must additionally take two courses from the following as a fourth-year technical elective, subject to prerequisite, availability and timetable constraints:

- `CS 360+` Introduction to the Theory of Computing
- `CS 446+` Software Systems Design and Implementation (Antireq: E&CE 455)
- `CS 448` Introduction to Database Management (Antireq: E&CE 456)
- `CS 452+` Real-Time Programming
- `CS 454+` Distributed Systems (Antireq: E&CE 428)
- `CS 457` Queueing Models: Analysis, Simulation and Computer Applications
- `CS 466+` Algorithm Design and Analysis
- `CS 486` Introduction to Artificial Intelligence (Antireq: E&CE 457)
- `CS 488` Introduction to Computer Graphics
- `E&CE 324` Microprocessor Systems and Interfacing
- `E&CE 427` Digital Systems Engineering
- `E&CE 428` Computer Communication Networks
- `E&CE 429` Computer Structures
- `E&CE 455` Software Engineering
- `E&CE 456` Database Systems
- `E&CE 457` Applied Artificial Intelligence
- `SY DE 422` Machine Intelligence (Antireq: E&CE 457)

These courses are part of a different program and as a result students choosing these optional courses may need to do extra work to compensate for different background preparation.

Electrical Engineering students taking the Option in Computer Engineering may not take E&CE 450 Software Systems as a technical elective (see program below).

Students are admitted into the Option at the end of their 2A term. In order to be admitted to the Option, a student must achieve a term average of 80% in the 2A term and in each of E&CE 223 and 250. In order to remain enrolled in the Option, a student must maintain a cumulative average of 80%.
The list of courses will be subject to change from time to time. For further information contact the Option Co-ordinator.

Management Sciences Option
This is a sequence of seven courses (see "Option in Management Sciences") designed for those students with an interest in the management of technology. Further details are made available from the Department.

The successful completion of these courses results in a designation on the transcript "Option in Management Sciences".

Mathematics Option
This is a sequence of eight courses (see "Option in Mathematics") designed to give students a broad background in either pure or applied mathematics. Further details are made available from the Department.

The successful completion of these courses results in a designation on the transcript "Option in Mathematics".

Physics Option
This is a sequence of eight courses (see "Option in Physics") designed to give students an enriched background in the fundamentals of physical science. Further details are made available from the Department.

The successful completion of these courses results in a designation on the transcript "Option in Physics".

Software Engineering Option
The Software Engineering Option described under Designated Options in the Faculty of Engineering section is available to Electrical Engineering students who have an 80% average. Although the Software Engineering Option includes all the Computer Engineering Option requirements, a student will only receive one of the Option designations. Further information on the Option is available from the Associate Chair or the Option Co-ordinator.

The successful completion of the required courses results in a designation on the transcript "Option in Software Engineering".

Environmental Engineering Option
This is a sequence of five required courses and a two-term project course (see "Option in Environmental Engineering") designed to give students an enriched background in environmental engineering issues.

The successful completion of these courses results in a designation on the transcript "Option in Environmental Engineering".

ACADEMIC PROGRAM

Notes
1. With the approval of the Department in terms 4A and 4B, students may take technical courses offered by other departments. The normal requirement in fourth year is E&CE 304, 471, two Complementary Studies Electives, and six technical electives. At least four of these technical electives must be from the Electrical and Computer Engineering Department. To be treated as fourth year technical electives, any courses taken from outside of the Department must have a significant engineering component. See the Department for further information.

2. The laboratory hours shown are approximate indications of the average time the student will spend in the laboratory.

The 1A term is as described in "First-Year Engineering Programs"
Environmental Engineering

Environmental Engineering is a multidisciplinary program involving the Faculties of Engineering, Science, and Environmental Studies. Within the Faculty of Engineering, the program involves the Departments of Chemical Engineering and Civil Engineering. The program is administered by the Environmental Engineering Board which consists of the Dean, the Associate Dean for Undergraduate Studies, faculty members from the above two departments, and representatives from the departments of Systems Design Engineering and Management Sciences, and from the Faculties of Science and Environmental Studies.

The two key foci of the Environmental Engineering Program are the following: the integration of environmental and ecological issues within the planning, design, operation and management of industrial and other technological processes; and the minimization, treatment, remediation and risk assessment aspects of the solid, liquid and gaseous wastes that are associated with living in a modern society. The Environmental Engineering Program has two divisions: a Chemical Engineering Branch and a Civil Engineering Branch. For the Chemical Engineering Branch, primary emphasis is on the first key focus, namely the planning, design, operation and management of industrial and other technological processes. For the Civil Engineering Branch, primary emphasis is on the second key focus, namely the minimization, treatment, remediation and risk assessment aspects of the solid, liquid and gaseous wastes. The "branch approach" permits future extension to other branches of engineering as they apply to the environment, e.g. decision analysis, management, ergonomic issues, occupational health issues, and human factors issues; considerable expertise in these areas already exists in the departments of System Design Engineering and Management Sciences, both being departments within the Faculty of Engineering at Waterloo.

Students will apply to the two branches of the Environmental Engineering separately and, if accepted into one of the branches, will be directly registered in the appropriate program, either the Environmental Engineering Program (Chemical Engineering Branch) or the Environmental Engineering Program (Civil Engineering Branch). For the Environmental Engineering Program (Chemical Engineering Branch), the 'home' department will be the Chemical Engineering department; for the Environmental Engineering Program (Civil Engineering Branch), the 'home' department will be the Civil Engineering Department.

Chemical Engineering Branch
(Control and Process Engineering Theme)

Engineers are facing important challenges with the imperative to protect and improve the environment. These challenges and opportunities will continue to grow in future years. In the past, regulatory action has often been the impetus for technological change. Regulatory agencies and industry are now receptive to a more proactive...
The goal now is to design and operate environmentally compatible, inherently safer and less polluting plants and processes, i.e. to prevent first, rather than to cure later. Chemical engineers with a thorough grounding in environmental issues have a key role to play in this effort.

The Chemical Engineering branch of the Environmental Engineering Program is characterized by a strong and extensive process engineering component. In addition to this element, students will learn aspects of environmental pathways and transport of pollutants, environmental regulations and legal issues, toxicology and ecology. Included in the course of study are the process design, operation and control principles and practices of environmentally and economically important aspects such as industrial wastewater treatment (by both physiochemical and biological means), gas scrubbing for air pollution control, and bioremediation of contaminated soils and waters. With this process engineering focus and ecological understanding, the graduates will be identifiably different from graduates of other undergraduate Environmental Engineering programs in Canada, and probably in North America.

In the long term, the most effective way to reduce environmental degradation and pollution is to stop it from occurring. It is essential to control and operate existing plants and processes so that materials which would degrade the quality of air, water and soil are eliminated or managed. Incorporation of environmental principles and constraints at the planning and design stage of new plants and processes will result in more effective operation and control to minimize pollution. With their process engineering background, graduates from the Environmental Engineering Program (Chemical Engineering Branch) will be ideally suited to address these needs.

Clearly, there is much in common (as well as significant differences) in the education of students in this program and in the Chemical Engineering Program. Therefore, although the education and job markets for graduates in Chemical Engineering and Environmental Engineering are somewhat different, there nonetheless exists a significant overlap in the job markets for the two disciplines. A substantial number of Chemical Engineering graduates and students on co-op work terms are employed in environmentally-related areas. Although a Chemical Engineering degree, perhaps with the Environmental Engineering Option, may be adequate for many of these jobs, for many other jobs, an Environmental Engineering program provides a better mix of skills and in-depth knowledge.

Academic Program
The academic program for the Chemical Engineering Branch of the Environmental Engineering Program is presented in the following table. The Chemical Engineering Branch will be a stream four program.
Civil Engineering Branch (Waste Treatment and Management Theme, Water and Soil Quality Theme, and Environmental Assessment and Modelling Theme)

This branch of the Environmental Engineering Program is characterized by three study areas, the first is in waste treatment, the second involves pathways migration of chemicals in the environment and the third involves environmental assessment and modelling. With the strong emphasis on the principles of pollutant transformation mechanisms within both waste treatment processes and the environment, the program provides depth, yet flexibility, to address a wide-ranging array of environmental engineering concerns.

All human activities result in some degree of impact on the environment; the environmental engineer must be sensitive to achieving a balance between economic development and environmental protection. For example, solid waste management is more than just waste disposal—it is waste generation, waste reduction, energy recovery, and disposal of the residual in an environmentally-acceptable manner. Improving water quality in rivers is more than just monitoring of pollutant levels—it must be translated into such features as watershed planning, reduction of pollutant discharges, and remediation of historical disposal practices. Historically, the client in many engineering tasks was the municipality or a governmental agency; now, in many respects, it is the public-at-large, the taxpayer. Environmental decision-making is becoming increasingly complex. With the depth and flexibility provided by the Waste Treatment and Management Theme, the Water and Soil Quality Theme, and the Environmental Assessment and Modelling Theme, the graduates from the Environmental Engineering Program (Civil Engineering Branch) will have the educational credentials to be important, contributing members to the resolution of these engineering problems.

The proposed program curriculum builds on many courses in the existing Civil Engineering curriculum, particularly in the first two years. In the third and fourth years, the program includes a mix of environmentally-oriented courses from a number of departments within the university and new courses essential to the educational objectives associated with the Waste Treatment and Management Theme, the Water and Soil Quality Theme, and the Environmental Assessment and Modelling Theme.

Academic Program
The academic program for the Civil Engineering Branch of the Environmental Engineering Program is presented in the following table. The Civil Engineering Branch will be a stream four program.

Civil Engineering Branch
Waste Treatment and Management Theme, Water and Soil Quality Theme, and Environmental Assessment and Modelling Theme

<table>
<thead>
<tr>
<th>Term 1A (Fall)</th>
<th>Term 1B (Spring)</th>
<th>Term 2A (Winter)</th>
<th>Term 2B (Fall)</th>
<th>Term 3A (Spring)</th>
</tr>
</thead>
<tbody>
<tr>
<td>CH E 102 Chemistry for Engineers</td>
<td>CIV E 127 Statics</td>
<td>*CIV E 204 Mechanics of Solids 1</td>
<td>*CIV E 222 Differential Equations</td>
<td>ENV E 322 Advanced Mathematics</td>
</tr>
<tr>
<td>ENV E 161 Environmental Engineering Concepts 1</td>
<td>CIV E 291 Survey Camp</td>
<td>*CIV E 221 Advanced Calculus</td>
<td>*CIV E 253 Geology for Engineers</td>
<td>*CIV E 353 Geotechnical Engineering 1</td>
</tr>
<tr>
<td>MATH 115 Linear Algebra for Engineering</td>
<td>GEN E 121 Digital Computation</td>
<td>ENV E 275 Environmental Chemistry</td>
<td>ENV S 200 Field Ecology</td>
<td>CH E 032 Introduction to Biotechnology</td>
</tr>
<tr>
<td>MATH 117 Calculus 1</td>
<td>GEN E 123 Electrical Engineering</td>
<td>CSE 1 Approved Complementary Studies Elective</td>
<td>or</td>
<td>or</td>
</tr>
<tr>
<td>PHYS 115 Mechanics</td>
<td>MATH 119 Calculus 2</td>
<td>Term 1A (Fall)</td>
<td>or</td>
<td>MSCI 452 Decision Making Under Uncertainty</td>
</tr>
<tr>
<td>PHYS 125 Physics for Engineers</td>
<td>PHYS 125 Physics for Engineers</td>
<td>Term 1B (Spring)</td>
<td>or</td>
<td>SY DE 311 Engineering Optimization</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Term 2A (Winter)</td>
<td>or</td>
<td>or</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Term 2B (Fall)</td>
<td>or</td>
<td>EARTH 458 Physical Hydrogeology</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Term 3A (Spring)</td>
<td>or</td>
<td>CSE 3 Approved Complementary Studies Elective</td>
</tr>
</tbody>
</table>
Term 3B (Winter)
*CIV E 381 Hydraulics
CIV E 292 (CSE 4) Engineering Economics
ENV E 320 Environmental Resource Management
ENV E 330 Lab Analysis and Field Sampling Techniques
One Technical Elective from List A

Term 4A (Fall)
ENV E 472 Wastewater Treatment
ENV E 430 Environmental Engineering Project 1
*CIV E 486 Hydrology
CSE 5 Approved Complementary Studies Elective
One Technical Elective from List B

Term 4B (Winter)
ENV E 431 Environmental Engineering Project 2
CIV E 491 (CSE 6) Engineering Law
Three Technical Electives from List A

*Civil Engineering and Environmental Engineering students in the stream are taught jointly in a single class.

Technical Electives
Elective courses may be selected from the following list in accordance with the academic program for the term in consultation with the Faculty Advisor.

List A:
CH E 572 Air Pollution Control
CH E 574 Treatment of Aqueous Inorganic Wastes
CIV E 354 Geotechnical Engineering 2
CIV E 422 Finite Element Analysis
CIV E 454 Geotechnical Engineering 3
CIV E 483 Design of Urban Water Systems
ENV E 473 Contaminant Transport
ENV E 477 Engineering for Solid Waste Management
GEOG 376 Environmental Remote Sensing

List B:
BIOL 454 Environmental Toxicology 1
EARTH 456 Groundwater Modelling
EARTH 458 Physical Hydrogeology
GEOG 358 Water Planning & Management: Strategies and Experiences
M E 469 Dynamics of the Atmospheric Boundary Layer
M E 559 Finite Element Methods
SY DE 533 Conflict Analysis
SY DE 555 Modelling of Continuum Systems
SY DE 575 Image Processing

Geological Engineering

Geological Engineering is an interdisciplinary program involving the Faculties of Engineering and Science and, in particular, the Departments of Civil Engineering and Earth Sciences. The program is administered by the Geological Engineering Board which consists of faculty from both departments.

Geological Engineers study the origins and properties of earth materials, and learn how to predict the behaviour of these materials. This information is used to design structures in or on soil and rock, design mineral extraction processes in mining and petroleum engineering, explore for and protect groundwater sources, plan and design transportation routes, and so on.

Employment opportunities for Geological Engineers are available in the areas of petroleum geology and engineering, mining geology and mine design, building construction, water supply, geophysics, surveying, highway and airport construction, hydrology, coastal engineering and granular materials supply. Geological Engineering graduates with strength in the geotechnical area find their employment activities most closely associated with public works such as site investigation and design studies for tunnels, roads, railroads, air-strips, shorelines, ports, underground storage, and waste disposal facilities. An increasing amount of activity lies in groundwater studies and environmental impact studies, including hydrologic and geotechnical investigations associated with mining development, geomechanical aspects of petroleum recovery, both conventional and unconventional such as tar sands development and in-situ heavy oil extraction.

The demand for the expertise offered by geological engineers is expanding into many of the resource-development areas that will probably continue to play a major role in the Canadian economy for many decades. Also, the geological engineer is in increasing demand for works of a civil nature, such as tunnels, dams, landfills, and aspects of environmental engineering.

Faculty Options
Complete details of designated Options available to engineering students are provided in this Calendar in the Engineering section entitled "Complementary Studies Requirements, Options and Electives". Students who satisfy the Option requirements will have the appropriate designation shown on their transcript.

Geological Engineering with an Option in Water Resources
This is a designated Engineering Faculty Option available through Civil Engineering. Students interested in the Option should see the Co-ordinator for approval and the complete list of approved courses. The Option is described earlier in this chapter within the "Complementary Studies Requirements, Options and Electives" section.
Geological Engineering with an Option In Management Sciences
This Option provides an understanding of the issues, concepts and techniques related to the management of technology. This Option consists of a sequence of seven courses. Students interested in this Option should see the Co-ordinator for approval.

Geological Engineering with an Option in Environmental Engineering
This Option is for students who wish to pursue their education with an emphasis on environmental concerns, assessment of the environmental impact of new or existing products or processes, methods for solving problems resulting from pollution in the air, in the water, or in the earth, and on the management of resources in order to minimize pollution in the environment. This is a Faculty Option and includes course material related to all of the disciplines but applied specifically to environmental concerns. The Option is described earlier in this chapter within the "Complementary Studies Requirements, Options and Electives for Engineering Students" section.

ACADEMIC PROGRAM

Term 1A (Fall)
MATH 115 Linear Algebra for Engineering
MATH 117 Calculus 1 (for Engineering)
CH E 102 Chemistry for Engineers
PHYS 115 Mechanics
GEN E 165 Introduction to Methods of Civil Engineering
GEN E 170 Engineering Graphics

Term 1B (Spring)
MATH 118 Calculus 2 (for Engineering Students)
PHYS 125 Physics for Engineers
GEN E 121 Digital Computation
GEN E 123 Electrical Engineering
GEN E 126 Geological Engineering Concepts
CIV E 127 Statics
CIV E 291 Survey Camp

Term 2A (Winter)
EARTH 221 Geochemistry 1
CIV E 204 Mechanics of Solids 1
CIV E 221 Advanced Calculus
CIV E 224 Probability and Statistics
GEO E 289 Seminar
Complementary Studies Elective (CSE 1)

Term 2B (Fall)
CIV E 222 Differential Equations
CIV E 280 Fluid Mechanics and Thermal Sciences
EARTH 231 Mineralogy
EARTH 235 Stratigraphy
EARTH 260 Applied Geophysics 1
GEO E 299 Seminar
Complementary Studies Elective (CSE 2)

Term 3A (Spring)
ENV E 322 Advanced Mathematics
CIV E 353 Geotechnical Engineering 1
CIV E 375 Water Quality Engineering
EARTH 232 Petrography
EARTH 238 Introductory Structural Geology
*EARTH 390 Methods in Geological Mapping
GEO E 386 Seminar
Complementary Studies Elective (CSE 3)

Term 3B (Winter)
EARTH 438 Engineering Geology
EARTH 433 Introductory Sedimentology
*EARTH 390 Methods in Geological Mapping
CIV E 292 Engineering Economics (CSE 4)
CIV E 354 Geotechnical Engineering 2
CIV E 381 Hydraulics
GEO E 399 Seminar

Term 4A (Fall)
CIV E 491 Engineering Law (CSE 6)
CIV E 492 Rock Mechanics
GEO E 401 Geological Engineering Thesis 2
GEO E 499 Seminar

One technical elective from:
EARTH 427 Crustal Evolution
EARTH 433 Applied Sedimentology
EARTH 435 Advanced Structural Geology
EARTH 459 Chemical Hydrogeology
EARTH 460 Applied Geophysics 2
ENV E 420 Modelling of the Environment
CIV E 454 Geotechnical Engineering 3
CIV E 473 Contaminant Transport
CIV E 493 Engineering in the Canadian North
CH E 514 Fundamentals of Petroleum Production
CH E 552 Extractive Metallurgy
* EARTH 390 Methods in Geological Mapping, is offered the last 2 weeks in April. It may be taken before the 3A term, or after the 3B term.

Notes
1. The availability of some elective courses is contingent upon sufficient demand, scheduling constraints, and teaching resources.
2. Each proposed program of study should be reviewed by the faculty advisor to ensure that it (a) satisfies prescribed minimum requirements with respect to Mathematics, Science, Engineering Science, Engineering Design and Complementary Studies, and (b) satisfies prerequisite requirements.
Management Sciences

The Department of Management Sciences, Faculty of Engineering, was established in 1969 as a graduate department and has subsequently extended its activities to undergraduate programs. The management sciences are concerned with the application of scientific methods in the resolution of complex problems facing management of both private and public sector organizations. The present activities of the department are:

1. the pursuit of advanced research in selected fields of the management sciences;
2. the provision of post-graduate courses of instruction for people who want to achieve high professional qualifications; and
3. the provision of undergraduate courses in the management sciences for students registered in the Faculties of Engineering and Mathematics.

Active faculty engagement in advanced research, as well as experience in professional practice, is considered essential to the development of adequate courses of instruction. The research activities of the faculty members include applied operations research, information systems and the management of technology.

Degrees Conferred
The Department confers degrees only at the graduate level (the MASc and PhD).

The Option in Management Sciences
The Management Sciences Option is available to students in the following departments:
- Chemical Engineering
- Civil Engineering
- Computer Engineering
- Electrical Engineering
- Environmental Engineering
- Geological Engineering
- Mechanical Engineering
- Systems Design Engineering

The Option in Management Sciences is structured to provide an understanding of the issues, concepts and techniques related to managerial problems, particularly those concerned with the management of technology. Students acquire skills which should help widen the scope of their immediate employment. Those taking the Option may advance to the MASc in Management Sciences within three academic terms following the completion of the BASc.

The option consists of seven courses (see course descriptions). F - fall, W - winter, S - spring.

Four required courses or their equivalents:
- M SCI 251 Probability and Statistics (F,W) - equivalents CH E 022, CIV E 224, E&CE 316, M E 202, SY DE 213
- M SCI 261 Managerial and Engineering Economics 1 (W,S) - equivalents CH E 044, CIV E 292, SY DE 231
- one of: M SCI 211 Organizational Behaviour (F,S) - equivalent to PSYCH 338
- or
- M SCI 311 Organizational Design and Technology (F,W)
- M SCI 331 Operations Research 1 (F,W,S) - equivalent to SY DE 311

Plus at least two of the following or equivalents:
- M SCI 452 Decision Making Under Uncertainty (W) - equivalents SY DE 214, SY DE 334
- M SCI 462 Public Cost-Benefit Analysis for Engineers (F)
- M SCI 431 Operations Research 2 (W) - equivalent to SY DE 511
- M SCI 432 Introduction to Production Management (F,W,S)
- one of: M SCI 311 Organizational Design and Technology (F,W)
- or
- M SCI 211 Organizational Behaviour (F,S) - equivalent to PSYCH 338
- M SCI 441 Management of Information Systems (W)

* M SCI 442 Impact of Information Systems on Organizations and Society (W)

The option consists of seven courses (see course descriptions). F - fall, W - winter, S - spring.

the use of these courses can be counted as part of the Complementary Studies requirements.

* This course counts as the requirement for the Impact of Technology on Society (List A)

There are many possible course combinations that could be selected depending on which aspects of the management sciences the student wishes to focus. Students who wish to develop business skills should consider including either ACC 371 or GEN E 452 in their program.

For the designation "Option in Management Sciences" to be shown on the transcript the student must achieve 50% in each course taken in the Option and an overall cumulative average of 60% in these courses.
Mechanical Engineering

The scope of Mechanical Engineering is so wide and its services so universally needed as a basic part of all kinds of engineering work that the mechanical engineer is in demand in all industries. Mechanical engineers are required in the field of power generation, where they deal with steam, diesel or other internal combustion engines, and with hydraulic or gas turbines; in the field of heating, ventilation and refrigeration; in the design, analysis, and production of machines and equipment, for example, safety equipment, material handling equipment, automobiles, locomotives, marine vessels, furnaces, boilers, pressure vessels, heat exchangers, motors, generators and machine tools. They are employed in industries whose function is concerned with manufacturing, steel production, mining, transportation, communications, oil refining, chemical manufacture, paper, sugar, textiles, aerospace, nuclear energy, natural gas production and transmission and construction. The undergraduate program in Mechanical Engineering is designed to provide the student with a firm grasp of the fundamentals of mathematics, physics and engineering as well as to provide some opportunity for specialization in the later years. The degree of B.A.Sc. in Mechanical Engineering is accredited and permits registration as a Professional Engineer in the Association of Professional Engineers in almost any Canadian province upon completion of the work experience requirement and upon passing the Association exams in law and ethics.

The Mechanical Engineering undergraduate program contains a core of basic subjects that must be taken by all students. The first year is virtually common with Civil and Electrical Engineering. The second and third years provide courses in Mechanical Engineering and Electrical Engineering with further development in mathematics and physics. Opportunities for specialization exist during the fourth year, when a choice of elective courses arranged into six different areas of specialization is available. Non-technical (complementary studies) courses are distributed throughout the program but do not appear in all years.

Each student is responsible for selecting their own program of electives, in keeping with the ultimate career objective after graduation. Each term, certain faculty members are designated to give advice to students and to approve their selection. It is anticipated, and indeed of their technical electives from one of the areas of specialization listed below:

Fluid Mechanics and Thermal Engineering

The courses in this area of specialization deal with a broad range of applications of the principles of thermodynamics and fluid mechanics, with emphasis on topics of industrial significance, for example, combustion, energy conversion, internal flows with heat and mass transfer, turbomachinery, and external flows such as plumes in air and effluents in water.

Environmental Fluid Mechanics

This is closely linked with the above area of specialization and involves application of the principles of fluid mechanics and thermodynamics to problems in the natural environment. It is intended for students interested in careers in air and water pollution control, oceanography, and related fields.

Machine Design and Solid Mechanics

The courses offered in this area of specialization range from those which provide the mathematical and physical basis of the subject matter through to those which are largely applied in nature. Subjects treated are: mechanics (including vibrations); theories of elasticity, plasticity and fracture; machine design and design optimization.

Materials Engineering and Processing

This area of specialization consists of a comprehensive series of courses in metallurgy, including heat treatment, casting, welding, cold and hot forming. Nonmetallic materials, including plastics and ceramics, and composites such as fiberglass and sandwich structures are also considered.

Production and Automation

The courses in this area of specialization are designed to provide the student with an understanding of the principles and control of production processes, the application of computers to the manufacturing activity and the organization of production. Topics treated are: automation, metal forming, numerical control of machine tools, application of fluid power and industrial noise control.

Mechanical Engineering Core with an Option in Management Sciences

A student may acquire a B.A.Sc. in Mechanical Engineering with an Option in Management Sciences by completing seven specific Management Sciences courses as electives. Students interested in this Designated Option must carefully plan their choice of complementary studies courses very early in order to ensure that the complementary studies requirements will be met.

1. Core Program (excluding First Year)

   a. Credit Courses

      M E 201 Advanced Calculus
      M E 202 Statistics for Engineers (equivalent to M SCI 251)
      M E 203 Ordinary Differential Equations
      M E 212 Dynamics
      M E 215 Structure and Properties of Materials
      M E 219 Mechanics of Deformable Solids 1
      M E 220 Mechanics of Deformable Solids 2
      M E 250 Thermodynamics 1
      M E 262 Introduction to Microprocessors and Digital Logic
      M E 269 Electromechanical Devices and Power Processing
      M E 304 Numerical Analysis
      M E 305 Partial Differential Equations
      M E 321 Kinematics and Dynamics of Machines
M E 322 Mechanical Design 1
M E 330 Control of Properties of Materials
M E 340 Manufacturing Processes
M E 351 Fluid Mechanics 1
M E 353 Heat Transfer 1
M E 354 Thermodynamics 2
M E 360 Introduction to Control Systems
M E 362 Fluid Mechanics 2

- Non Credit Courses
  M E 200A/B Seminar
  M E 300A/B Seminar
  M E 400A/B Seminar

2. Elective Courses
   - Complementary Studies Electives
     Students entering the program will take Engineering Economics plus five Complementary Studies Electives in total in non-technical subjects. The marks obtained in these courses will be included in the calculation of term averages. These courses are organized on a faculty basis and detailed in this Calendar under the section "Complementary Studies Requirements, Options and Electives for Engineering Students".

- Technical Electives
  Nine technical Elective courses are required in addition to the core courses listed above to fulfill the requirements of the Mechanical Engineering program. In the final year, a project course, M E 482, normally a two-term project course, may be taken as a technical elective in each of the 4A and 4B terms. The project requires the student to demonstrate initiative and assume responsibility. Each student is responsible for selecting their program of electives and project.

  During the term, certain faculty members are designated to give advice to students. A student who has an unusual career goal in mind should discuss choices with one of the designated faculty members, since it is possible to combine courses from different areas of specialization, to take courses from other departments and in some circumstances take graduate-level courses. Students who are contemplating graduate study are particularly urged to discuss their plans with the appropriate faculty member.

  As a guide, typical lists of elective courses for the six areas of specialization within the Department of Mechanical Engineering are given below:

- Fluid Mechanics and Thermal Engineering
  M E 452 Energy Transfer in Buildings
  M E 456 Heat Transfer 2
  M E 459 Energy Conversion
  M E 557 Combustion 1
  M E 559 Finite Element Methods
  M E 563 Turbomachines
  M E 564 Aerodynamics
  M E 565 Gas Dynamics
  M E 566 Fluid Mechanics 3
  M E 568 Noise Analysis and Control
  M E 569 Fluid Mechanics – Design Topics
  M E 580 Basic Tribology

- Environmental Fluid Mechanics
  M E 469 Dynamics of the Atmospheric Boundary Layer
  M E 559 Finite Element Methods
  M E 566 Fluid Mechanics 3
  M E 568 Noise Analysis and Control
  M E 571 Air Pollution 1

- Machine Design and Solid Mechanics
  M E 423 Mechanical Design 2
  M E 435 Industrial Metallurgy
  M E 524 Advanced Dynamics
  M E 525 Mechanical Vibrations in Machines
  M E 527 Mechanics of Deformable Solids 3
  M E 544 Welding
  M E 559 Finite Element Methods
  M E 568 Noise Analysis and Control
  M E 580 Basic Tribology

- Materials Engineering and Processing
  M E 432 Deformation and Fracture of Engineering Materials
  M E 435 Industrial Metallurgy
  M E 527 Mechanics of Deformable Solids 3
  M E 531 Microstructural Changes in Engineering Alloys
  M E 533 Composite Materials
  M E 534 Non-metallic Materials
  M E 541 Deformation Processes
  M E 543 Metal Casting Processes
  M E 544 Welding
  M E 546 Theory of Solid Modelling
  M E 547 Robot Manipulators: Kinematics, Dynamics, Control
  M E 548 Numerical Control of Machine Tools 1
  M E 559 Finite Element Methods
  M E 561 Fluid Power Control Systems
  M E 568 Noise Analysis and Control
  M E 580 Basic Tribology

- Production and Automation
  M E 435 Industrial Metallurgy
  M E 447 Advanced Manufacturing Technologies
  M E 541 Deformation Processes
  M E 542 Machine Tool Analysis
  M E 543 Metal Casting Processes
  M E 544 Welding
  M E 546 Theory of Solid Modelling
  M E 547 Robot Manipulators: Kinematics, Dynamics, Control
  M E 548 Numerical Control of Machine Tools 1
  M E 559 Finite Element Methods
  M E 561 Fluid Power Control Systems
  M E 568 Noise Analysis and Control
  M E 580 Basic Tribology

- Mechanical Engineering Core with Option in Management Sciences
  This Option consists of the following courses in Management Sciences in addition to the core Mechanical Engineering program. For further details, see the section on the Department of Management Sciences.
  1B (W,S) M SCI 261++
  2A (W,F) M SCI 251++(M E 202)
  2A/2B/4A/4B M SCI 331 and M SCI 211* or 311* plus at least two of the following or equivalents:
  M SCI 311* or 211*, M SCI 431, M SCI 432,
  M SCI 441, M SCI 462*; and at most one of the

  - Environmental Fluid Mechanics
    M E 469 Dynamics of the Atmospheric Boundary Layer
    M E 559 Finite Element Methods
    M E 566 Fluid Mechanics 3
    M E 568 Noise Analysis and Control
    M E 571 Air Pollution 1
  - Machine Design and Solid Mechanics
    M E 423 Mechanical Design 2
    M E 435 Industrial Metallurgy
    M E 524 Advanced Dynamics
    M E 525 Mechanical Vibrations in Machines
    M E 527 Mechanics of Deformable Solids 3
    M E 544 Welding
    M E 559 Finite Element Methods
    M E 568 Noise Analysis and Control
    M E 580 Basic Tribology
  - Materials Engineering and Processing
    M E 432 Deformation and Fracture of Engineering Materials
    M E 435 Industrial Metallurgy
    M E 527 Mechanics of Deformable Solids 3
    M E 531 Microstructural Changes in Engineering Alloys
    M E 533 Composite Materials
    M E 534 Non-metallic Materials
    M E 541 Deformation Processes
    M E 543 Metal Casting Processes
    M E 544 Welding
    M E 546 Theory of Solid Modelling
    M E 547 Robot Manipulators: Kinematics, Dynamics, Control
    M E 548 Numerical Control of Machine Tools 1
    M E 559 Finite Element Methods
    M E 561 Fluid Power Control Systems
    M E 568 Noise Analysis and Control
    M E 580 Basic Tribology
  - Production and Automation
    M E 435 Industrial Metallurgy
    M E 447 Advanced Manufacturing Technologies
    M E 541 Deformation Processes
    M E 542 Machine Tool Analysis
    M E 543 Metal Casting Processes
    M E 544 Welding
    M E 546 Theory of Solid Modelling
    M E 547 Robot Manipulators: Kinematics, Dynamics, Control
    M E 548 Numerical Control of Machine Tools 1
    M E 559 Finite Element Methods
    M E 561 Fluid Power Control Systems
    M E 568 Noise Analysis and Control
    M E 580 Basic Tribology
  - Mechanical Engineering Core with Option in Management Sciences
    This Option consists of the following courses in Management Sciences in addition to the core Mechanical Engineering program. For further details, see the section on the Department of Management Sciences.
    1B (W,S) M SCI 261++
    2A (W,F) M SCI 251++(M E 202)
    2A/2B/4A/4B M SCI 331 and M SCI 211* or 311* plus at least two of the following or equivalents:
    M SCI 311* or 211*, M SCI 431, M SCI 432,
    M SCI 441, M SCI 462*; and at most one of the
following: ACC 371*, ECON 201*, GEN E 452*, STAT 335.

++ course is part of the Mechanical Engineering core program
* Complementary Studies course

The Mechanical Engineering curriculum structure is summarized in the following table:

<table>
<thead>
<tr>
<th>Term</th>
<th>Courses</th>
</tr>
</thead>
<tbody>
<tr>
<td>1A (F)</td>
<td>CH E 102, GEN E 163, MATH 117, MATH 115, PHYS 115, GEN E 170</td>
</tr>
<tr>
<td>1B (W,S)</td>
<td>GEN E 121, GEN E 123, MATH 118, M E 126, PHYS 125, M SCI 261</td>
</tr>
<tr>
<td>2A (F,W)</td>
<td>M E 200A, M E 201, M E 202, M E 212, M E 219, M E 269, 1 CSE</td>
</tr>
<tr>
<td>2B (S,F)</td>
<td>M E 200B, M E 203, M E 215, M E 220, M E 250, M E 262, 1 CSE</td>
</tr>
<tr>
<td>3B (F,W)</td>
<td>M E 300B, M E 322, M E 340, M E 353, M E 360, M E 362</td>
</tr>
<tr>
<td>4A (S,F)</td>
<td>M E 400A, 4 TECH ELECT++, 2 CSE</td>
</tr>
<tr>
<td>4B (W)</td>
<td>M E 400B, 5 TECH ELECT++, 1 CSE</td>
</tr>
</tbody>
</table>

++ A project course, M E 482, may be taken in the 4A and 4B terms as a technical elective for each of these terms.

Systems Design Engineering

Effective solutions to problems involving both society and technology must be based on a broad systems point-of-view. Not only must the overall technical factors of these problems be carefully considered, but the economic, social, human and political parameters must be given equally careful attention. When large scale engineering problems are under study, few people can be knowledgeable of the complete span of factors and parameters which must be considered. For these cases, solutions must be arrived at by interdisciplinary teams where each member contributes his or her own special expertise. In order to work effectively on this team, each member needs to be aware of the fundamental systems and design aspects of the problem. The rapid growth and complexity of industry have, indeed, created unusual problems; however, underlying the complexities of modern civilization and technology are similarities which make it possible to approach problems in many diverse fields with essentially the same concepts, theories and techniques. Systems science has emerged as a scientific discipline for quantitative analysis, design and control of large classes of problems in engineering and social sciences.

The Engineering Profession

Systems Design Engineering is a unique engineering discipline which is formally accredited by the Canadian Engineering Accreditation Board (CEAB). With two years of work experience beyond graduation (BASc)1, the Systems Design Engineer may apply for registration as a Professional Engineer. If a Masters degree (MASc)2 in Systems Design is also obtained, only one year of work experience is required before application.

Each province within Canada has its own Professional Engineering Association. The Canadian Engineering Accreditation Board (CEAB) is a national organization that has representation from all of the Provincial Professional Engineering Associations. The CEAB determines what types of courses must be contained in a university engineering program in order for the program to meet the standards of Canadian engineering. The Systems Design Engineering program satisfies the strict standards of the CEAB and is therefore acknowledged as a fully qualified Engineering Program. In fact, the Department of Systems Design Engineering at the University of Waterloo is the only department of its kind in all of Canada.
The Systems Design Engineering program is specifically oriented towards developing graduates who can solve problems lying at the interface of technology and the human environment. Therefore, if you are technically oriented and also have a strong parallel interest in social and human problems, Systems Design Engineering may be the right program for you.

The Department of Systems Design Engineering also offers programs leading to MASc and PhD degrees, and in the past many Systems Design Engineering students have gone on to complete graduate degrees. The faculty members of the Department are involved in a wide spectrum of research activities such as conflict analysis, pattern recognition, ergonomics, computer engineering, and solar energy. Students who also wish to do research in one of these areas may start at the undergraduate level by entering the combined Bachelor's-Master's program at the end of their 3B academic term. In this way they will be able to complete a Master's degree within one year after receiving their Bachelor's degree.

The Systems Design Engineering program is quite challenging. It is not easy to acquire the tools for resolving the problems of complex systems. Moreover, these tools are becoming more and more sophisticated. Thus, the average student in Systems Design Engineering is expected to work at least 50 hours per week as he or she increases in awareness of the theories of human communication, makes progress in the areas of Systems Theory, Human Systems Engineering, and Socio-Economic Systems, and absorbs the implications of the tremendous growth of electronic computing systems.

Further information is available from:
Associate Chair for Undergraduate Studies
Department of Systems Design Engineering
University of Waterloo
Waterloo, Ontario, N2L 3G1
(519) 885-1211, Ext. 5566 or Ext. 2600

High School Liaison Officer
Department of Systems Design Engineering
University of Waterloo
Waterloo, Ontario, N2L 3G1
(519) 885-1211, Ext. 3162 or Ext. 2600

Footnotes
1 BASc Bachelor of Applied Science
2 MASc Master of Applied Science
3 PhD Doctor of Philosophy

Employment Opportunities
Graduates of Systems Design Engineering will find employment opportunities in a number of diverse fields. To some extent, the technical elective area chosen by the student in the third and fourth year determines more specifically what he or she does upon graduation. Some particular types of jobs which Systems Design engineers may be involved with include:
- analysis and optimization of engineering systems
- simulation and advanced computer applications
- process control and instrumentation
- operations research
- development of alternative energy sources
- design of man-machine interface
- control systems design
- socio-economic systems design
- data analysis and pattern recognition
- occupational health and safety
- product design, planning and management
- ergonomics
- resources management
- research and development

These types of professional activities may fall within the domain of one or more engineering disciplines such as chemical, civil (e.g. structural, water resource and transportation systems), electrical (e.g. circuit design and microprocessor applications), mechanical (e.g. energy conversion and design of machines), environmental (e.g. environmental impact assessment and planning), industrial and human engineering.

UNDERGRADUATE CURRICULUM IN SYSTEMS DESIGN ENGINEERING

The Undergraduate program in Systems Design Engineering encompasses a study of the basic skills required for systems analysis, simulation, optimization and design. In particular the first three years of the program are intended to provide each student with a broad background and capability in the areas of:
- applied mathematics
- engineering sciences and systems theory
- socio-economic systems
- human systems engineering
- computer systems and applications

Throughout these three years the student's ability to grasp real engineering problems is enhanced by courses in Systems Design methodology followed by a series of challenging problem-solving experiences in the Systems Design Workshop. It is here that a focus is given to the whole curriculum and the student learns to apply the lecture material, to develop skills in solving problems that cut across the traditional disciplines, and to develop design, planning and organizational abilities.

These first three years of the program are followed by one year in which the problem solving capabilities of the student are applied with emphasis in one particular area of technology. This provides the required background for a future year of advanced study to the MASc degree, or for a rewarding career in industry or government with the Bachelor's degree (BASc).

Complementary Studies Electives
Five courses must be chosen to satisfy the Complementary Studies requirements.
## Systems Design Engineering Undergraduate Core Curriculum (Listed by Terms)

### 1A (Fall)
- SY DE 101 Seminar
- SY DE 111 Calculus 1
- SY DE 121 Digital Computation
- SY DE 161 Introduction to Systems Design Engineering
- SY DE 181 Physics 1 (Statics)
- SY DE 183 Chemistry

### 1B (Spring)
- SY DE 102 Seminar
- SY DE 112 Calculus 2
- SY DE 114 Linear Algebra
- SY DE 142 Introduction to Human Systems
- SY DE 182 Physics 2 (Dynamics)
- SY DE 192 Digital Systems

### 2A (Winter)
- SY DE 201 Seminar
- SY DE 211 Differential Equations
- SY DE 213 Probability
- SY DE 221 Software Design
- SY DE 281 Mechanics of Deformable Solids
- SY DE 283 Physics 3 (Electricity, Magnetism, and Optics)

### 2B (Fall)
- SY DE 202 Seminar
- SY DE 214 Statistics
- SY DE 252 Linear Systems and Signals
- SY DE 282 Fluid Mechanics
- SY DE 292 Circuits, Instrumentation, and Measurements
- One Complementary Studies Elective

### 3A (Spring)
- SY DE 301 Seminar
- SY DE 311 Engineering Optimization
- SY DE 331 Engineering Economics
- SY DE 351 Systems Models 1
- SY DE 361 Introduction to Design
- SY DE 381 Thermodynamics

### 3B (Winter)
- SY DE 302 Seminar
- SY DE 312 Numerical Methods
- SY DE 352 Introduction to Control Systems
- SY DE 362 Systems Design Workshop 1
- One Technical Elective
- One Complementary Studies Elective

### 4A (Fall)
- SY DE 401 Seminar
- SY DE 461 Systems Design Workshop 2
- Two Technical Electives
- Two Complementary Studies Electives

### 4B (Winter)
- SY DE 402 Seminar
- SY DE 462 Systems Design Workshop 3
- Three Technical Electives
- One Complementary Studies Elective

## Technical Electives in Systems Design Engineering

Each undergraduate student in Systems Design Engineering must choose a technical elective package by the 3B term. Additionally, the Faculty of Engineering has approved options in the following areas:
- Computer Engineering
- Environmental Engineering
- International Studies in Engineering
- Management Sciences
- Mathematics
- Physics
- Statistics
- Water Resources

Students who complete the requirements of these designated Options will receive a final academic transcript from the University with a statement that the Option has been successfully completed. Students should refer to the section, “Complementary Studies Requirements, Options and Electives for Engineering students” for further information. Details for Management Sciences and Computer Engineering Options for Systems Design Engineering students are included at the end of this section.

The Department of Systems Design Engineering offers a wide variety of technical elective courses in the third and fourth year. Students are encouraged to design their own elective programs to develop expertise in their particular interest area. Courses may be chosen from other departments as well as from Systems Design Engineering, subject to the approval of the undergraduate advisor.

The Department has identified four technical elective areas within its current offerings. In each area students may want to consider courses from other departments to complement their choices within Systems Design Engineering. Additional information may be obtained from the Undergraduate Associate Chair and faculty advisors.

Six technical and four Complementary Studies Electives are required during the final three terms (3B, 4A and 4B). Students may arrange the sequencing of the elective slots to suit their program. Additional electives may be taken with the approval of the Undergraduate Associate Chair.

Many of the courses within the four departmental technical elective areas can be used as credits towards the various Faculty of Engineering Option programs. Moreover, students may find it possible to arrange their electives in such a way as to complete the requirements for more than one faculty Option as well as a departmental technical elective area. To do this, students with sufficiently high grades are encouraged, subject to approval from the Undergraduate Associate Chair, to supplement their programs through extra courses or courses taken by distance education or at other universities during work terms.

## Human Systems Engineering

The elective package in Human Systems Engineering offers students the opportunity to develop knowledge and skills applicable to the design and analysis of systems that interact closely with human beings. The Department offers a selection of courses in the areas of human factors...
Engineering and ergonomics, occupational safety, and biomedical engineering. Courses in engineering, psychology and physiological modelling provide an overview of human characteristics, abilities, and limits. Application-oriented courses show how this information can be applied in the design of interactive systems, in biomedical and clinical systems, and in the industrial workplace. In addition, students are encouraged to select other courses which complement and strengthen their chosen field of study. These might include courses in statistics and experimental design, perception and pattern recognition, physiology and kinesiology, or psychology. The elective courses in this package are as follows:

**3B (Winter)**
- SY DE 342 Industrial Ergonomics
- SY DE 384 Materials Engineering
- SY DE 444 Biomedical Engineering: Human Function and Its Measurement

**4A (Fall)**
- SY DE 453 Time Domain Models for Physical Systems
- SY DE 543 Engineering Psychology and Human Performance
- SY DE 575 Image Processing

**4B (Winter)**
- SY DE 372 Introduction to Pattern Recognition
- SY DE 442 Occupational and Environmental Systems Safety
- SY DE 444 Biomedical Engineering: Human Function and Its Measurement (if not taken in 3B)
- SY DE 454 Computer Simulation of Systems
- SY DE 548 Design of Human-Machine Systems

**Intelligent Systems**
The Intelligent Systems elective package provides a theoretical and methodological framework for the study of "Information Engineering", an emerging field that includes artificial intelligence, robotics, communication, "smart" machines, and human-computer symbiosis. The systems-oriented approach emphasizes pattern analysis, since the recognition and classification of patterns is central to both human and machine intelligence, as well as finding application in many subfields of engineering. Courses in artificial perception (Image Processing) and artificial reasoning (Machine Intelligence) provide focused views in key application areas. The intelligent systems field provides one of the richest environments in which to acquire the familiarity with algorithms and data structures essential for disciplined software system design. Elective courses in this package are as follows:

**3B (Winter)**
- SY DE 324 Data Structures and Algorithms
- SY DE 372 Introduction to Pattern Recognition

**4A (Fall)**
- SY DE 423 Computer Algorithm Design and Analysis
- SY DE 453 Time Domain Models for Physical Systems
- SY DE 511 Optimization Methods for Stochastic Systems
- SY DE 513 Linear Graph Theory and Application
- SY DE 543 Engineering Psychology and Human Performance
- SY DE 575 Image Processing

**4B (Winter)**
- SY DE 422 Machine Intelligence
- SY DE 432 Numerical Optimization
- SY DE 434 Random Processes in the Environment
- SY DE 548 Design of Human-Machine Systems

**Societal and Environmental Systems**
When analysing, operating or designing a complex engineering project, a variety of interactions with the natural and social environment must be considered. Within this package are courses which present the methods and techniques for formally studying societal and environmental systems from an engineering perspective. Specifically, the courses are to provide a strong background in probability and statistics, economics, mathematical modelling (deterministic and stochastic) and decision methodologies. Additional experience is gained by doing related workshop projects.

Interested students may wish to include the Designated Faculty Option in Environmental Engineering in their package. The courses in this elective package are:

**2B (Fall)**
- BIOL 250 Ecology
- ERS 241K Introduction to Environmental and Social Impact Assessment*

**3B (Winter)**
- ENV E 220 Environmental Chemistry and Ecotoxicology
- ENV E 320 Environmental Resource Management
- ENV E 420 Modelling of the Environment

**4A (Fall)**
- ERS 241K Introduction to Environmental and Social Impact Assessment*
- SY DE 461 Systems Design Workshop 2 (Core, replaces ENV E 430)**

**4B (Winter)**
- ENV E 320 Environmental Resource Management
- ENV E 420 Modelling of the Environment
- ERS 241K Introduction to Environmental and Social Impact Assessment*
- SY DE 462 Systems Design Workshop 3 (Core, replaces ENV E 431)**
- SY DE 536 Environmental Systems Models

* ERS 241K is a Complementary Studies Elective and satisfies the Faculty's Impact of Technology on Society requirement.
** The workshop topics must meet the Faculty option requirements for ENV E 430/431. Students may also wish to include a significant societal component in their topic proposals.
Students may choose the remaining electives (two technical, four complementary) according to interest, subject to approval of the Undergraduate Advisor.

Alternatively, students may elect to design their own package by selecting an appropriate combination of six technical and five complementary courses from the course calendar. Relevant course headings include Systems Design, Chemical and Civil Engineering, Environmental and Resource Studies, Geography, Sociology, Political Science, Biology, Economics, and Society, Technology and Values. Elective courses in this package include:

**3B (Winter)**
- SY DE 334 Applied Statistics
- SY DE 372 Introduction to Pattern Recognition

**4A (Fall)**
- SY DE 511 Optimization Methods for Stochastic Systems
- SY DE 533 Conflict Analysis
- SY DE 575 Image Processing

**4B (Winter)**
- SY DE 432 Numerical Optimization
- SY DE 434 Random Processes in the Environment
- SY DE 454 Computer Simulation of Systems
- SY DE 536 Environmental Systems Models

**Systems Modelling and Analysis**
The Systems Modelling and Analysis elective package offers the student a selection of elective courses that encompasses the theory, methods and mathematics of engineering systems design. In modern engineering practice, a design engineer is increasingly confronted with complex projects involving a variety of interdisciplinary sub-systems. The engineer must understand the operation of each sub-system, and be able to integrate them together to achieve an efficient and appropriate solution to the overall problem. The Systems Modelling and Analysis elective package introduces modelling and analysis of deterministic and probabilistic systems, as well as discrete and distributed parameter systems. The courses comprising the elective package emphasize analytical as well as computer based methods; the use of currently available computer aided analysis and design packages are encouraged.

The elective package structure is such that the students enrolled in this elective package can take additional courses, possibly from other departments, in order to specialize in any specific engineering discipline and at the same time obtain a strong systems modelling and design foundation. The elective courses for this package are as follows:

**3B (Winter)**
- SY DE 354 Systems Models 2
- SY DE 384 Materials Engineering

**Option in Management Sciences**
This option consists of a mixture of courses, some of which are technical in nature, and some of which qualify as complementary studies courses. It is intended for students interested in the issues, concepts and techniques related to managerial problems, particularly in technologically-based organizations. The courses in the option, in addition to Systems Design Engineering core courses, are:

**2A (Winter)**
- M SCI 211 Organizational Behaviour 1 (Complementary Studies Course)
- PSYCH 338 Organizational Psychology (Complementary Studies Course)

any three of the following:

**3B (Winter)**
- M SCI 311 Organizational Design and Technology (Complementary Studies Course)
- SY DE 334 Applied Statistics

**4A (Fall)**
- M SCI 461 Managerial and Engineering Economics 2 (Complementary Studies Course)
- SY DE 511 Optimization Methods for Stochastic Systems

**4B (Winter)**
- M SCI 441 Management Information Systems (Complementary Studies Course)
- M SCI 432 Introduction to Production Management
Option in Computer Engineering

The aim of this Option is to augment the core curriculum with technical elective courses from the Systems Design Engineering, Electrical and Computer Engineering, and Computer Science departments so that students can acquire a strong background in both hardware and software aspects of computer systems. The focus is on software development, computer interface design and applications.

In addition to the Systems Design core courses which are mandatory for this Option, the following technical electives are required:

3B (Winter)
SY DE 324 Data Structures and Algorithms

4A (Fall)
SY DE 423 Computer Algorithm Design and Analysis

4B (Winter)
E&C 427 Digital Systems Engineering
and three other 300-, 400- or 500-level courses from Systems Design Engineering, Electrical and Computer Engineering, and Computer Science approved by the Computer Engineering Option Advisor in the Department.

Some of these courses are:

CS 354 Operating Systems
CS 442 Principles of Programming Languages
CS 446 Software Systems Design and Implementation
CS 450 Computer Architecture
CS 486 Introduction to Artificial Intelligence (Antireq: SY DE 422)

CS 487 Introduction to Symbolic Computation
E&C 411 Data Communication
E&C 412 Digital Communication
E&C 413 Digital Signal Processing
E&C 428 Computer Communications Networks
SY DE 372 Introduction to Pattern Recognition
SY DE 422 Machine Intelligence (Antireq: CS 486)
SY DE 521 Computer Aided Design
SY DE 575 Image Processing

Information regarding all other faculty approved options is available at the beginning of this chapter.
Faculty of Environmental Studies

Students participating in a field studies course at Presqu'ile Provincial Park Research Station.
Faculty of Environmental Studies

Introduction
The Faculty of Environmental Studies is composed of the Department of Environment and Resource Studies, Department of Geography, School of Architecture and School of Urban and Regional Planning. As a whole and within these units, the Faculty concentrates on using diverse knowledge and methods from different disciplines to understand human relationships with both built and natural environments. The Faculty utilizes the best of traditional teaching methods combined with innovative techniques to explore the many contemporary issues in environmental studies.

Architecture and Urban and Regional Planning are professional schools and, therefore, are vocation oriented. Through the Faculty of Environmental Studies, they are integrated into the mainstream of the University's concern with mankind and the environment, through the two main thrusts of research and practical applications.

The academic departments, Environment and Resource Studies and Geography, have the interaction of people with the environment as their core. Both the Environment and Resource Studies and Geography Departments are interdisciplinary in nature and interact with many fields of study and research from the Arts, Science, Social Sciences, Mathematics, and Engineering.

One of the innovative aspects of the Faculty of Environmental Studies is the high degree of interaction among its four units. Faculty members in each School or Department participate in the programs of the other units. Interaction with other parts of the University is also fostered, and joint appointments of faculty members with other Faculties and Schools/Departments have been made. Students are not only free to, but are encouraged to, choose courses from across the whole University.

Degrees

The Faculty of Environmental Studies offers two undergraduate degrees: a Bachelor of Environmental Studies (BES), and a Bachelor of Architecture (BArch). At the graduate level a Master of Arts (MA) and a Doctoral (PhD) degree may be obtained in both Geography, and Regional Planning and Resource Development. A Master of Environmental Studies (MES) is also available in Geography. A Master of Environmental Studies (MES) may be obtained in Environment and Resource Studies. A Master of Applied Environmental Studies (MAES) in Local Economic Development is offered by the Faculty. In addition, the Environment and Resource Studies and Geography Departments offer Joint Honours programs at the undergraduate level with many other Departments in the University (see programs for other details). Normally, admission to Joint Honours programs will be at the Year Two level.

Environmental Studies

Degrees

Admission

Degrees may be obtained in the following program areas:

- BES Pre-professional Architecture (3-1/3 years on rotating work/study co-operative scheme)
- BArch Professional Architecture (2-2/3 years with co-operative work terms following completion of the BES Pre-professional Architecture)
- BES Honours Environment and Resource Studies (4 years)
- BES Honours Co-operative Environment and Resource Studies (4-2/3 years with rotating work/study terms)
- BES Honours Geography (4 years)
- BES Honours Co-operative Geography (4-2/3 years with rotating work/study terms)
- BES General Geography (3 years)
- BES Honours Urban and Regional Planning (4 years)
- BES Honours Co-operative Urban and Regional Planning (4-1/3 years with rotating work/study terms)
- MA Geography
- MA Regional Planning and Resource Development
- MES Environment and Resource Studies
- MAES Local Economic Development
- MES Geography
- PhD Geography
- PhD Regional Planning and Resource Development

The student should apply to the unit most suited to her/his interests. There is considerable freedom to transfer to other Faculties after Year One, depending upon the student's academic record and program. Ease of transferring between the units of the Faculty of Environmental Studies varies. Transfer to the Department of Environment and Resource Studies and the School of Urban and Regional Planning is not normally permitted above Year Two.

The Faculty has several awards granted to students for meritorious performance, e.g. Dean's Honours List, Alumni Gold Medal, monetary prizes. Further information can be obtained from the office of the Associate Dean, Undergraduate Studies.

Admission

The admission categories, requirements and procedures for all programs are outlined in detail in the "Admissions" section of this Calendar. The following points emphasize some of the admission requirements which relate specifically to programs in the Faculty of Environmental Studies.

Applicants to Environment and Resource Studies, Geography and Planning are required to present an Ontario Academic Course (OAC) credit in English. Geography also requires an OAC Geography.

Because of the increasing use of statistics and quantitative methods in environmental research it is recommended, but not required, that students present at least one Ontario Academic Course credit or equivalent in Mathematics for admission to programs in Environmental
Letters of Permission

For applicants to the School of Architecture, English or Français, Physics, Calculus, Algebra and Geometry (OAC) or equivalent are required. Finite Mathematics is recommended.

Interviews

Students being seriously considered for admission to the School of Architecture are normally required to participate in an interview as part of the admissions process. In addition, a test in the form of a précis will be required of applicants on the day of their scheduled interview. A portfolio of creative work must also be submitted at the time of the interview. Contact the School of Architecture for further details.

Transfer Credit

Generally transfer credit is given for courses in which a grade of 60.0% (C-) or better was obtained. Students transferring from other institutions may have their transferred courses count toward the University of Waterloo degree as determined by the admissions officer of the particular program. Marks obtained in these courses will not be included in the calculation of the student's average.

Students transferring from Faculties within the University, or former University of Waterloo students returning after an absence, generally have the option of either transferring previous UW courses with 60.0% (C-) or better without including these in the cumulative average or transferring all relevant courses passed and including all courses passed and failed in the cumulative average. The specific transfer credit policies vary with each program or Faculty and students are advised to refer to the program or Faculty sections in the Calendar for detailed regulations.

Courses at Other Universities (Letter of Permission)

Students may request to take a course(s) at other universities for credit towards a UW degree by Letter of Permission. A Letter of Permission is granted only to students who have successfully completed a minimum of four University of Waterloo term courses and who are in good standing, that is, they have satisfied the minimum cumulative average requirements for their current program. A maximum total of 10 term courses may be taken on a Letter of Permission basis. Courses taken on a Letter of Permission at other institutions (except Wilfrid Laurier University) will appear on UW records as transfer credits (marks of CR) if a minimum grade of C- (60%) or equivalent is attained. Commencing Fall 1993, courses taken at Wilfrid Laurier University will appear on UW records as graded courses and the grades attained will be included in average and credit calculations.

A Letter of Permission must be approved by the student's advisor prior to enrolling at the host institution and is subject to departmental regulations. You may obtain the necessary form from the Registrar’s Office. More information about the Letter of Permission Policy and Procedures is given on the reverse side of the form.

Environmental Studies

Admission

English Language Proficiency Program

Examinations and Standings

English Language Proficiency Program

The Faculty of Environmental Studies expects that students enrolled in any of its programs should be able to demonstrate competence in writing. Accordingly, all students newly admitted to the Faculty are required to write the English Language Proficiency Examination (ELPE) during their first term of registration (normally scheduled during registration week in September). Effective August 1989, students who have attained a final grade of 80.0% or higher in English OAC 1 (no substitutes) are exempt from writing the ELPE and will be considered to have satisfied the ELPE requirement. Students may demonstrate their competence in writing by achieving a passing grade on this examination. If students are not initially successful in achieving a passing grade on this examination, they will be allowed two additional opportunities, in their first year only, to re-write the exam. If students do not achieve a passing grade on this examination, they must successfully complete the assignments of the University of Waterloo Writing Clinic. The English Language Proficiency Program is recorded on students' academic records as ARTS 000 Y.

The passing grade varies with each academic program. Please contact the Undergraduate Officer for your particular program for further details.

Note

Students who arrange a special sitting of the ELPE outside the scheduled dates will be assessed an administrative charge.

Examinations and Standings

The following regulations govern the practise of the Faculty of Environmental Studies in regard to final examinations, standing, and make-up examinations. These regulations also apply to part-time students and special programs. Further details concerning University Examination Regulations can be found in "Examination Regulations".

A maximum of 13 first-year term courses will be counted towards a BES. For other requirements, see the program section for the Department/School.

Students should note that the Faculty of Environmental Studies operates under a "term course system", except in Architecture, in which student progress is measured by term courses successfully completed rather than by years. A term course is a course with a credit weight of 0.5. Students who have passed fewer than ten term courses will be considered Year One students; those who have passed at least ten but fewer than 20 will be considered Year Two students; those with at least 20 but fewer than 30, Year Three; and those with 30 or more, Year Four.
Final Examinations
1. In all courses each student is required to submit (in such form and at such time as may be determined by the instructor) evidence of satisfactory participation in term work. The marks obtained from work during term are used in part in determining standing. At the discretion of the Chair of the Department or the Director of the School concerned and of the Dean, a student may be barred from the final examination if the course requirements are not completed to the satisfaction of the instructor.

2. Failure to write an examination is ordinarily considered a failure to pass (F-). A student who defaults a final examination, except for a properly certified reason, shall have no make-up examination privileges and may be required to repeat the work in class. If a student fails to write for medical reasons, a Doctor's certificate covering the precise period of absence must be filed in the Registrar's Office within one week of the set examination date.

3. A student will be eligible for make-up examinations only when failure to pass is attributable to extraordinary circumstances. In addition, students:
   - Must have attended a reasonable number of lectures in the course in which they propose to write, and must have satisfied all term work requirements;
   - Must have secured the permission of the professor concerned.

Petitions, Re-assessments and Appeals
A PETITION involves instances where a student seeks relief from normal Faculty or University rules and regulations because of special circumstances normally beyond his or her control such as illness or bereavement. Petition forms are available at departmental offices and the Registrar’s Office. Appropriate supporting documentation must accompany all petitions.

A request for RE-ASSESMENT or a re-read may be initiated by a student who is convinced that the grade received in an examination, essay, or other piece of academic work is unreasonable. The first step in this process is for the student to approach the course instructor and attempt to work the matter out informally. This initial step must take place within four months of the receipt of the grade. If the problem cannot be resolved in this way, the student may submit a Request for a Formal Review to the Faculty’s Associate Dean for Undergraduate Studies. A student who believes that an error in academic judgment or procedure has occurred may initiate an APPEAL. Whenever possible, an informal approach to the person whose judgment is being questioned should precede a formal appeal. Failure to reach a mutually satisfactory solution at the informal level may result in the student submitting a Request for a Formal Review to the Associate Dean for Undergraduate Studies. A formal appeal must be submitted within six months following the action being appealed.

At the informal and formal level students are encouraged to seek advice and assistance from the Undergraduate

Environmental Studies
Examinations and Standing

Associate Dean, Assistant Registrar, University Secretariat and/or the Ombudsperson.

See the Student Grievance Policy (UW Policy #70) for more information.

Submission of Course Material
In situations where a student wishes to submit a body of material to satisfy the requirement of more than one course, the student must notify the instructors of both courses of her/his intention where the courses are concurrent so that they may each decide what is appropriate for their own course.

When one of the courses has been taken in a previous term, the current course instructor must be informed by the student of her/his intention of submitting the same course material. The current instructor has the final decision on the extent to which the material is allowed.

Failure of a student to comply with the above regulation constitutes an academic offence.

Standing
1. Standing in an individual subject is determined by combining the marks assigned for term work with those obtained in the final examination. For the purpose of grading, the University Grading System described in Chapter 1 will be used. The letter grade system is used in the calculation of averages in the Faculty of Environmental Studies. The assigned letter grade is given a numerical common weighting factor as per the table in "Grading System". The credit weighting of courses is also taken into consideration in average calculations.

2. Except in Architecture, all courses taken from May 1984 to the present whether passed or failed are included in the cumulative overall and major averages except for repeated courses in which case only the latest course attempt and grade are included. The first grade will, however, remain on the student's record. Students (except those in the School of Architecture) should note that their major average is determined by the cumulative average of grades assigned for all courses taken in the student's major program including those with the Environmental Studies (ENV S) designation. In Architecture, ENV S courses are included in the overall average calculations.

3. Students receiving an incomplete (INC), or no mark received (NMR) standing in any course will be allowed four months from the completion date of the course to clear such standings. Any such standings not cleared within this period will automatically be converted to a grade of F-. In the School of Urban and Regional Planning, this grade cannot be changed without a student appeal to the School. The mark of “IP” or "In Progress" may be assigned temporarily to the first half of what is essentially a year course which is listed as two term courses (i.e. PLAN 400A and 400B). The mark indicates that the course is "In Progress" and that when completed, a final grade will be assigned to both the ‘A’ and ‘B’ halves of the course (usually the same
Full-time students may be enrolled for additional or fewer courses than the normal course load as required in each program only after obtaining the approval of the appropriate Undergraduate Officer.

Even while otherwise in good standing, a student who fails more than four term courses or the equivalent over the academic year or who, in the opinion of the School or Departmental Promotions Committee, is deemed not to be profiting from university studies may be required to withdraw regardless of her/his cumulative average.

If a student receives a "Required to Withdraw" or a "May Not Proceed" decision, he or she must withdraw from that program for two academic terms; that student is entitled to apply to any other program; if the reasons for withdrawal include disciplinary problems, a statement will be placed in the student's file.

Generally, students wishing to graduate with a University of Waterloo Bachelor of Environmental Studies (BES) undergraduate degree must spend a minimum of two years or their final year in residence (full-time on campus). Architecture students wishing to graduate with a University of Waterloo BES degree must spend the equivalent of four terms of full-time study in residence including the final two terms. Architecture students wishing to graduate with a University of Waterloo BArch degree must spend the last two terms in residence. This does not preclude special studies approved in advance. Architecture students who choose to undertake alternate studies to the Waterloo 3B term may not graduate with a BES (pre-professional) degree because of the residence requirements. Students who do not have a BES (pre-professional) degree from Waterloo and wish to return to continue studies here in fourth year will be considered as external applicants.

Dean's Honours List
In order to officially recognize students who have attained a consistent high degree of academic excellence during their studies in the Faculty of Environmental Studies, the Faculty awards the distinction of 'Dean's Honours List'. This distinction is awarded to selected students at the completion of each academic term and appears on the Student Examination Report and on the Official Transcript as part of the academic decision. Students who graduate with Dean's Honours List distinction will have it noted on their diploma.

To be eligible for this distinction, students must:

1. have completed a minimum of ten UW courses which count in the cumulative overall average,
2. in Environment and Resource Studies, Geography and Urban and Regional Planning, have a cumulative overall average of 83.0% or higher if admitted in the Fall term 1993 or later. Those admitted prior to Fall 1993 will continue to require a cumulative overall average of 80.0% or above. In Architecture, students must be in the top 5% of the class.
3. have no marks of INC or NMR or failing grades in their last term.
Academic Programs

Students who have not determined the field or subject in which they wish to concentrate should study the Calendar carefully. After examining the suggested departmental program, the student should read the descriptions of individual courses in order to have a more comprehensive idea of what the content of any program would include. Students should consult their High School Guidance Officer, Chair or Undergraduate Officer of any University department, or the Registrar, by letter or in person for additional clarification and information.

The Calendar is designed to enable students to make a wise choice of the programs and courses while at the University of Waterloo. Students are encouraged to consult the Undergraduate Officer of the appropriate School or Department. The Secondary School Liaison Officer and the Assistant Registrar for Environmental Studies will also respond to written or personal inquiries.

Course and Program Changes

1. Students may add and drop courses before and during the first two weeks of classes in the term in which the courses begin.

2. After the two week period, and before November 1, March 1, and July 1, a student may add courses only with the written permission of the course instructor and the appropriate Undergraduate Officer.

3. After the two week period, and before November 1, March 1, and July 1, a student may drop courses only with the written permission of the course instructor and the appropriate Undergraduate Officer and after demonstrating that such a change is in the student's academic interest.

4. The mark of "IP" or "In Progress" may be assigned to the first half of what is essentially a year course which is listed as two term courses (i.e. GEOG 490A and 490B). The mark indicates that the course is "In Progress" and that when completed, a final grade will be assigned to both the A and B halves of the course (usually the same grade). The mark "IP" will automatically revert to F- after a specified period of time. When the second or B half of such courses is dropped as the result of a schedule change or withdrawal, the first half must also be dropped.

5. A grade of WD (withdraw after the course drop deadline) may be assigned by the Associate Dean, Undergraduate Studies. This grade is used when it is not appropriate to completely remove a course from a student's record and not in the academic interests of the student to continue with the course. The WD grade has no effect on average or credit calculations.

6. Students in the Faculty of Environmental Studies may not register for courses on an audit basis.

7. All schedule changes at any time must be submitted to the designated Department/School office.

8. Students are encouraged not to register for more courses than their programs require unless exceptional circumstances can be demonstrated.

9. Full-time students may reduce their programs below the specified minimum only upon the recommendation of the Undergraduate Officer of the major Department/School.

10. Courses not dropped by the deadlines specified in 3. above will be graded and included in the calculation of the student's average.

Voluntary Withdrawals

Students may voluntarily withdraw from their program of study without incurring academic penalty, provided that the appropriate Notice of Withdrawal form is completed, received and signed by the Undergraduate Officer, no later than: November 1 (Fall Term), March 1 (Winter Term), July 1 (Spring Term). After these deadlines, students who withdraw will normally be held responsible for the term's courses in the sense that such courses will be recorded with a grade of "NMR" and subsequently will be recorded as failures. Students who voluntarily withdraw prior to or during the full refund period will not have the term recorded on their academic record. Students who voluntarily withdraw from their studies after the first three weeks of classes and before the above deadlines, will have their transcripts with the statement "Voluntary Withdrawal from Term (effective date) – No Academic Penalty". Students who voluntarily withdraw may be eligible for tuition fee and residence refunds depending on the effective date of withdrawal. See "Withdrawals" for details.

Minors

Students may concentrate study in an associated field to the extent it becomes a Minor (typically ten term courses; consult the Minor requirements for the applicable program) within Honours programs in the Faculty of Environmental Studies. A Minor can be in any area such as Anthropology, Canadian Studies, Chemistry, Management Studies, Personnel Studies, Psychology, etc.

Options

Students can elect to take one of the recognized University Options. Consult Interdisciplinary Programs for more information. The Options include:

- Canadian Studies
- Cognitive Science
- Environmental Economics
- Human Resources Management
- International Studies
- Legal Studies
- Liberal Science
- Management Studies
- Middle East Studies
- Peace and Conflict Studies
- Print Journalism
- Russian and East European Studies
- Society, Technology and Values
- Speech Communication
The Environmental Studies Minor consists of ten courses, as follows:

- Two of: ARCH 100, ENV S 200, 201, 220
- Four of: ENV S 320, ENV S 334/REC 334, ENV S 401, 417, ENV S 433/REC 433, ENV S 434/REC 434/ GEOG 367/PLAN 340, ENV S 469, 500

Three other courses offered within the Faculty of Environmental Studies.

The Environmental Studies Minor is not available to students enrolled in the Geography, Environment and Resource Studies and Urban and Regional Planning programs. Architecture students may not take ARCH 100. Architecture students must take the three other courses from within the Faculty but outside Architecture. An overall average of B- in the ten courses will be required. The Associate Dean, Undergraduate Studies may substitute courses if any of the above are not available.

** UW/WLU Business Option**

A Business Option, offered jointly with Wilfrid Laurier University, is available to undergraduates in the Departments of Environment and Resource Studies and Geography and in the School of Urban and Regional Planning. It may not be combined with the Personnel Studies Minor or the Management Studies Minor due to similar coursework.

1. The requirements for the Option are eight term courses (five core and three elective):
   - Five core courses selected from: ACC 121*, BUS 121W or ACC 131/132, BUS 352W, 388W, 454W or HRM 200. *Students with an OAC Accounting are exempted from this course.
   - Three elective courses selected from: ECON 121, any other Economics course (one only), ACC 122, any other Accounting course (one only), SOC 238 or 243 or 340, PSYCH 338 or SOC 242, PSYCH 339 or HRM 300, BUS 206W, 362W, 363W, 385W, 396W, 452W, 458W, 462W, 464W, 465W, 470W, 472W, 481W, 482W.

2. It is recommended that students take an introductory Economics course in the first or second year.

3. All WLU Business courses have BUS 121 as a prerequisite; however, WLU will accept ACC 131/132 as a replacement for BUS 121W. WLU prerequisites do not apply to UW Environmental Studies students enrolled in the Business Option except for BUS 362W (prereq 352W), BUS 462W (prereq 352W) and BUS 398W (prereq 388W).

4. Third- or fourth-year students will be admitted to fourth-year courses with the permission of the instructor.

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4. Third- or fourth-year students will be admitted to fourth-year courses with the permission of the instructor.
School of Architecture

Nature of the Program
Architects organize spaces within and about buildings. They determine the shape a total building will take and how it is to be built. They design, at a large scale, with an awareness of the demands of society. They design in detail with attention to the needs and aspirations of individuals and groups. They show understanding of structural technique, construction detail and the sound use of materials. They determine the way in which the building will be built and supervise the construction process.

Architecture is a vast spread of concerns about people and their surroundings, their history, cultures, resources, disciplines and contradictions. The School’s primary concern is the development of design skills in architecture, and it stresses awareness of cultural background and existing environment.

The five-year academic program in Architecture is intended to prepare the student to become an architect capable of practice within contemporary professional constraints and capable, too, of adaptation to a changing profession and to the society it serves.

The five years of architectural studies are made up of: a Pre-professional, three-year Bachelor of Environmental Studies program followed by a two-year professional program of study for the Bachelor of Architecture degree.

Both programs are on the Co-operative system which consists of alternating periods of academic study and practical work experience.

Degrees
The Pre-Professional Architecture program comprises six academic terms of study and three four-month Co-operative work terms leading to the degree, Bachelor of Environmental Studies (BES Pre-Professional Architecture). This degree, combined with a minimum cumulative average of C- in design theme courses, indicates appropriate preparation for four subsequent academic terms of study and two Co-operative work terms, each of eight months duration, leading to the degree, Bachelor of Architecture (BArch).

BACHELOR OF ENVIRONMENTAL STUDIES
(Pre-Professional Architecture Program)
The BES program provides the foundation studies in architecture, and forms the basis for the subsequent professional program. It aims to educate future architects to an understanding of the beliefs and needs of the individual and of society, and to a willingness to take an active role in creating and improving the environment; to an understanding of materials and techniques at their disposal, and of the principles of related disciplines; to a comprehension of the many forms of creative expression, and to an understanding of the present as part of an historical process.

BACHELOR OF ARCHITECTURE
The BArch program is intended to prepare students to enter into the professional world of architectural practice and discourse. As they advance in the program an increased emphasis is placed on architectural design and theory, students deal with issues of a broader scope, having more flexibility in their topics, and assuming greater independence in their work. There are opportunities to study and work abroad, and to choose from a selection of studies. A special series of courses addresses professional aspects of architecture. The Faculty of Environmental Studies provides architecture students an exceptional computing environment to support their creative design activities.

Theme Areas
In both programs courses are arranged in four main thematic groups:

1. The practice of design and the understanding of its theories and methods.
2. The understanding of cultural forces in the creative world.
3. The understanding of technological and practical aspects of design and construction.
4. The understanding of environmental issues in natural and human ecologies.

Design
The design courses are the primary focus of the program and are informed both directly and indirectly by the knowledge and skills developed in the other theme areas.

Design courses are conducted in the form of studios in which students undertake a series of directed design projects, aimed to illustrate and engage practical, theoretical and artistic issues of architectural conception, and progressively establish expertise and understanding.

The projects range from fundamental design studies of building elements to large scale complexes, through a sequence which includes individual and multiple habitation, design in natural and built environments, development of building programs, studies of principal building types, and urban design. In the final year, theory and design are integrated into a major individual statement, the design thesis.

Culture
Cultural history is a unique element of the architecture program at Waterloo. The courses are concerned with the human imagination and the symbolic forms through which it expresses itself. In the classes students read and write a great deal. They are exposed to works of history, philosophy, literature and the other arts. Architecture is thus conceived as a form of cultural expression and the creative activity of all students takes place against a background of broad humanistic study. The program fosters excellent critical, discursive and expressive abilities which are essential to the quality of the School and its graduates.
## PROGRAM REQUIREMENTS FOR THE DEGREE OF BACHELOR OF ENVIRONMENTAL STUDIES

(Pre-Professional Architecture)

<table>
<thead>
<tr>
<th>Year/Term</th>
<th>Technology Theme Area</th>
<th>Ecology Theme Area</th>
<th>Culture Theme Area</th>
<th>Design Theme Area</th>
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<tbody>
<tr>
<td><strong>1A</strong></td>
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<tr>
<td><strong>Fall</strong></td>
<td>ARCH 124: Introduction to Landscape Design</td>
<td>ARCH 100: An Introduction to Architecture</td>
<td>ARCH 110: Architectural Presentation Media</td>
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<td><strong>Sept.-Dec.</strong></td>
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<td><strong>TOTAL 8 term courses</strong></td>
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<tr>
<td><strong>1B</strong></td>
<td>ARCH 113: Introduction to Computer Usage in Architecture</td>
<td>ARCH 143: Cultural History 2</td>
<td>ARCH 193: Design Studio</td>
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<tr>
<td><strong>Winter</strong></td>
<td>ARCH 163: Statics and Structural Analysis</td>
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<td><strong>Jan.-April</strong></td>
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<td><strong>TOTAL 8 term courses</strong></td>
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<td><strong>Off-Term</strong></td>
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<td><strong>Spring</strong></td>
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<td><strong>May-Aug.</strong></td>
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<tr>
<td><strong>2A</strong></td>
<td>ARCH 262: Strength of Materials</td>
<td>ARCH 246: Cultural History 3: Foundations of Europe</td>
<td>ARCH 292: Design Studio</td>
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<tr>
<td><strong>Fall</strong></td>
<td>ARCH 266: Building Construction 2</td>
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<td><strong>Sept.-Dec.</strong></td>
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<td><strong>TOTAL 8 term courses</strong></td>
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<td><strong>Co-op Work Term 1</strong></td>
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<tr>
<td><strong>Winter</strong></td>
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<tr>
<td><strong>Jan.-April</strong></td>
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<tr>
<td><strong>Co-op Work Term 2</strong></td>
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<td><strong>May-Aug.</strong></td>
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<td>(3 term courses)</td>
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<td><strong>TOTAL 8 term courses</strong></td>
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<tr>
<td><strong>Co-op Work Term 3</strong></td>
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<tr>
<td><strong>Spring</strong></td>
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<tr>
<td><strong>May-Aug.</strong></td>
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<td><strong>3A</strong></td>
<td>ARCH 362: Steel: Design, Structure and Construction</td>
<td>ARCH 392: Design Studio</td>
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<td><strong>Winter</strong></td>
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<td><strong>Jan.-April</strong></td>
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<td><strong>TOTAL 7 term courses</strong></td>
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<td><strong>Co-op Work Term 3</strong></td>
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<td><strong>Spring</strong></td>
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<tr>
<td><strong>May-Aug.</strong></td>
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<tr>
<td><strong>3B</strong></td>
<td>ARCH 363: Concrete: Design, Structure and Construction</td>
<td>ARCH 393: Design Studio</td>
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<tr>
<td><strong>Fall</strong></td>
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<td><strong>Sept.-Dec.</strong></td>
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<td><strong>TOTAL 7 term courses</strong></td>
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<td><strong>TOTAL 46 term courses</strong></td>
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# PROGRAM REQUIREMENTS FOR THE DEGREE OF BACHELOR OF ARCHITECTURE

<table>
<thead>
<tr>
<th>Year/Term</th>
<th>Technology Theme Area</th>
<th>Culture Theme Area</th>
<th>Design Theme Area</th>
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<tbody>
<tr>
<td>Co-op Work Terms 4 &amp; 5 Winter and Spring Jan.-Aug.</td>
<td>After the first degree program (BES) is completed, this period of eight months may serve many objectives, including the choice of travelling and assessing future goals before returning to the School for the second degree program (BArch). Students might also choose to continue the Co-op work term program and obtain experience in design research (by assisting in the development of conceptual designs and schematics, by preparing site plans and details, floor plans, elevations, cross-sections and standard details) and assisting the site architect or construction superintendent.</td>
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<tr>
<td>4A Fall Sept.-Dec. TOTAL 7 term courses</td>
<td>ARCH 348 Italian Renaissance Architecture or ARCH 449 The Development of Modern Italian Architecture or FE</td>
<td>ARCH 446 Italian Urban History or Rome and the Campagna or FE (2)</td>
<td>ARCH 492Z (Rome) Design Studio (4 term courses) or ARCH 492 (Waterloo) Design Studio (4 term courses)</td>
</tr>
<tr>
<td>4B Winter Jan.-April or Spring May-Aug. TOTAL 7 term courses</td>
<td>ARCH 451 (0.25) The Financial Aspects of Architecture or ARCH 452 (0.25) Specifications or See Note 4 below</td>
<td>FE (2)</td>
<td>ARCH 493 Design Studio Options (4 term courses)</td>
</tr>
<tr>
<td>Co-op Work Terms 6 &amp; 7 Winter or Spring, and Fall</td>
<td>This is the last Co-op term of eight months before the final year of study. On the basis of previous experience in a variety of jobs, a student is capable of handling somewhat advanced work in professional offices. Experiences might include: design research, preparation of design schematics and small project design, preparation of site plans and details, development of special details, co-ordination of consultant's work, assisting the site architect on small projects, and assisting the construction superintendent on large projects.</td>
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<tr>
<td>5A Winter Jan.-April TOTAL 7 term courses</td>
<td>See Note 4 below</td>
<td>FE</td>
<td>ARCH 592 Design Studio (6 term courses)</td>
</tr>
<tr>
<td>5B Spring May-Aug. TOTAL 7 term courses</td>
<td>See Note 4 below</td>
<td>ARCH 593 Design Studio (6 term courses)</td>
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<td>TOTAL 28 term courses</td>
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</table>

**Electives**

Students are permitted to study courses given by the University at large which are in the area of the student's individual interest, with the aim of providing better orientation and more interdisciplinary communications.

(FE) Free Elective courses selected by the student without restrictions as long as the course is approved by Senate.

**Notes**

1. Department approval is mandatory for a FE.
2. Students enrolled in 4A in Waterloo are required to take three term courses, approved electives in addition to Architecture studio requirements.
3. Additional term courses obtained during the BES program may not be transferred or applied towards requirements for the BArch degree at any time.
4. ARCH 451, 452, 453, 454 are each half-term courses. All four must be completed for graduation. However, they may be taken in any order during the 4B, 5A, 5B terms. These courses are open to BArch students only. Architecture BES students may not enrol.
technology
The study of the technical aspects of building and design begins with courses in statics, construction and computer applications in architecture. These establish a basis for the main sequence of courses in building materials and methods, structures, the mechanics of environmental control and computing. In the BArch program, courses address specifications, financial and legal aspects and professional practice and management.

Ecology
Architecture has an essential relationship with its context, and can never avoid being part of a larger reality. Understanding those situations, in both the natural and built environment, is a necessary and important part of architectural design. This theme area addresses such questions in courses which range from an introduction to landscape to studies of settlement patterns and the nature of cities.

Note
Students are expected to defray costs of materials in connection with studio projects. There is a $25.00 studio fee for each term.

See Recommended Core Program for course arrangement.

Additional Regulations, Examinations and Promotions
In order to proceed unconditionally from one term to the next in the BES and BArch programs, the student must satisfy each of the following requirements:

1. Maintain a minimum cumulative overall average of C- (60.0%) calculated at the end of each term of study.
2. Pass the studio course.
3. Not fail** more than one half course or equivalent (excluding studio) in any single term.
   A term of study refers to a particular four-month period of registration including the 1N Fall and Winter terms and all "A" and "B" terms.
   A minimum passing grade in any course is D- (50.0%).

While the School reserves the right to make exceptional academic decisions for students who require exceptional consideration, the Promotions Committee will be guided by the following:

- Students who satisfy at least two of the above requirements in a given term may be permitted to continue conditionally in the program as outlined in Notes 1, 2, 3, 4 and 5.
- Promotions decisions for students who satisfy only one of these requirements in any given term will be made on an individual basis by the Promotions Committee.
- Students who satisfy one or none of the above requirements in a given term will normally receive the decision "May not Proceed."
- No supplemental examinations are given by the School of Architecture.

Notes
1. Cumulative Average
Students who fail to maintain the minimum cumulative overall average requirement but who satisfy the other two requirements will receive the academic decision "May not Proceed." At the discretion of the Promotions Committee such students must raise their cumulative average to a minimum of C- (60.0%) by repeating the term or by repeating courses which are detrimental to their average and/or by taking approved elective courses before enrolling in the next higher level core or studio courses. The minimum cumulative average must be attained within the next calendar year. Failing this, the student will be required to withdraw. Failure to maintain the minimum cumulative average of C- (60.0%) by the end of the next higher level term will result in the academic decision "Required to Withdraw."

2. Studio Courses
Students who fail a studio course (ARCH 192, 193, 292, 293, 392, 393, 492, 493, 592, 593) but who satisfy the other requirements will receive the academic decision "May not Proceed." Such students must repeat and pass the studio course. Failure to pass the studio in question on the second attempt will result in the academic decision "Required to Withdraw." Students may not register in any higher level studio course or core courses until the failed studio course is passed. Credit will be retained for courses passed in a term in which a studio course is failed. Students who fail the 4B Winter Studio will not be permitted to register in the 4B Spring Studio during the same calendar year.

3. Elective Courses
Students who fail more than one term elective course or equivalent in any single term (but who pass studio and maintain the minimum cumulative overall average) will receive the academic decision "Proceed on Probation." Failed elective courses or their equivalents must be repeated and passed by the end of the next term of study. Should the student fail more than one half course or equivalent in the next term, the student will receive the academic decision "Required to Withdraw."

4. Core Courses
Students who fail or achieve "Incomplete" status in two or more one-term courses or equivalent in any single term, including the 4A Rome term, and students who accumulate three or more failed or incomplete courses over a period of time (but who pass studio and maintain the minimum cumulative overall average) will receive the academic decision "May not Proceed." The failed core courses or equivalent must be repeated and passed before the student may register in any higher level studio or core courses. Should the student fail two or more one-term courses or equivalent in the next term, the student will receive the academic decision "Required to Withdraw."

5. Conditional Status
Notwithstanding the provisions of Notes 1-4, students who have been granted conditional status in a previous term during the course of the BES (Pro-professional) program...
will be required to withdraw if at any subsequent time they fail to meet any one or more of the three basic requirements for unconditional promotion as stated in 1, 2, 3 under "Additional Regulations, Examinations and Promotions."

Similarly, students who have been granted conditional status on one previous occasion during the course of the BArch program will be required to withdraw if at any subsequent time they fail to meet any one or more of the three basic requirements for unconditional promotion stated in 1, 2, 3 under "Additional Regulations, Examinations and Promotions."

6. Incomplete Courses
Students who receive the decision INC in any course must clear the incomplete within four months of the decision or the grade will revert to an F-. To obtain credit for a core or elective course, subsequently, the student must retake and register again for the course (or an approved equivalent). For an elective course, an alternative may be taken.

7. Course Loads
Normally students of the School are permitted to take only one more or one fewer term courses than that prescribed for the particular year and term in which they are registered. Any further addition or reduction to the student's program must be approved by the Undergraduate Officer of the School of Architecture.

8. Appeals
See Faculty procedure.

Co-operative Programs
The Bachelor of Environmental Studies program includes six terms of study, three four-month Co-operative work terms and one "off-term." The subsequent Bachelor of Architecture program consists of four terms of academic study and two Co-operative work terms, of eight months each. The work terms must be pre-approved by the Department of Co-operative Education and Career Services.

Note
The "off-term" in the Bachelor of Environmental Studies Pre-professional program follows the first two terms of study (from September to April) in Year One. Students may use the "off-term" as a vacation period or they may seek temporary employment. Any employment arrangements made for the "off-term" are the student's own responsibility.

The terms are arranged as indicated in "Work/Study Sequence for Architecture".

Objectives of the Work Term
The Co-operative work terms are designed to provide the student with knowledge of present day practice in architecture and to allow him or her to acquire skills essential for the practice of architecture. The School encourages students to acquire a wide range of work experience including international placements.

Work opportunities are available in private architectural firms, construction and development companies, public agencies, corporations, design related enterprises and research institutes. Drafting and computing skills, methods of construction, division of sub-trades, construction supervision, real problem solving, and the disciplines of time and money are some of the specific areas of knowledge normally acquired through Co-op.

At the completion of the work terms the student who has taken full advantage of the opportunities offered will have a thorough understanding of the current methods and procedures used in the design and construction of building, sufficient ability and the maturity and judgment to assume responsibility for any medium-sized building project.

Professional Recognition
The Waterloo School of Architecture was the first school to be formally accredited by the Canadian Architectural Certification Board under its new regulations. The program leading to the BArch degree is thereby recognized as fulfilling the academic requirements for entry into the registration process in any Canadian province.

Graduates wishing to proceed to professional registration in Ontario should contact The Registrar, Ontario Association of Architects, 111 Moatfield Drive, Don Mills, Ontario, M3B 3L6 for information regarding the work experience and other requirements.

Non-Architecture Students
Students not enrolled in the School of Architecture may take any architectural course listed in the recommended core program (depending on availability of space) with the exception of courses in the theme area of Design. Prerequisites indicated in the course descriptions are primarily for Architectural students. For Non-Architectural students, prerequisite evaluation must be carried out by the respective instructors.

Department of Environment and Resource Studies

Nature of the Program
The Department of Environment and Resource Studies offers both an Honours Regular program and an Honours Co-operative program.

These two Honours degree programs are oriented towards study of the many dimensions of human interrelationships with various environments, including natural and managed landscapes, buildings and cities, small groups, communities, and whole societies. Through problem- and issue-oriented inquiry into such complex relationships, along with related study in contributing academic disciplines, ample scope is provided for acquiring a broad-based education, as well as technical knowledge and skills.

The current emphases in research and scholarship among the faculty fall into three major thematic areas:
1. Sustainable Environmental and Resource Systems
2. Environmental and Social Impact Assessment
3. Natural Area Management

Many of the positions held by graduates of the Department can be described by one of these headings.

An even more important goal of the programs offered by the Department is the development of abilities to think and to analyse which are not artificially constrained by conventional boundaries of academic disciplines. The importance of the ability to analyse environmental situations from a broad perspective derives from the recognition that the complex interrelated problems of the contemporary world and of the future will only be resolved through this type of approach. These problems require attention from people who not only have specialized technical abilities, but also have increased perspective, awareness and understanding. They must also have the ability to work effectively in cooperation with others and to take responsibility for the human, social, and environmental implications of the results.

The Environment and Resource Studies programs are flexible and do not concentrate on one technical or pre-professional field to meet specifications for particular jobs. Rather, by presenting a wide range of subjects and problems inherent in the theme of human-environment relationships, the programs allow students to see for themselves what the needs of society are. Through selection of topics for study within required courses, through selection of electives, and through summer work experiences in the Regular program and work-term experiences in the Cooperative program, students can equip themselves for careers which will meet those societal needs.

Some graduates of the Department of Environment and Resource Studies further enhance their qualifications through graduate study.

Graduates holding the BES degree in Environment and Resource Studies have found employment in a range of government agencies in fields such as natural resources management, pollution control, social services planning, and urban affairs as well as with private corporate and consulting firms in the communications industry and environmental design; with other universities as full-time teaching or research personnel; and with community agencies in various social programs. Many also dedicate themselves to considerable voluntary work with environmental and community-based organizations. Others who have graduated from Environment and Resource Studies have gone on to postgraduate work in programs such as urban and metropolitan studies, natural resources administration, regional planning, environmental engineering, law, systems design, teacher training, adult education, and communications studies.

The Department is fortunate in having a multidisciplinary faculty whose formal education and experience range over a number of disciplines in the natural sciences, social sciences and the humanities. They bring to the program qualifications in such fields as agriculture, biology, communications, economics, geography, law, mathematics, physics, political science, and sociology, as well as a variety of experiences in such diverse areas as ecological research, economic studies, urban affairs, technology assessment, and work with international organizations. For the approach used in Environment and Resource Studies, considerable academic innovation has been desirable. Besides lectures and labs, the program emphasizes open-door, personal contact among students and faculty members; student-selected projects and community work; field trips to environments other than lecture halls; team teaching; a regular flow of visitors from outside the University; and workshop instruction to help develop techniques and skills relevant to environmental studies. Students in both the Regular and Co-operative Environment and Resource Studies programs are encouraged to relate aspects of their academic program to summer or work-term employment, involvement with community organizations or other self-generated activity. Students often incorporate this experiential learning into the university-based educational process. For many students a “theme”-oriented program of this kind offers a more satisfying undergraduate education than traditional alternatives.

More information may be obtained from the Undergraduate Officer, Department of Environment and Resource Studies.

BACHELOR OF ENVIRONMENTAL STUDIES (Honours Environment and Resource Studies Program)

The formal admission requirements of the program are listed in the “Admissions” section of this Calendar. Six OAC credits including English are required.

The Faculty of Environmental Studies expects that students enrolled in any of its programs should be able to demonstrate competence in writing. Accordingly, all students newly admitted to the Faculty (except those who have passed OAC 1 English with a final grade of 80% or higher) are required to write the English Language Proficiency Examination during their first term of registration (normally scheduled during registration week in September). The English Language Proficiency Program is recorded on the student’s academic record as Arts 000Y. Because of the necessity of communicating research and project results, both in the program and in careers after graduation, writing skills are particularly important in Environment and Resource Studies.

Applicants who have been out of school for a number of years are considered on the basis of their work experiences, their involvement in environmental activities or interests in environmental studies, as well as their past academic record.

There are 13 required courses in the program. The first-year introductory courses examine major environmental themes from the viewpoints of the natural and social sciences. In the second year, further work in natural ecology and the social sciences, including techniques for investigating environmental questions and experience in conducting a systematic enquiry through the device of small
group projects, helps to introduce other perspectives and themes running through environment and resource studies. Additional course work on research design, methodology, and information or data handling is also required in the second year.

The core requirements for the third and fourth years include an in-depth examination of the development of environmental thought and a two-term independent project course in each year, in which the student, working with an advisor, develops a project proposal and undertakes research. Arrangements to receive extra credit for project work have been provided for those who learn most effectively through undertaking self-directed work under the guidance of faculty and other advisors.

The emphasis given to project-oriented learning within the program reflects the importance attached to having students develop increasingly sophisticated abilities for coping with situations that are inherently complex, value-laden, ambiguous and uncertain. Project-oriented learning provides the occasion to practise skills in problem definition, information and data gathering, analysis and synthesis of material, and presentation of results in a suitable format using the most appropriate communications media. Skills of this nature can be refined, adapted and applied in whatever context or situations students choose during and after their university years. An increasing number of students incorporate work with governmental agencies, community organizations and other groups into projects they select for their third- and fourth-year project assignments and, in a few cases, well-conceived and executed projects have led to employment in a variety of organizations.

Elective courses can be chosen from anywhere in the University and options start from the first year in the program. Faculty will advise on this, but essentially there are five possibilities, as follows:

1. The Honours Regular and Co-operative Programs
   Students take the required core program and whatever sets of elective courses they wish to round out their individual interests and skills.

2. A Joint Honours Degree
   Students can elect to take a Joint Honours degree with another department, which will require fulfilling the core program of a second department as well as Environment and Resource Studies.

3. A Minor
   Students can elect to take a Minor with another department, which requires completion of ten term courses in another department, as designated by that department.

4. An Option
   Students can elect to take one of the recognized Options outside of the Department involving choices among sets of courses all bearing on some theme or field of interest. See, for example, Society, Technology and Values (STV), Canadian Studies, Legal Studies, Management Studies, Peace and Conflict Studies, and other Interdisciplinary Programs. A Business Option, offered jointly with Wilfrid Laurier University, is available; it is described in "Academic Programs" in the calendar. A Parks Option is also available.

In each case students should give careful consideration to their choices in terms of the educational goals and possible careers they may wish to pursue after obtaining a BES degree. They would also do well to seek information and advice on the kind of undergraduate courses favoured by graduate programs in which they may be interested.

The recommended course load is five term courses per term. Each student must have completed 40 term courses or the equivalent to graduate. Of these, 13 are specific required courses. An additional five courses must be selected from ERS and/or ENV S courses, with 22 courses as free electives. A cumulative overall average of 65.0% and a cumulative average of 70.0% in ERS/ENV S courses must be maintained. There are several evaluation techniques used to determine grades.

The Honours Regular Program Requirements

<table>
<thead>
<tr>
<th>Year One</th>
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<tbody>
<tr>
<td>ARTS 000</td>
<td>English Language Proficiency Exam (not a course)</td>
</tr>
<tr>
<td>ENV S 195</td>
<td>Introduction to Environmental Studies</td>
</tr>
<tr>
<td>ERS 100</td>
<td>Issue Analysis and Problem Solving for Environmental Studies 1</td>
</tr>
<tr>
<td>ERS 101</td>
<td>Issue Analysis and Problem Solving for Environmental Studies 2</td>
</tr>
<tr>
<td>ENV S 178</td>
<td>Introduction to Environmental Research Methods</td>
</tr>
<tr>
<td>plus electives for a total of ten term courses</td>
<td></td>
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</tbody>
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<table>
<thead>
<tr>
<th>Year Two</th>
<th></th>
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</thead>
<tbody>
<tr>
<td>ENV S 200</td>
<td>Field Ecology</td>
</tr>
<tr>
<td>ERS 218</td>
<td>Introduction to Sustainable Environmental and Resource Systems</td>
</tr>
<tr>
<td>ERS 285</td>
<td>Greening the Campus</td>
</tr>
<tr>
<td>plus electives for a total of ten term courses</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Year Three</th>
<th></th>
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</thead>
<tbody>
<tr>
<td>ERS 360A</td>
<td>Environmental Research Project</td>
</tr>
<tr>
<td>ERS 390B</td>
<td>Environmental Research Project</td>
</tr>
<tr>
<td>ERS 395</td>
<td>Development of Environmental Thought 1</td>
</tr>
<tr>
<td>plus electives for a total of ten term courses</td>
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</tbody>
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<table>
<thead>
<tr>
<th>Year Four</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>ERS 490A</td>
<td>Senior Honours Project</td>
</tr>
<tr>
<td>ERS 490B</td>
<td>Senior Honours Project</td>
</tr>
<tr>
<td>ERS 496</td>
<td>Development of Environmental Thought 2</td>
</tr>
<tr>
<td>plus electives for a total of ten term courses</td>
<td></td>
</tr>
</tbody>
</table>

Note
Students who transfer to ERS may be granted a maximum of ten term courses advanced standing except where equivalent environmental studies courses have been successfully completed. In these cases, transfer courses may exceed ten, and will be determined by the Undergraduate Officer.
The Honours Co-operative Program Requirements
Terms 1A, 1B, 4A and 4B are the same as Years One and Four respectively of the Regular program. During the Winter term of Year One (1B) interested students may apply to enter the Co-op program. Admission decisions to the program will be made during May-June following 1B. Students will be notified as soon as these decisions are made. In the Fall term (2A) Co-op students will be interviewed for jobs. The first work term will be in the Winter following 2A. A total of four approved work term reports is required for the Honours Co-op degree. The Co-op schedule is as follows:

Terms 1A and 1B
Same as Regular program

Term 2A
ENV S 200 Field Ecology
ERS 218 Introduction to Sustainable Environmental and Resource Systems
ENV S 178 Introduction to Environmental Research Methods

plus electives for a total of five term courses

Term 2B
ERS 285 Greening the Campus
ERS 390A Environmental Research Project
ENV S 200 Field Ecology (when offered)

plus electives for a total of five term courses

Term 3A
ERS 390B Environmental Research Project

plus electives for a total of five term courses

Term 3B
ERS 395 Development of Environmental Thought 1

plus electives for a total of five term courses

Terms 4A and 4B
Same as Regular program

Deviation from this schedule may cause difficulty in satisfying all requirements.

Note
The arrangement of academic and work terms, and further information on Co-operative study generally, are given in Chapter 5 of the Calendar. Students transferring to ERS with 5.0 credits of advanced standing and considering the Co-op program should consult the ERS Admissions Officer or Undergraduate Officer. Only a small number of transfer students (two or three) will be admitted to the ERS Co-op Program each year. These students will be selected from Co-op applicants on the basis of applicants' marks in the first semester of their enrolment in ERS.

Joint Honours Programs
Students may combine Environment and Resource Studies with another academic discipline to earn a Joint Honours degree. Arrangements to do this have been approved with 14 other departments and more are being considered. Students interested in Joint Honours should consult with the Undergraduate Officer.

Minors
Consult "Academic Programs".

Options
Consult "Interdisciplinary Programs".

Department of Geography

Nature of the Program
Geography is concerned with both the natural and human environment, studying how it has been shaped according to human need, how patterns of human activities are structured over space, and how these are influenced by environmental factors.

At the University of Waterloo, we stress the study of environmental change at a variety of scales from local to global. Our courses are highly integrated to encourage the study of the environment from many perspectives. These include the practical application of geographical studies, the role of field work, and the use of computer techniques such as model building, geographical information systems and digital remote sensing.

Geography is considered both a natural and social science and flourishes in an academic organization where the multi-disciplinary approach is emphasized. The Bachelor of Environmental Studies (BES) programs in Geography (Honours and General) provide students with considerable freedom to choose supporting electives from any department in the University. Students can develop programs to suit their particular interests. Joint Honours programs with a number of other departments are listed in "Joint Honours Programs".

The formal admission requirements of the program are listed in the "Admissions" section of this Calendar. Six OAC credits including English and Geography are required. The Regular Honours Geography program provides a sound foundation in the discipline, and prepares the student for specialization at the graduate level in almost any aspect of Geography. The mandatory content courses include a series of integrated courses in both physical and human geography. Although the Honours program is broad in scope, students may concentrate their courses in one or more of the major areas of specialization available in the Department which include: Applied Physical Geography, Canadian Geography, Environmental and Resource Management, Regional Development, Regional Geography, Methods and Techniques, Urban-Economic Geography and UW/WLU Business Option. The fourth year includes a research project, the Senior Honours Thesis.

The Honours Co-op program provides for alternate terms of practical work experience and academic study. Students may be admitted to the Co-op program in the first or second year. The first work term is in the Winter of the second year. Co-op Geography students must normally follow the work and study-term sequence outlined in...
“Co-op Course Scheduling Recommendation”. Students must complete five work terms. A work-term report is required upon completion of each work term and four of these must be approved for the Co-op degree. Inquiries for additional information regarding Co-operative studies should be directed to the Co-op Undergraduate Officer.

The three-year General Geography program provides a liberal education in environmental studies, with less specialization in Geography than in the Honours program. This program can also be completed by distance education. In addition to the BES (Bachelor of Environmental Studies) program in Geography a BA (Bachelor of Arts) degree program is also available in Geography (see the Faculty of Arts).

In all programs there is emphasis on the development of both theory and methodology and on the practical application of geographical concepts to the environmental, economic, social and political problems of Canada and other parts of the world. The “applied geography” aspects of the program are enhanced by the availability in the Faculty of elective courses in Architecture, Urban and Regional Planning and Environment and Resource Studies. Graduating students acquire a variety of jobs in education, government, industry and planning agencies; more information on employment possibilities is provided in a Department of Geography publication, Jobs in Geography.

The Department of Geography offers both Master’s (MA and MES) and Doctoral (PhD) graduate programs as part of the joint Waterloo-Wilfrid Laurier Graduate Program in Geography. At the graduate level course work and research are concentrated on a specific subfield of Geography. Areas of research specialization include physical geography, spatial data handling, urban and economic geography, resources management, cultural, historical and regional geography.

The Faculty of Environmental Studies expects that students enrolled in any of its programs should be able to demonstrate competence in writing. Accordingly, all students newly admitted to the Faculty (except those who have passed OAC 1 English with a final grade of 80% or higher) are required to write the English Language Proficiency Examination during their first term of registration (normally scheduled during registration week in September). The English Language Proficiency Program is recorded on the student’s academic record as ARTS 000Y.

**BACHELOR OF ENVIRONMENTAL STUDIES**

**Geography Program**

**Three-Year Program Requirements**

### Year One

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
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</thead>
<tbody>
<tr>
<td>GEOG 101</td>
<td>Geography and Human Habitat</td>
</tr>
<tr>
<td>GEOG 102</td>
<td>Geography and Our Planetary Environment</td>
</tr>
<tr>
<td>GEOG 165</td>
<td>Introduction to Cartography and Remote Sensing</td>
</tr>
</tbody>
</table>

**Electives (see notes below)**

### Year Two

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>GEOG 201</td>
<td>Geomorphology and Soils</td>
</tr>
<tr>
<td>GEOG 202A</td>
<td>Location of Economic Activities</td>
</tr>
<tr>
<td>ENV S 200</td>
<td>Field Ecology</td>
</tr>
</tbody>
</table>

**One of:**

- GEOG 208 Applied Climatology
- GEOG 303 Geographical Hydrology
- GEOG 309 Physical Climatology

and additional courses so that by the end of the second year a student should have completed 20 term courses. One of these term courses should be ENGL 109, 129R, 140R, taken in Year One or ENGL 208, 210C, 210E, 210F taken in Year Two. A term course in English is a requirement, except for a student who obtains greater than an 80% average on the English Language Proficiency Exam who will then be exempt from the English requirement. A student who receives greater than 80% on OAC English is exempt from ELPE and the English requirement.

### Year Three

Additional courses so that a student should have completed at least 30 term courses.

**Notes on Three-Year Program**

1. **Minimum Required Credits**

   Total: 30 term courses. Geography: 12 term courses.

   Outside of Faculty of Environmental Studies: eight term courses. All Environmental Studies courses are included in the cumulative Geography average but only four can be counted in meeting the minimum required credits of Geography courses.

2. **Term Course Load**

   No more than five courses may be taken in a term without the approval of the Associate Chair (Undergraduate Studies). Normally, approval for a sixth course will be considered only if the cumulative Geography average is B+ or higher.

3. **Average Requirements**

   Students must maintain an overall cumulative average of 60.0% and a Major cumulative average of 65.0%.

   All required courses must be passed.

4. **First-Year Term Courses**

   For a three-year General degree, a student must have at least 17 term courses above the 100-level.

5. **Students must take one of the following regional courses in years two, three or four:**

   - GEOG 204  Geography of Russia and Post-Soviet States
   - GEOG 205  Africa
   - GEOG 206  The World Region and World Issues
   - GEOG 221  The United States
   - GEOG 223  The Geography of Indonesia
   - GEOG 227  Regional Problems of Europe
   - GEOG 229  Political Geography
   - GEOG 322  Geographical Study of Canada
   - GEOG 326  Gender Roles and Development Alternatives in the Third World
Environmental Studies
Geography

GEOG 332 Health, Environment and Development in the
Third World
GEOG 340 Towns and Villages of Rural Canada
GEOG 412 Japan and the Pacific Rim
GEOG 421 Europe
GEOG 422 Canada
GEOG 425 Africa
GEOG 426 Sustainable Development in the Third World

6. Other Comments
See notes 4, 5 and 6 on four-year programs.

Notes on Four-Year Programs

1. Minimum Required Credits
Total: 40 term courses. Geography: 20 term courses. All term courses for which 1.0 credit is awarded will count as the equivalent of two term courses. Outside of the Faculty of Environmental Studies: ten term courses. Only four term courses designated Environmental Studies may be counted as Geography courses but all courses designated Environmental Studies are included in the cumulative Geography average.

2. Term Course Load
No more than five courses may be taken in a term without the approval of the Associate Chair (Undergraduate Studies). Normally, approval for a sixth course will be considered only if the cumulative Geography average is B+ or higher.

3. Average Requirements
Students in the Honours programs must maintain an overall cumulative average of 65.0% and a Major cumulative average of 70.0%. All required courses must be passed.

4. Secondary School Teaching
Students intending to teach in Secondary Schools should take at least four term courses of Regional Geography and at least four term courses in another teachable school subject.

5. Materials and Costs
For some courses, extra fees may be required to defray heavy equipment/travel costs, e.g. GEOG 397 (Field Research). Statements on extra costs, where required, will be found with the course description.

6. Independent Study
Up to three independent study courses (GEOG 475A, B, C) may be taken.

7. Honours Co-operative Program
Honours Geography Co-op is a five work-term program in which four work-term reports have to be written. The first work-term occurs in the Winter term of the second year and a work report is required at the end of this placement.

Honours Geography Co-op is a limited enrolment program. Students are admitted to the Co-op program in first year based on secondary school grades. Interested students enrolled in first year Regular Geography at the University of Waterloo may be considered for admission to any remaining Co-op positions at the end of first year based on university academic performance and work experience related to Geography.

The Honours Geography Co-op program has the same academic requirements as the Honours Regular program with the exception that GEOG 391 need not be taken by Co-op students. In addition, Honours Co-op students may elect to submit a work term report to be evaluated in lieu of GEOG 490 A/B. If the report is considered to be of comparable academic quality, the student will take additional courses to meet the requirement of 40 term courses. The additional 1.5 credit courses must be selected from the Third and Fourth year offerings with the approval of the Associate Chair (Undergraduate Studies).
8. First-Year Term Courses
For a four-year Honours degree a student must have at least 27 term courses above the 100-level.

9. All fourth year Geography courses will be restricted to fourth year Honours students. Other students must have permission of the instructor.

10. Students must take one of the following regional courses in years two, three or four:
GEOG 204 Geography of Russia and Post-Soviet States
GEOG 205 Africa
GEOG 206 The World Region and World Issues
GEOG 221 The United States
GEOG 223 The Geography of Indonesia
GEOG 227 Regional Problems of Europe
GEOG 229 Political Geography
GEOG 322 Geographical Study of Canada
GEOG 326 Gender Roles and Development Alternatives in the Third World
GEOG 332 Health, Environment and Development in the Third World
GEOG 340 Towns and Villages of Rural Canada
GEOG 412 Japan and the Pacific Rim
GEOG 421 Europe
GEOG 422 Canada
GEOG 425 Africa
GEOG 426 Sustainable Development in the Third World

Co-op Course Scheduling Recommendations

Year One
GEOG 101, 102, 165
ENV S 178

Year Two
Fall Term 2A
GEOG 201 Geomorphology and Soils
GEOG 202A Location of Economic Activity
ENV S 200 Field Ecology

One of:
GEOG 208 Applied Climatology
GEOG 303 Geographical Hydrology
GEOG 309 Physical Climatology

Electives, one of which must be ENGL 109, 129R, 140R, taken in Year One or ENGL 209, 210C, 210E, 210F preferably taken in Spring term 2B

Winter Work Term 1

Spring Term 2B
GEOG 202B, and one of: 204, 205, 206, 221, 223 228, 227
Electives

Fall Work Term 2

Environmental Studies
Geography

Year Three
Winter Term 3A
Electives

Spring Work Term 3
Fall Term 3B
GEOG 393
Electives

Year Four
Winter Term 4
GEOG 490A
Electives

Spring Term 4A
Fall Work Term 5
Winter Term 4B
GEOG 490B

GEOGRAPHY MINOR FOR HONOURS STUDENTS IN OTHER DEPARTMENTS
A total of ten term courses in Geography among which can be included ENV S 195 and ENV S 200, and a cumulative Geography average of at least 65% (C).

JOINT HONOURS PROGRAMS
Joint Honours programs have been arranged between Geography and other disciplines in the University. Detailed programs have been worked out with Anthropology, Biology, Earth Sciences, Economics, English, Environment and Resource Studies, Fine Arts, French, German, History, Management Studies, Mathematics, Music, Political Science, Philosophy, Psychology, Recreation, Russian, and Sociology. The program "Geography with Canadian Studies," is available only as an Option. These programs lead to degrees in the Faculty in which the student is registered.

The Department of Geography is prepared to work out other programs not listed for Honours students. Geography core requirements in Joint programs are similar to those of the Geography Honours program but equivalent courses in the home department to ENV S 178, 278 and GEOG 393 and 490A, 490B are accepted.

Required courses are GEOG 101, 102, 165, 201, 202A, 202B, 208 or 309, a 200 or above-level Regional course (see note 10 above), and ENV S 200. If scheduling difficulties arise in meeting required courses, contact the Associate Chair (Undergraduate Studies) in Geography for possible substitute courses.

Notes on Joint Honours Programs
1. Admission to Joint Honours Programs
Admission to a Joint Honours program will occur no earlier than Year Two.

2. Minimum Required Credits
The minimum number of term courses in Geography/Environmental Studies for students registered in Joint Honours programs is 14. If both majors are taken in the
Faculty of Environmental Studies, and the student's first declared major is geography, a minimum of ten term courses must be taken outside of the Faculty of Environmental Studies. The total number of term courses required is 40.

3. Average Requirements
Geography students taking Joint Honours with another department must achieve Honours standing as required by the Geography Department (65.0% overall, 70.0% in Geography). The average required in the second major is the minimum Honours standing set by that department. Students in other departments taking Joint Honours with Geography must achieve a cumulative average of 70.0% in Geography and Environmental Studies courses. Environmental Studies courses are included with Geography courses in the calculation of the Geography average.

4. Canadian Studies
Students choosing the program Geography with Canadian Studies are referred to the regulations of that program. In addition, the Department of Geography recommends that course selections include at least six courses from those listed for Areas of Specialization under Canadian Geography (see Associate Chair, Undergraduate Affairs).

UW/ILU BUSINESS OPTION
A Business Option, offered jointly with Wilfrid Laurier University, is available. The requirements of the Business Option are outlined in "Academic Programs".

School of Urban and Regional Planning

BACHELOR OF ENVIRONMENTAL STUDIES
(Honours Urban and Regional Planning Program)

Nature of the Program
The emphasis of the program is on planning as a process, conceived in broad terms to include policy making, research and decision making. The subject focus is regional; that is, the integrated planning of regions, large and small. It includes urban-centred or core regions and rural components in which the policy emphasis is on environmental issues and other contexts typical of the Canadian scene, in which resource potentials are not yet realized, and where development issues and problems of human adjustment are in the forefront.

To implement this approach, the School of Urban and Regional Planning has gathered a team of faculty with diverse academic and practical planning experience.

The broad aim of the School is to prepare the student for active participation in the planning process. This approach gives equal emphasis to the 'why' and 'how' of planning and requires that a style be adopted that strives for a continuum between classroom and field experience, between planning studies and related disciplines, and between academic studies and future professional practice. Realizing this concept requires integration within the program of selected elements from geography, social sciences and pure and applied sciences. For this purpose, the School of Urban and Regional Planning has been located in a Faculty with an interdisciplinary approach to a wide range of environmental issues.

The program gives a well-rounded preparation for a wide variety of professional or graduate work in urban planning, regional planning and resource development. Courses on the theory, methods and philosophy of planning provide an integrating framework. The student is also given an opportunity to pursue a special interest in economic, social, and ecological issues in planning, or in planning methodology. This is done through the selection of elective courses. Students are also encouraged to select Senior Honours Essay Topics from these special fields of interest.

The integration of practical work experience into the program is considered an important part of the educational process. Students will be brought into direct contact with the profession and will be exposed to problems typical of those encountered in practice, as well as being introduced to projects and operations beyond the scope of any university laboratory.

The Co-operative program provides for alternative terms of practical work experience and academic study. Planning Co-op is a limited enrolment program. Interested students must apply to this stream of study in November of their first year of the program. Admission is based on academic standing. An interview may be required. The first work term is in the Spring following completion of second year. A work-term report is required upon completion of each work term and four of these must be graded as "satisfactory" in order to graduate. Inquiries regarding Co-operative studies should be directed to the School's Co-op Program Coordinator, or the Department of Co-operative Education and Career Services.

The Regular program encourages students to actively seek work experience during the summer months of their second and third years.

Because of the importance of effective communication, an OAC English is required. Incoming students are expected to demonstrate proficiency in written English through the English Language Proficiency Examination (ELPE) offered by the English Department at the start of the fall term. Students who have a final grade of 80% or higher in English OAC 1 are exempt from writing the ELPE. If necessary, students will take the appropriate remedial work in addition to normal course and credit requirements. With an increased emphasis in the profession on quantitative techniques, students are encouraged to take at least one Ontario Academic Course credit in Mathematics and Science. Finite and Biology are recommended. Students with deficiencies in these areas can elect to take equivalent or remedial courses in their first year of the program.

Additional Information
The Planning programs are recognized by the Canadian Institute of Planners and an increasing number of employers as a satisfactory preparation for a wide range of careers.
Notes
1. Academic Standing
Students must obtain a minimum average of 65% in the overall average and 70% in the major average (Planning and Environmental Studies courses) throughout the four years of their program. In order to proceed to subsequent years, students must also obtain minimum credits and term courses as follows: Year One – five credits (ten term courses); Year Two – ten credits (20 term courses); Year Three – 15 credits (30 term courses); Year Four – 20 credits (40 term courses).

Students may be granted conditional standing at the discretion of the School, which permits a student to proceed to a subsequent year on a conditional basis. Should the student be permitted to continue on the basis of "conditional" due to average and/or course credit standing, and if subsequently the required averages are not met this second time, or credit deficiencies not cleared, withdrawal from the program will be required.

2. Course Loads and Sequencing
Year One students must select courses from first-year level only with the exception of ENV S 200. Students in the School of Planning are expected to carry a minimum load of ten term courses in each of the four years of the program. However, students interested in taking extra courses are free to take a six term course load in any given term without approval from the School; preregistration for more than six term courses may only be done with the Undergraduate Advisor's approval.

3. First-Year Term Courses
No more than 12 term courses (six credits) at the first-year level will be allowed toward the 40 required to graduate (20 credits).

4. Admission to Year Two
To enter Year Two of Urban and Regional Planning from Year One, a student must obtain a minimum cumulative overall average of 65.0% and 70.0% in Planning and Environmental Studies courses and must obtain credit standing in ten term courses. In subsequent years, a student must maintain a cumulative overall average of 65.0% and 70.0% in Planning and Environmental Studies courses, as well as obtain credit standing in an additional ten term courses each year of the program.

It is possible for non-Planning students to apply for admission to Year Two. Advanced standing may be obtained through the transfer of credits from other programs and institutions. However, advanced standing will not be granted to transfer students beyond the Year One level (ten term course credits). All transfer students are required to complete a minimum of three full academic years in the program Years Two – Four) before being eligible for graduation.

All students admitted to the program with advanced standing must have their program for each year approved by the Undergraduate Advisor.

5. Joint Honours and Minors
Although the School does not share in Joint Honours programs, Planning students are encouraged to participate in the Minors offered by other departments. Students choosing Minors (in such programs as Canadian Studies, Political Science, and Management Studies) are referred to the regulations of those programs. See other faculty and department sections in this Calendar regarding Minors available.

6. A Business Option, offered jointly with Wilfrid Laurier University, is available. The requirements of the Business Option are outlined in "Academic Programs".

7. The School reserves the right to make changes to the curriculum as necessary. Please consult the School prior to registration.

8. Program Manual
A number of important program guidelines and regulations are covered in the Undergraduate Program Manual available from the Undergraduate Advisor. Program areas covered include: Admission, Courses, Examinations, English Language Proficiency Requirement, Records and Transfers, Registration, Co-op, Appeals and Discipline, Academic Standing, Senior Honours Essay, and Leave of Absence. Students are expected to refer to this manual in all matters concerning academic conduct.

HONOURS URBAN AND REGIONAL PLANNING PROGRAM (REGULAR AND CO-OP)

Year One
Required Planning Courses
PLAN 100 Introduction to Urban Planning Concepts and Techniques
PLAN 101 Urban Planning Concepts and Techniques
PLAN 110 Graphics for Planners
PLAN 130 Social Concepts for Planners
ENV S 178 Introduction & Environmental Research Methods
ARTS 000Y English Language Proficiency Program (No credit)

Year One Elective Courses (5)
It is strongly recommended that students select a term course in English as one elective choice: ENGL 109 or 140R taken in Year One or ENGL 210C, 210E or 210F taken in Year Two. One elective from each of the Biophysical and Economics/Politics areas must be selected plus two other additional electives. For a listing of the courses included under these areas see the current School Undergraduate Program Manual.

Note
Required and elective courses together will total ten term courses – all courses to be at the first-year level. Before making a final selection in these courses, students must check that prerequisites have been covered for courses which they might take in Years Two, Three and Four.
Environmental Studies
Urban and Regional Planning

Year Two

Required Planning Courses
PLAN 210 Principles of Environmental Design
PLAN 250 The Small Group in the Planning Process
PLAN 255 Introduction to GIS (Geographic Information Systems)
ENV S 200 Field Ecology
ENV S 201 Introduction to Environmental and Planning Law
ENV S 278 Advanced Environmental Research Methods

Year Two Elective Courses (4)
Choose two or more second year Planning courses and any other electives, for a total of ten term courses. For a listing of the second year Planning courses see current School Undergraduate Program Manual.

Year Three

Required Planning Courses
PLAN 300 Planning Theory
PLAN 302 Studio 1
PLAN 350 Social Research Techniques in Planning
PLAN 390 Senior Honours Essay Proposal

Year Three Elective Courses (6)
Choose three or more third year Planning courses and any other electives, for a total of ten term courses. For a listing of the third year Planning courses see current School Undergraduate Program Manual.

Year Four

Required Planning Courses
PLAN 400 Challenges and Ethics in Planning
PLAN 401 Studio 2
PLAN 403 The Organizational, Political and Economic Contexts of Planning Practice
PLAN 404 Organization and Issue Analysis
PLAN 490 Senior Honours Essay

Year Four Elective Courses (5)
Choose two or more fourth year Planning courses and any other electives, for a total of ten term courses. For a listing of the fourth year Planning courses see current School Undergraduate Program Manual.
Independent Studies Program

*synthesizing material for a term project.*
Independent Studies

Independent Studies is a small undergraduate degree program which emphasizes individualized programs of study. Students in the program have the opportunity to determine the goals and methods of their studies. Methods can take the form of independent library or laboratory research, group discussions, seminars, courses, and/or field placement. Areas of study can include any of the humanities, fine and performing arts, social sciences, environmental sciences, health sciences, science, and mathematics, or applications of these areas where the University of Waterloo has faculty expertise to assist students.

Independent Studies students are encouraged to explore a variety of interests and develop a perspective beyond that of a single discipline. Similarly, students are encouraged to explore a number of methods which may provide a depth of perspective on a specific area.

The ability to ask a meaningful question, obtain information related to that question, synthesize that information, and communicate conclusions, are important life-long learning skills that are central to Independent Studies and are also valued by employers.

Degree

The Bachelor of Independent Studies (BIS) degree is awarded by the University upon successful completion of the degree program described under the Independent Studies Program.

Admission

General Requirements

The admission requirements of Independent Studies are the same as the minimum General Admission Requirements of the University for full-time study. In addition to these requirements, students must have the academic potential and motivation to work independently.

Admission is determined by an Admission Committee which interviews applicants.

1. Academic Potential

Students must be able to do academic work at university level. Evidence of academic ability may be demonstrated by one or more of the following:

- The completion of the Ontario Secondary School Diploma (OSSD) including a minimum of six Ontario Academic Course (OAC) credits or the equivalent (refer to the "Admissions" section for details on admission categories, requirements, and procedures);

2. Motivation

Students must be so motivated that they can pursue their academic work independently. The committee would like evidence that an applicant has worked on her/his own projects outside of regular work or studies (i.e. started own business, built own computer, prepared original reports). Letters attesting to this motivation are important and should be specific, giving examples of projects undertaken.

Advanced Standing

If a student is transferring from another university or other post-secondary program or coming back to university as a mature student with some post-secondary academic background, prior credits obtained may reduce the time of enrollment required in I.S. to a minimum of four terms.

Independent Studies Program

The Independent Studies Program is divided into two phases: the Pre-Thesis Phase and the Thesis Phase.

1. Pre-Thesis Phase

New students in Independent Studies (I.S.) begin by developing a study plan with the assistance of advisors in I.S. This study plan focuses on expectations and objectives of a student's academic activities in the Program and establishes the habit of setting specific goals which provide structure for independent study. Each student during each Pre-Thesis Phase term will meet at least five times with I.S. advisors to discuss her/his academic work.

A study plan (Term Plan) is required of every student at the beginning of each term during the Pre-Thesis Phase of the Program. A complete record of academic work accomplished during each term (Term Performance Report) must be submitted at the end of each term. These documents of work completed in the Pre-Thesis Phase of the Program provide the basis for review and evaluation.

Students must spend at least two terms in this first phase if they have already completed two terms of university work, or at least four terms (of a possible six) if they have not previously attended university. While students in Pre-Thesis Phase may take regular university courses, they are expected to engage in a significant amount of independent study and are encouraged to develop a perspective beyond that of an individual discipline.

2. Thesis Phase

The Bachelor of Independent Studies degree (BIS) is recommended to Senate by the Academic Board of Independent Studies. The Board is composed of faculty members drawn from the disciplines represented on the
Options and Minors

Students enrolled in Independent Studies may elect to complete the requirements for an interdisciplinary option or a minor. The option or minor will be designated on a student’s diploma and transcript upon graduation.
Voluntary Withdrawal

Those students who voluntarily withdraw prior to or during the full refund period will not have the term recorded on their academic record and transcript. After these periods, students who voluntarily withdraw before the final day of classes, do so without Academic Penalty. However, this will be noted on their transcripts with the statement “Voluntary Withdrawal From Term (effective date) – No Academic Penalty”. See “Withdrawals” for details.

Graduate Opportunities

The responsibility that students in this program must assume for their studies ensures that graduates will possess a high level of organizational skills, self-discipline and motivation combined with their attested academic development. These capabilities have prepared them well for further endeavours and have proven advantageous in their search for employment.

Graduates have been remarkably successful in building upon their degree programs to further their formal education. A sizeable number have gained graduate degrees, many on scholarship, from this and other Canadian universities and institutions as diverse as Columbia Teachers’ College, Massachusetts Institute of Technology, and Cambridge University. In addition many have completed professional training in law, education, medicine, business and other areas. Others have tailored their programs to prepare themselves to meet specific job requirements, or have started their own companies.
Faculty of Mathematics

The Mathematics and Computer Building.
FACULTY OF MATHEMATICS

The Faculty of Mathematics consists of the Departments of Applied Mathematics, Combinatorics and Optimization, Computer Science, Pure Mathematics, and Statistics and Actuarial Science. The degree Bachelor of Mathematics (BMath) is awarded upon successful completion of four-year Honours and three-year General programs.

The Faculty also offers graduate programs leading to the following degrees: Master of Mathematics (MMath), Master of Philosophy (MPhil), and Doctor of Philosophy (PhD). Detailed information is contained in the University of Waterloo Graduate Studies Calendar.

ADMISSION

Admission requirements and procedures for all programs are described on pages 2:8 and 2:10 in the “Admissions” section of this calendar.

Most students are admitted directly from secondary school. However, students who are enrolled in another faculty in the University of Waterloo, or at another university, may apply to transfer to the Faculty of Mathematics. Applicants should have strong academic records. (See "Transfer Students" on page 13:28 for additional policies concerning transfer students and transfer credits.) In addition, a student who has been away from formal education for more than two years may apply as a mature student. We encourage, and sometimes require, these applicants to re-do some Math courses, since time away can have a negative impact on one’s performance in the discipline.

ACADEMIC PROGRAMS

Three-Year General vs. Four-Year Honours Programs

The Faculty of Mathematics offers a variety of four-year Honours programs and a three-year General program. The Honours programs are more demanding than the General program, both with regard to the mathematical content and the number of required courses.

Students are normally admitted into the Honours program in their first year. In subsequent years, students who wish to pursue a less intensive program of studies or who are unable to meet the requirements of the Honours program may transfer to the three-year General program.

Co-op vs. Regular

Most of the Faculty’s programs are available in both the Regular (conventional September to April academic year) and Co-operative (alternating four-month academic and work terms) systems of study. Programs that are offered only for Co-op students are explicitly indicated in the list of programs below.

Students in the Regular program normally take courses during the Fall and Winter terms. Because of resource limitations, Co-op students are given priority for enrolling in courses in the Spring term.

DEPARTMENTAL HONOURS PROGRAMS

The Faculty offers the following Honours Programs through the five departments:

- Actuarial Science
- Applied Mathematics
- Applied Mathematics with Engineering Electives (Co-operative only)
- Applied Mathematics with Physics Electives
- Combinatorics and Optimization
- Computer Science
- Computer Science with Electrical Engineering Electives
- Computer Science/Information Systems Option
- Computer Science/Software Engineering Option
- Operations Research
- Pure Mathematics
- Statistics
- Applied Statistics with Engineering Electives (Co-operative only)

FACULTY HONOURS PROGRAMS

The following Honours programs are under the jurisdiction of the Faculty Programs Committee:

- Mathematics/Business Administration Program
- Mathematics/Chartered Accountancy Program (Co-operative only)
- Mathematics/Management Accountancy Program (Co-operative only)
- Mathematics/Teaching Option (Co-operative only)
- Inter-Departmental Program

THREE-YEAR GENERAL PROGRAM

This program is under the jurisdiction of the Faculty Programs Committee.

COMBINATION HONOURS PROGRAMS WITHIN THE FACULTY OF MATHEMATICS

Double Honours ‘X’ and ‘Y’ Programs

All Honours requirements for both areas ‘X’ and ‘Y’ must be satisfied. ‘X’ and ‘Y’ refer to any two of Actuarial Science, Applied Mathematics, Combinatorics and Optimization, Computer Science, Operations Research, Pure Mathematics, and Statistics (with the exception that the combination Combinatorics and Optimization and Operations Research is not an officially recognized Double Honours Program). For each pairing of ‘X’ and ‘Y,’ the names will appear in alphabetical order in the program title. Note that with some ‘X’ and ‘Y’ combinations, it may be necessary to complete more than the minimum 40 half-credits to satisfy all of the course requirements.

Joint Honours ‘X’ and ‘Y’ Programs

Joint Honours ‘X’ and ‘Y’ programs, in conjunction with the common degree requirements in Table I on page 13:4, require a total of 40 half-credits: the ten mathematics
half-credits in the Faculty core (outlined in Table II on page 13:5) plus the joint requirements of the two departments for a minimum of 28 mathematics half-credits, and at least ten non-math half-credits. Joint requirements for each department can be found in the corresponding department description. 'X' and 'Y' refer to any two of Actuarial Science, Applied Mathematics, Combinatorics and Optimization, Computer Science, Pure Mathematics, and Statistics. For each pairing of 'X' and 'Y,' the names will appear in alphabetical order in the program title.

Honours 'X' with 'Y' Minor Programs
All Honours requirements for area 'X' and the specific minor requirements for area 'Y' must be satisfied. Requirements for each department may be found in the corresponding department description. 'X' refers to any one of Actuarial Science, Applied Mathematics, Combinatorics and Optimization, Computer Science, Mathematics/Teaching Option, Operations Research, Pure Mathematics, and Statistics. 'Y' is different from 'X' and refers to any one of Actuarial Science, Applied Mathematics, Combinatorics and Optimization, Computer Science, Pure Mathematics, and Statistics. Students register in the Honours 'X' program and request an official 'Y' Minor designation when they complete an "Intention to Graduate" form.

COMBINATION HONOURS PROGRAMS WITH OTHER FACULTIES LEADING TO THE BMATH DEGREE
In the descriptions below, 'X' refers to any one of Actuarial Science, Applied Mathematics, Combinatorics and Optimization, Computer Science, Mathematics/Teaching Option, Operations Research, Pure Mathematics, and Statistics, and the Inter-Departmental program. 'Z' refers to any discipline, in a faculty other than Mathematics, that chooses to make a combination Honours program or a Minor available to Faculty of Mathematics students. Students should consult with the department concerned for specific course requirements.

Honours 'X' and 'Z' Programs
All Honours requirements for area 'X' and the set of departmental requirements and average requirements prescribed by discipline 'Z' must be satisfied. Note that with some 'X' and 'Z' combinations, it may be necessary to complete more than 40 half-credits to satisfy all of the course requirements.

Honours 'X' with 'Z' Minor Programs
All Honours requirements for area 'X' and a set of ten half-credits and average requirements prescribed by discipline 'Z' must be satisfied. Students register in the Honours 'X' program and request an official 'Z' Minor designation when they complete an "Intention to Graduate" form.

Note
Combination Honours Programs leading to a degree in another faculty (i.e. not BMMath) are described in "Combination Honours Programs Leading to a Degree in Another Faculty: Requirements" on page 13:23.

Interdisciplinary Programs
Students can elect to take an Interdisciplinary Option which will be designated on the transcript and diploma. Consult Chapter 15 of the Calendar for information. The options include

- Canadian Studies
- Cognitive Science
- Environmental Economics
- Human Resources Management
- International Studies
- Legal Studies
- Liberal Science
- Management Studies
- Middle East Studies
- Peace and Conflict Studies
- Print Journalism
- Russian and East European Studies
- Society, Technology and Values
- Speech Communication
- Studies in Personality and Religion
- Studies in Sexuality, Marriage and the Family
- Women's Studies

BMath Transcripts and Diplomas
BMath transcripts and diplomas list at most two areas of study in the academic program section.

ADMISSION TO SPECIFIC HONOURS PROGRAMS
At any time prior to their 3A term, Honours students in good standing within the Faculty will be eligible for admission to the program of their choice, subject to limitations 1, 2, and 3 below. It is understood, however, that academic advisors will continue to recommend that students who appear to be inadequately prepared for their choice of program consider an alternative.

1. Students seeking admission to Computer Science major programs will have to satisfy the CS major average continuation requirement (see "Major Average Continuation Requirement for Honours Programs" on page 13:25).
2. The Math/Accounting and Teaching Option programs are restricted-enrolment programs.
3. With the exceptions of Applied Math/Engineering, Math/Business, Accounting, and Computer Science programs, students are not admitted to specific Honours programs prior to year two.

In the 3A term and beyond, admission to specific Honours programs is at the discretion of the major Department(s) or Faculty Programs Committee as appropriate.
DEGREE REQUIREMENTS

The degree requirements described below apply only to students whose initial registration as BMath degree candidates was Fall 1994 or later.

Table I - Degree Requirements Common To All BMath Programs

<table>
<thead>
<tr>
<th>Requirements</th>
<th>Four-Year Honours Programs</th>
<th>Three-Year General Programs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Minimum total half-credits</td>
<td>40</td>
<td>30</td>
</tr>
<tr>
<td>Minimum math half-credits</td>
<td>20 - 28</td>
<td>16</td>
</tr>
<tr>
<td>Minimum non-math half-credits</td>
<td>ten</td>
<td>ten</td>
</tr>
<tr>
<td>Minimum Cumulative Average (CAV)</td>
<td>60%</td>
<td>60%</td>
</tr>
<tr>
<td>Minimum Major Average (MAV)</td>
<td>65%</td>
<td>not applicable</td>
</tr>
<tr>
<td>Maximum total failures allowed</td>
<td>four half-credits</td>
<td>eight half-credits</td>
</tr>
<tr>
<td>Maximum course attempts allowed</td>
<td>50 half-credits</td>
<td>40 half-credits</td>
</tr>
<tr>
<td>Minimum number of complete terms</td>
<td>four</td>
<td>none</td>
</tr>
<tr>
<td>Minimum number of full-time terms</td>
<td>eight, including the four complete terms required above</td>
<td>none</td>
</tr>
<tr>
<td>English Writing Skills</td>
<td>All BMath degree candidates must satisfy an English Writing Skills Requirement. See below.</td>
<td></td>
</tr>
</tbody>
</table>

The terms used in Table I are explained below.

Math half-credit - A course with one of these prefixes: ACTSC (Actuarial Science), AM (Applied Mathematics), C&O (Combinatorics and Optimization), CS (Computer Science), MATH (non-departmental Faculty courses), PMATH (Pure Mathematics), and STAT (Statistics).

Non-math half-credit - Courses with the prefix MTHEL and those courses offered by other faculties.

Major Average - See sections 2 and 4 in "Faculty Policies" on page 13:25.

Cumulative Average - See sections 1 and 3 in "Faculty Policies" on page 13:25.

Course Attempt - Any course registration not formally cancelled with the Registrar's Office.

Complete Term - A term in which a student successfully completes at least five half-credits, at least two of which must be math, with no failures that term.

Full-time Term - A term in which a student is enrolled in at least three half-credit courses.

First-Year English Writing Skills Requirement
Any student in the Faculty of Mathematics must satisfy the following Writing Skills Requirement before enrolling in Year 2:
- A grade of 80% or better in OAC English 1
- A grade of 60% or better on the UW English Language Proficiency Exam (ELPE).

Exemptions for students from jurisdictions outside Ontario will be considered on an individual basis by the Admissions Committee.

Notes
1. Students who arrange a special sitting of the ELPE outside the scheduled dates will be assessed an administrative charge.
2. The entry ARTS 000 with a Credit (CR) grade on a student's grade report will indicate successful completion of this requirement.

No-Credit/Overlap Courses
There are some restrictions on course selection for obtaining credit toward a BMath degree. Before enrolling in a course, students should check the Faculty of Mathematics "No-Credit List" and "Course Overlap List" in the most recent "Math Students' Handbook" to determine whether or not the course will count towards their BMath degree. This handbook is published each September and is available from the Math Undergraduate Office. See section 13.4 in "Faculty Policies" for further details.
Table II – Required Faculty Core Courses – Honours Programs

<table>
<thead>
<tr>
<th>Courses</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>MATH 135</td>
<td>(or MATH 145)</td>
</tr>
<tr>
<td>MATH 136</td>
<td>(or MATH 146)</td>
</tr>
<tr>
<td>MATH 235</td>
<td>(or MATH 245)</td>
</tr>
<tr>
<td>MATH 137</td>
<td>(or MATH 147)</td>
</tr>
<tr>
<td>MATH 138</td>
<td>(or MATH 148)</td>
</tr>
<tr>
<td>MATH 237</td>
<td>(or MATH 247)</td>
</tr>
<tr>
<td>STAT 230</td>
<td>(or STAT 240)</td>
</tr>
<tr>
<td>STAT 231</td>
<td>(or STAT 241)</td>
</tr>
<tr>
<td>CS 134</td>
<td>Principles of Computer Science</td>
</tr>
</tbody>
</table>

One of

- CS 130 Concepts of Computer Programming
- CS 230 Introduction to Computers and Computer Systems
- CS 246 Software Abstraction and Specification

Notes

1. The MATH and STAT core courses are offered at two levels: Advanced and Honours. The Advanced courses are more challenging than the Honours courses. The Advanced course numbers are listed in brackets in Table II above.

2. Most students will take CS 130 in their 1A term, followed by CS 134 in their 1B term. However, students with extensive programming experience will take CS 134 in their 1A term followed by CS 246 or CS 230 in their 1B term. Students entering the Mathematics Faculty with no previous computer science experience will take CS 120 in their 1A term, CS 130 in 1B, and CS 134 in 2A.

3. The three algebra and three calculus courses are normally taken in sequence in the 1A, 1B, and 2A terms. The two STAT courses are normally taken in the 2A and 2B terms.

Responsibility For Meeting Degree Requirements

Students are responsible for being aware of all regulations pertaining to their programs of study. When all requirements for a particular BMath degree have been met, it is each student’s responsibility to submit a completed “Intention to Graduate” form to the Registrar’s Office.

Honours Fallback Provision

Students who satisfy all the conditions below, but do not satisfy the cumulative major average requirement and/or the complete term requirement for an Honours degree, will be eligible for a three-year BMath General degree:

1. all course requirements for a specific Honours program;
2. cumulative average (CAV) at least 60%;
3. failed half-credits at most six;
4. half-credit course attempts at most 50.

Recognition of Excellence

Alumni Gold Medal

An alumni Gold Medal is presented annually, usually at Spring Convocation, to recognize the academic excellence of the Math Faculty’s most outstanding undergraduate student.

K.D. Fryer Gold Medal

The K.D. Fryer Gold Medal is presented annually, at Fall Convocation, to a graduating Math student who best exemplifies academic excellence and good student citizenship.

Graduating “With Distinction” – Dean’s Honours List

In recognition of outstanding academic records throughout their undergraduate careers, all students who graduate with a BMath Honours degree and have a cumulative average (CAV) of at least 87% are eligible to graduate “With Distinction – Dean’s Honours List”. In addition to having this notation appear on their official University transcripts and diplomas, such students have their names displayed in gold in the Math Faculty Colloquium Room (MC 5158).

Graduating “With Distinction”

In recognition of distinguished academic achievement throughout their undergraduate careers, all students who graduate with a BMath degree, either four-year Honours or three-year General, and a cumulative average (CAV) of at least 80% are eligible to graduate “With Distinction”. This notation appears on official University transcripts and diplomas.

Term Dean’s Honours List

To recognize outstanding academic achievement each term, the designation “Dean’s Honours List” is awarded to undergraduate Math students in an Honours program whose term average (TAV) is at least 87% in complete term. This designation is reflected on end-of-term grade reports and official University transcripts and diplomas.

J. Alan George Award

The J. Alan George Award is presented annually, at the Math Graduation Ball, to a graduating Math student who best exemplifies student leadership and dedicated involvement in student affairs on campus for the benefit of Math students.

Note

The criteria for the Dean’s Honours List, as above, were implemented starting with students admitted to the Faculty as degree candidates in the Fall term 1993. Students who were registered as degree candidates in the Faculty prior to Fall 1993 will be required to satisfy the earlier Dean’s Honours List requirements as outlined in the 1992/93 Undergraduate Calendar.
DEPARTMENTAL HONOURS PROGRAMS: REQUIREMENTS

Actuarial Science

The Department of Statistics and Actuarial Science offers courses and programs in Actuarial Science which is the application of mathematics and statistics to financial problems with particular emphasis on life insurance, casualty insurance, and employee benefit programs. The courses offered provide theoretical preparation for the courses of the Society of Actuaries and the Casualty Actuarial Society and include studies of such subject areas as Mathematics of Finance, Life Contingencies, Risk Theory, and Casualty Ratemaking.

By carefully selecting their non-math courses, students can also gain valuable background knowledge in economics, finance, administration, and law.

Honours Actuarial Science

In conjunction with the common degree requirements in Table I in “Degree Requirements” on page 13:4, this program requires at least 26 math half-credits. These overall requirements must include the Faculty core courses outlined in Table II in “Degree Requirements” on page 13:5 and the following courses:

All of
- ACTSC 231 Mathematics of Finance
- ACTSC 232 Introduction to Actuarial Mathematics
- ACTSC 331 Life Contingencies 1
- ACTSC 431 Risk Theory

One of
- ACTSC 332 Life Contingencies 2
- ACTSC 432 Loss Distributions and Credibility Theory

Six additional half-credits chosen from:
- ACTSC 332 Life Contingencies 2
- ACTSC 338 Graduation of Life Tables
- ACTSC 363 Introduction to Casualty Insurance
- ACTSC 432 Loss Distributions and Credibility Theory
- ACTSC 433 Analysis of Mortality Data
- ACTSC 435 Introduction to Demographic Statistics
- ACTSC 453 Basic Pension Mathematics
- ACTSC 462 Casualty Insurance
- C&O 350 Linear Optimization (or ACTSC 335)
- CS 337 Introduction to Numerical Analysis
- STAT 331 Applied Linear Models

All of
- STAT 330 Statistical Theory and Methods
- STAT 333 Applied Probability

Three additional 400-level math half-credits

All of
- ECON 102 Introduction to Macroeconomics
- MTHEL 305A General Life Insurance 1
- MTHEL 305B General Life Insurance 2

Joint Honours Actuarial Science

See “Academic Programs” on page 13:2 for a complete description of Joint program requirements. Note that at least 28 math half-credits are required (MTHEL courses are classified as non-math courses).

All of
- ACTSC 231 Mathematics of Finance
- ACTSC 232 Introduction to Actuarial Mathematics
- ACTSC 331 Life Contingencies 1
- ACTSC 431 Risk Theory
- MTHEL 305A General Life Insurance 1

Two additional 400-level ACTSC half-credits

Two additional half-credits chosen from
- Any 300- or 400-level ACTSC half-credit
- C&O 350 Linear Optimization
- CS 337 Introduction to Numerical Analysis
- MTHEL 305B General Life Insurance 2
- STAT 330 Statistical Theory and Methods
- STAT 331 Applied Linear Models
- STAT 333 Applied Probability

Honours 'X' with Actuarial Science Minor

See “Academic Programs” on page 13:3 for a complete description of Minor program requirements.

All of
- ACTSC 231 Mathematics of Finance
- ACTSC 232 Introduction to Actuarial Mathematics
- ACTSC 331 Life Contingencies 1
- ACTSC 332 Life Contingencies 2
- MTHEL 305A General Life Insurance 1

One of
- ACTSC 431 Risk Theory
- ACTSC 432 Loss Distributions and Credibility Theory

One additional ACTSC half-credit.

POST-DEGREE DIPLOMA IN ACTUARIAL SCIENCE

This pre-professional Diploma program is directed at holders of a Bachelor's degree in an area other than Actuarial Science who wish to obtain the background necessary for entry-level employment in the actuarial profession. Instead of completing the standard Ontario Universities Application Centre application-for-admission form normally used for BMath undergraduate degree studies, applicants interested in this Diploma program should contact the Actuarial Science Graduate Officer directly to apply.

Course Requirements

A Post-Degree Diploma in Actuarial Science requires successful completion of eight half-credits, at least six of
which must be labelled ACTSC. If equivalent credits have not been earned in the student’s previous baccalaureate program, the following three courses must be included in the six ACTSC half-credits:

- ACTSC 231 Mathematics of Finance
- ACTSC 232 Introduction to Actuarial Mathematics
- ACTSC 331 Life Contingencies 1

The remaining courses to satisfy the overall Diploma requirements described above must be selected from the following list:

- All ACTSC courses numbered 330 or higher
- STAT 330, 331, 333, 431, 433, 443
- C&O 350
- CS 337
- MTHEL 305A, 305B
- Other courses approved by the Actuarial Science Graduate Officer.

**Applied Mathematics**

Applied Mathematics is motivated mathematics, or mathematics to a purpose. It reflects the belief that there exists a basic order and harmony in the physical world which may be described by the logical structures of mathematics. Thus, it is no coincidence that some of the greatest mathematicians of the past were also interested in engineering and physics.

This rich, classical tradition of Applied Mathematics is typified by the ongoing work in Theoretical and Fluid Mechanics, General Relativity, and Quantum Theory, at the interface among Mathematics, Theoretical Physics, and Engineering, and covering such diverse areas as the study of supersonic flow, the behaviour of ocean waves, the structure of space-time and cosmology, and the fundamental symmetry properties of the world of atoms and molecules. In addition, newer areas, such as Control Theory and Information Theory, analyze processes ranging from optimal control of a space vehicle to the measuring, coding, and transmission of information. As scientists find out more and more about the mechanisms that make the world ‘tick’, we also find that more, often new, mathematics is necessary to systematize, digest, and take advantage of this wealth of knowledge in all scientific areas. This need is often reflected in a keen interest among applied mathematicians in ordinary and partial differential equations and their discretizations.

In their first two years, all Applied Mathematics students take the same core courses as are taken by other Mathematics students, in order to acquire a sound mathematical background. At the same time, since the application of analytical reasoning to a wide variety of problems is the essence of Applied Mathematics, there is room in the program for introductory courses in scientific disciplines which are heavy users of mathematics, such as Physics or Engineering. In the upper years, the focus is on courses more specifically related to their chosen area of specialization. It is our experience that graduates from any of our programs will find their career opportunities to be excellent and varied.

**Honours Applied Mathematics**

In conjunction with the common degree requirements in Table I in “Degree Requirements” on page 13:4, this program requires at least 26 math half-credits. These overall requirements must include the Faculty core courses outlined in Table II in “Degree Requirements” on page 13:5 and the following courses:

- AM 231 Calculus 4
- AM 261 Newtonian Mechanics
- AM/PMATH 332 Complex Analysis
- AM 351 Ordinary Differential Equations
- AM 353 Partial Differential Equations 1

Three 400-level AM half-credits

Three additional 300- or 400-level AM half-credits

- PHYS 121 Mechanics, Wave Motion and Heat 1
- PHYS 122 Mechanics, Wave Motion and Heat 2

**Recommended**

- AM 251 Elementary Differential Equations and Applications
- AM/PMATH 331 Real Analysis

One additional half-credit chosen from:

- CS 370 Numerical Computation
- AM/PMATH 331 Real Analysis

**Note**

CS 370 may be counted as equivalent to an AM 3xx credit towards an Honours Applied Mathematics degree.

**Joint Honours Applied Mathematics**

See “Academic Programs” on page 13:2 for a complete description of Joint program requirements.

- AM 231 Calculus 4
- AM 261 Newtonian Mechanics
- AM/PMATH 332 Complex Analysis
- AM 351 Ordinary Differential Equations
- AM 353 Partial Differential Equations 1

Three 400-level AM half-credits

One of

- CS 370 Numerical Computation
- AM/PMATH 331 Real Analysis

One additional 300- or 400-level AM half-credit

- PHYS 121 Mechanics, Wave Motion and Heat 1
- PHYS 122 Mechanics, Wave Motion and Heat 2

**Note**

CS 370 may be counted as equivalent to an AM 3xx credit towards an Honours Applied Mathematics degree.
Honours Applied Mathematics with Engineering Electives (Co-operative only)
Enrolment in this program is limited; a cumulative average of 70% or higher is strongly recommended.

In conjunction with the common degree requirements in Table I in "Degree Requirements" on page 13:4, this program requires 25 math half-credits. These overall requirements must include the Faculty core courses outlined in Table II in "Degree Requirements" on page 13:5, all the specific courses listed below, and one of the course packages a)-d).

Due to its highly structured nature, students in this program have only five free-choice elective course slots available in a normal program schedule of 40 courses. In order to introduce a non-technical component into the program, it is required that these electives be chosen from outside the Mathematics, Science, and Engineering faculties.

All of
AM 231 Calculus 4
AM 251 Elementary Differential Equations and Applications
AM 261 Newtonian Mechanics
AM 331 Real Analysis
AM 332 Complex Analysis
AM 351 Ordinary Differential Equations
AM 353 Partial Differential Equations 1
AM 361 Continuum Mechanics
AM 441 Numeric Computation for Dynamic Simulation
AM 451 Introduction to Dynamical Systems
AM 453 Partial Differential Equations 2
CS &O 350 Linear Optimization
CS 230 Introduction to Computers and Computer Systems
CS 370 Numerical Computation
PHYS 115 Mechanics
PHYS 125 Physics for Engineers

Engineering Course Packages: (Consult the Applied Mathematics Undergraduate Handbook for more detailed listings, including the terms in which the courses are normally taken.)

a) Fluids and Heat
All of
AM 463 Fluid Mechanics
M E 126 Scientific Principles of Mechanical Engineering
M E 219 Mechanics of Deformable Solids 1
M E 250 Thermodynamics 1
M E 353 Heat Transfer 1
M E 354 Thermodynamics 2
M E 452 Energy Transfer in Buildings
M E 456 Heat Transfer 2 (or ME 469 Dynamics of the Atmospheric Boundary Layer)
M E 557 Combustion 1 (or ME 571 Air Pollution 1)

b) Systems and Control
All of
E&CE 241 Circuit Analysis and Design
E&CE 342 Signals and Systems
E&CE 380 Control Systems
E&CE 446 Linear Systems
E&CE 481 Design of Digital Control Systems
E&CE 482 Multivariable Control Systems
E&CE 486* Robot Dynamics and Control
GEN E 123 (MAM option) Electrical Engineering

One additional 300- or 400-level AM half-credit

*Students may replace this course with
SY DE 372 Introduction to Pattern Recognition or
SY DE 444 Biomedical Engineering

c) Signals and Communications
All of
E&CE 241 Circuit Analysis and Design
E&CE 318 Communication Systems
E&CE 342 Signals and Systems
E&CE 411 Digital Communications 1
E&CE 412* Digital Communications 2
E&CE 413* Digital Signal Processing
E&CE 446 Linear Systems
GEN E 123 (MAM option) Electrical Engineering

One additional 300- or 400-level AM half-credit

*Students may replace one of these courses with
SY DE 372 Introduction to Pattern Recognition or
SY DE 444 Biomedical Engineering

d) Structural Analysis
All of
CIV E 127 Statics
CIV E 204 Mechanics of Solids 1
CIV E 205 Mechanics of Solids 2
CIV E 303 Structural Analysis 1
CIV E 403* Structural Analysis 2
CIV E 405 Structural Dynamics
M E 212* Dynamics
M E 525 Mechanical Vibrations in Machines

One additional 300- or 400-level AM half-credit

*Students may replace this pair of courses with the pair
CIV E 265 Structure and Properties of Materials and
CIV E 460 Orthopaedic Bioengineering

Honours Applied Mathematics with Physics Electives
In conjunction with the common degree requirements in Table I in "Degree Requirements" on page 13:4, this program has the same course requirements as Honours Applied Mathematics, with the following additional courses required in the non-math component of the program:

Six half-credits in the physical sciences, normally selected from:

CHEM 120 Physical and Chemical Properties of Matter
CHEM 123 Chemical Reactions, Equilibria, Kinetics
PHYS 252 Electricity and Magnetism 1
PHYS 253 Electricity and Magnetism 2
PHYS 256 Geometrical and Physical Optics
PHYS 275 Astrophysics 1 - The Solar System
PHYS 358 Thermodynamics
PHYS 359 Statistical Mechanics
PHYS 375  Astrophysics 2 – Stellar Astronomy  
PHYS 380  Molecular Biophysics  
PHYS 480  Radiation Biophysics  

Honours 'X' with Applied Mathematics Minor  
See “Academic Programs” on page 13:3 for a complete description of Minor program requirements.

All of  
AM 231  Calculus 4  
AM 251  Elementary Differential Equations and Applications  
AM 343  Discrete Models In Applied Mathematics  
AM 351  Ordinary Differential Equations  
AM 353  Partial Differential Equations 1  
AM 451  Introduction to Dynamical Systems  
Two additional 300- or 400-level AM half-credits.

Combinatorics and Optimization  
Combinatorics is the study of discrete structures and their properties. It includes coding theory, combinatorial design, enumeration theory, graph theory and polyhedral theory. Many modern scientific advances have employed combinatorial structures to model the physical world, and recent advances in computational technology have made such investigations feasible. In particular, since computers process discrete data, Combinatorics has become indispensable to Computer Science.

Optimization, or mathematical programming, is the study of maximizing and minimizing functions subject to specified boundary conditions or constraints. The functions to be optimized arise in engineering, the physical and management sciences, and in various branches of mathematics. With the emergence of computers, Optimization experienced a dramatic growth as a mathematical theory, enhancing both Combinatorics and classical analysis. In its applications to engineering and management sciences, Optimization forms an important part of the discipline of Operations Research.

Both Combinatorics and Optimization have long been special interests of Canadian mathematicians. Indeed, Waterloo was the first university in the world to have a Department of Combinatorics and Optimization, and it continues to be a leading centre for teaching and research in the theories and applications of these disciplines.

Honours Combinatorics and Optimization  
In conjunction with the common degree requirements in Table I in “Degree Requirements” on page 13:4, this program requires at least 26 math half-credits. These overall requirements must include the Faculty core courses outlined in Table II in “Degree Requirements” on page 13:5 and the following courses:

All of  
C&O 230  Introduction to Combinatorics  
One of  
C&O 350  Linear Optimization  
C&O 355  Mathematical Optimization  
One of  
C&O 330  Combinatorial Enumeration  
C&O 342  Introduction to Graph Theory  

One of  
C&O 351  Network Flow Theory  
C&O 367  Nonlinear Optimization  
(If C&O 355 is taken, this requirement can be satisfied by taking one of C&O 450-466.)

Three additional half-credits chosen from:  
C&O 330  Combinatorial Enumeration  
C&O 331  Coding Theory  
C&O 342  Introduction to Graph Theory  
C&O 351  Network Flow Theory  
C&O 355  Mathematical Optimization  
C&O 367  Nonlinear Optimization  
C&O 430 - 466  

All of  
PMATH 336  Introduction to Group Theory  
Two of  
AM/PMATH 331  Real Analysis  
AM/PMATH 332  Complex Analysis  
PMATH 334  Introduction to Rings and Fields  
(AM/PMATH 331 may be replaced by one of CS 337, 370)  
Two additional 300- or 400-level math half-credits with a course prefix other than C&O  
One additional 300- or 400-level math half-credit

Joint Honours Combinatorics and Optimization  
See “Academic Programs” on page 13:2 for a complete description of Joint program requirements.

All of  
C&O 230  Introduction to Combinatorics  
One of  
C&O 350  Linear Optimization  
C&O 355  Mathematical Optimization  

Four additional half-credits chosen from:  
C&O 330  Combinatorial Enumeration  
C&O 331  Coding Theory  
C&O 342  Introduction to Graph Theory  
C&O 351  Network Flow Theory  
C&O 355  Mathematical Optimization  
C&O 367  Nonlinear Optimization  
C&O 430 - 466  

All of  
PMATH 336  Introduction to Group Theory  
Two of  
AM/PMATH 331  Real Analysis  
AM/PMATH 332  Complex Analysis  
PMATH 334  Introduction to Rings and Fields  
(AM/PMATH 331 may be replaced by one of CS 337, 370)
Honours ‘X’ with Combinatorics and Optimization

Minor
See “Academic Programs” on page 13:3 for a complete description of Minor program requirements.

All of
- C&O 230 Introduction to Combinatorics
One of
- C&O 350 Linear Optimization
- C&O 355 Mathematical Optimization
One of
- C&O 330 Combinatorial Enumeration
- C&O 342 Introduction to Graph Theory
Two additional half-credits chosen from:
- C&O 330 Combinatorial Enumeration
- C&O 331 Coding Theory
- C&O 342 Introduction to Graph Theory
- C&O 351 Network Flow Theory
- C&O 367 Nonlinear Optimization
- C&O 430 - 466

OPERATIONS RESEARCH
Operations Research is the field of mathematics that deals with the problems of management in business and government. It involves constructing mathematical models of complex real world situations and then applying sophisticated techniques to these models in order to make optimal, or near optimal, decisions. The three major components of the discipline of Operations Research are Optimization, Statistics and Computer Science.

The Honours program in Operations Research combines a solid foundation in mathematics with special sequences of courses in economics, business and management science. The mathematics portion of the program includes linear programming, modelling, scheduling, forecasting, decision theory and computer simulation.

In Canada, employers of Operations Research graduates are found in manufacturing, distribution and retail companies, mining, transportation, banking, health services, education, and government agencies. Students proceeding to a Master’s of Business Administration degree (MBA) find that a degree in mathematics, emphasizing Operations Research, together with relevant work-term experience, is an excellent preparation for a rewarding career.

Honours Operations Research
In conjunction with the common degree requirements in Table I in “Degree Requirements” on page 13:4, this program requires at least 26 math half-credits, of which at least four must be 400-level math half-credits. These overall requirements must include the Faculty core courses outlined in Table II in “Degree Requirements” on page 13:5 and the following courses:

One of
- C&O 350 Linear Optimization
- C&O 355 Mathematical Optimization

Mathematics
Combinatorics and Optimization

All of
- C&O 351 Network Flow Theory
- C&O 370 Deterministic OR Models
- CS 230 Introduction to Computers and Computer Systems
- CS 337 Introduction to Numerical Analysis
- STAT 331 Applied Linear Models
- STAT 333 Applied Probability
- STAT 371 Stochastic OR Models
(If C&O 355 is taken, one of C&O 450-466 may be taken instead of C&O 351.)

Five of
- C&O 230 Introduction to Combinatorics
- C&O 342 Introduction to Graph Theory
- C&O 367 Nonlinear Optimization
- C&O 437 Cryptography and Communications Security
- C&O 450 Combinatorial Optimization
- C&O 452 Integer Programming
- C&O 453 Network Design
- C&O 454 Scheduling
- C&O 463 Convex Optimization and Analysis
- C&O 466 Continuous Optimization
- CS 432 Business Systems Analysis
- CS 457 System Performance Evaluation
- STAT 332 Sampling
- STAT 335 Statistical Process Control
- STAT 433 Stochastic Processes
- STAT 443 Forecasting

All of
- ECON 101 Introduction to Microeconomics
- M SCI 211 Organizational Behaviour

One of
- ACC 121 Understanding and Using Financial Accounting Information
- ACC 122 Understanding and Using Managerial Accounting

Two additional courses selected from
- ACC 122 Understanding and Using Managerial Accounting Information
- ECON 102 Introduction to Macroeconomics
- M SCI 311 Organizational Design and Technology
- M SCI 432 Introduction to Production Management

Recommended
- BUS 352W Marketing I
- DRAMA 223 Public Speaking

(BUS 352W is offered by Wilfrid Laurier’s School of Business and Economics. See “Business-Related Programs”.)

Students enrolled in a Double Honours program in Computer Science and Operations Research must replace the Computer Science courses listed above with the equivalent courses required by Honours Computer Science Major students.
Computer Science

Computer Science is centered around the study of information. It is concerned with the nature and properties of information, its structure and classification, its storage and retrieval, and the various types of processing to which it can be subjected. It is also concerned with the physical machines that perform these operations, with the elemental units of which these machines are composed, with the organization of these units into efficient information processing systems, and with the exploration of the limits of the abilities of these machines.

Computer Science is recognized as an independent discipline with an inherently mathematical nature. Its activity ranges from theoretical areas such as the theory of automata, system organization and logic design, formal languages and computability theory to applied areas such as scientific computing, programming languages, software management and computer systems.

The advent of the computer has facilitated a systems approach to solving many problems in science, business and industry. There is currently a great demand for information analysts to define how systems will perform these functions and for programmers to implement production systems on computers.

The Computer Science program is designed to prepare students for the challenges of a career in this rapidly evolving technological environment. Considerable emphasis is placed on learning fundamental principles throughout the program. As well, students have the opportunity to explore the ways in which these principles are exploited in current practice and likely future developments.

Computer Science Major Programs

There are a number of specialized Computer Science major programs in addition to Honours Computer Science. These specialized programs include: Honours Computer Science with Electrical Engineering Electives, Honours Computer Science/Information Systems Option, Honours Computer Science/Software Engineering Option and all Joint or Double Honours BMath programs involving Computer Science as one of the explicitly designated major areas of study.

Students interested in Computer Science Major programs will normally be admitted to the faculty in Honours Computer Science and may select any of the specialized programs at the beginning of their second year. They should see a Computer Science advisor and select one of the specialized programs when preregistering for their first term in second year.

Late admission to a Computer Science Major program is handled by seeing a Computer Science advisor during preregistration or registration for 2A or later. Admission will be based on the student’s academic record.

Honours Computer Science

In conjunction with the common degree requirements in Table I in “Degree Requirements” on page 134, this program requires at least 26 math half-credits. A maximum of six CS half-credits at the 400-level may be included in the 40 half-credits presented for a degree. These overall requirements must include the Faculty core courses outlined in Table II in “Degree Requirements” on page 135 and the following courses:

All of
- CS 241 Foundations of Sequential Programs
- CS 246 Software Abstraction and Specification
- CS 340 Data Structures and Algorithms
- CS 342 Concurrent Programming
- CS 351 Digital Design and Architecture
- CS 354 Operating Systems
- CS 360 Introduction to the Theory of Computing
- CS 370 Numerical Computation

One of
- CS 457 System Performance Evaluation
- CS 462 Formal Languages and Parsing
- CS 464 Computational Complexity Theory
- CS 466 Algorithm Design and Analysis
- CS 472 Numerical Linear Algebra
- AM 441/CS 476 Numeric Computation for Dynamic Simulation
- CS 487 Introduction to Symbolic Computation

Two additional 400-level CS half-credits chosen from CS 440 - 498

Students who do not take CS 130 will be required to take an additional third- or fourth-year CS Major course.

All of
- C&O 230 Introduction to Combinatorics

Four of
- ACTSC 232 Introduction to Actuarial Mathematics
- AM 231 Calculus 4
- AM 250 Modelling with Ordinary Differential Equations
- AM/PMATH 331 Real Analysis
- AM/PMATH 332 Complex Analysis
- AM 351 Ordinary Differential Equations
- C&O 330 Combinatorial Enumeration
- C&O 342 Introduction to Graph Theory
- C&O 350 Linear Optimization
- PMATH 330 Introduction to Mathematical Logic
- PMATH 334 Introduction to Rings and Fields
- PMATH 336 Introduction to Group Theory
- STAT 333 Applied Probability
- STAT 433 Stochastic Processes

Joint Honours Computer Science

See “Academic Programs” on page 132 for a complete description of Joint program requirements.

All of
- CS 241 Foundations of Sequential Programs
- CS 246 Software Abstraction and Specification
- CS 340 Data Structures and Algorithms

Two of
- CS 342 Concurrent Programming
- CS 351 Digital Design and Architecture
- CS 360 Introduction to the Theory of Computing
- CS 370 Numerical Computation
Two additional 400-level CS-half credits chosen from CS 440 - 498

One additional CS half-credit chosen from CS 342, 351, 354, 360, 370, 440-498

Students who do not take CS 130 will be required to take an additional third- or fourth-year CS Major course.

All of
C&O 230 Introduction to Combinatorics

Honours Computer Science with Electrical Engineering Electives

Enrolment in this program is limited. A cumulative average of 70% or higher is strongly recommended.

In conjunction with the common degree requirements in Table I in “Degree Requirements” on page 13:4, this program requires at least 26 math half-credits. A maximum of six CS half-credits at the 400-level may be included in the 40 half-credits presented for a degree. These overall requirements must include the Faculty core courses outlined in Table II in “Degree Requirements” on page 13:5 and the following courses:

All of
CS 241 Foundations of Sequential Programs
CS 246 Software Abstraction and Specification
CS 340 Data Structures and Algorithms
CS 342 Concurrent Programming
CS 354 Operating Systems
CS 360 Introduction to the Theory of Computing
CS 370 Numerical Computation

Two of
CS 450 Computer Architecture
CS 462 Real-time Programming
CS 454 Distributed Systems
CS 457 System Performance Evaluation
One additional 400-level CS half-credit chosen from CS 440 - 498

Students who do not take CS 130 will be required to take an additional third- or fourth-year CS Major course.

All of
C&O 230 Introduction to Combinatorics

Four of
ACTSC 232 Introduction to Actuarial Mathematics
AM 231 Calculus 4
AM 250 Modelling with Ordinary Differential Equations
AM/PMATH 331 Real Analysis
AM/PMATH 332 Complex Analysis
AM 351 Ordinary Differential Equations
C&O 330 Combinatorial Enumeration
C&O 342 Introduction to Graph Theory
C&O 350 Linear Optimization
PMATH 330 Introduction to Mathematical Logic
PMATH 334 Introduction to Rings and Fields
PMATH 336 Introduction to Group Theory
STAT 333 Applied Probability
STAT 433 Stochastic Processes

Mathematics
Computer Science

All of
E&CE 222 Digital Computers
E&CE 223 Digital Circuits and Systems
E&CE 241 Circuit Analysis and Design
E&CE 427 Digital Systems Engineering
GEN E 123 Electrical Engineering
PHYS 352 Analogue Electronics
PHYS 352L Analogue Electronics Laboratory

Recommended for students who do well in PHYS 352
E&CE 438 Switching and Digital Circuits

Honours Computer Science/Information Systems Option

In conjunction with the common degree requirements in Table I in “Degree Requirements” on page 13:4, this program requires at least 25 math half-credits. A maximum of six CS half-credits at the 400-level may be included in the 40 half-credits presented for a degree. These overall requirements must include the Faculty core courses outlined in Table II in “Degree Requirements” on page 13:5 and the following courses:

All of
CS 241 Foundations of Sequential Programs
CS 246 Software Abstraction and Specification
CS 340 Data Structures and Algorithms
CS 342 Concurrent Programming
CS 351 Digital Design and Architecture
CS 354 Operating Systems
CS 360 Introduction to the Theory of Computing
CS 370 Numerical Computation

Three additional 400-level CS half-credits chosen from CS 440 - 498. Recommended courses are:

CS 445 Software Requirements Specification and Analysis
CS 446 Software Design and Architectures
CS 447 Software Testing, Quality Assurance and Maintenance
CS 448 Introduction to Database Management
CS 454 Distributed Systems
CS 480 Information Systems Management

Students who do not take CS 130 will be required to take an additional third- or fourth-year CS Major course.

All of
C&O 230 Introduction to Combinatorics

Three of
C&O 342 Introduction to Graph Theory
C&O 350 Linear Optimization
C&O 370 Deterministic OR Models
C&O 453 Network Design
C&O 454 Scheduling
PMATH 330 Introduction to Mathematical Logic
STAT 330 Statistical Theory and Methods
STAT 331 Applied Linear Models
STAT 332 Sampling
STAT 333 Applied Probability
STAT 335 Statistical Process Control
STAT 371 Stochastic OR Models
STAT 443 Forecasting
STAT 450 Estimation and Hypothesis Testing

Ten half-credits chosen from ACC, BUS, ECON, and ISCI. Recommended courses are:

ACC 121 Understanding and Using Financial Accounting Information
ACC 122 Understanding and Using Managerial Accounting Information
BUS 111W Introduction to Business Organization
BUS 121W Functional Areas of the Organization
BUS 352W Marketing I
BUS 454W Personnel Management
BUS 481W Business Policy I
BUS 491W Business Policy II
ECON 101 Introduction to Micro-economics
ECON 102 Introduction to Macroeconomics
M SCI 211 Organizational Behaviour
M SCI 311 Organizational Design and Technology

Additional recommended half-credits
DRAMA 223 Public Speaking
ENGL 210 Writing Courses
MTHEL 100 Commercial and Business Law for Mathematics Students
PHIL 215 Professional and Business Ethics
STV Courses

Courses labeled BUS are offered by Wilfrid Laurier's School of Business and Economics (see "Business-Related Programs").

Honours Computer Science/Software Engineering Option

This Option is offered jointly by the Departments of Computer Science and Electrical and Computer Engineering. The rationale for the program is described in the "Options and Electives for Engineering Students" section of the Engineering chapter.

The course requirements specific to the Option are identical in each Faculty and differ only in the Faculty and Departmental requirements.

The complete requirements for the version offered in the Computer Science Department are listed below.

Faculty Requirements

In conjunction with the common degree requirements in Table I in "Degree Requirements" on page 13:4, this program requires at least 28 math half-credits. A maximum of six CS half-credits at the 400-level may be included in the 40 half-credits presented for a degree. These overall requirements must include the Faculty core courses outlined in Table II in "Degree Requirements" on page 13:5 and the courses in the Departmental Requirements and Options Requirements sections below.

Departmental Requirements

All of: (additional mathematics core)

C&O 230 Introduction to Combinatorics

All of: (additional mathematics foundations)

ACTSC 232 Introduction to Actuarial Mathematics
AM 231 Calculus 4
AM 250 Modeling with Ordinary Differential Equations

AM/PMATH 331 Real Analysis
AM/PMATH 332 Complex Analysis
AM 351 Ordinary Differential Equations
C&O 330 Combinatorial Enumeration
C&O 342 Introduction to Graph Theory
C&O 350 Linear Optimization
PMATH 330 Introduction to Mathematical Logic
PMATH 334 Introduction to Rings and Fields
PMATH 336 Introduction to Group Theory
STAT 333 Applied Probability
STAT 433 Stochastic Processes

Option Requirements

All of: (central concepts [for BMath students])
CS 241 Foundations of Sequential Programs
CS 246 Software Abstraction and Specification
CS 340 Data Structures and Algorithms
CS 342 Concurrent Programming
CS 351 Digital Design and Architecture
CS 354 Operating Systems
CS 360 Introduction to the Theory of Computing
CS 370 Numerical Computation
CS 448 Introduction to Database Management

All of: (central concepts [for BASc students])
E&CE 203 Discrete Mathematics
E&CE 222 Digital Computers
E&CE 223 Digital Circuits and Systems
E&CE 250 Algorithms and Data Structures
E&CE 304 Numerical Methods
E&CE 324 Microprocessor Systems and Interfacing
E&CE 354 Real-time Operating Systems
E&CE 380 Control Systems
E&CE 456 Database Systems

All of: (Option foundations)
CS 445/E&CE 451 Software Requirements Specification and Analysis
CS 446/E&CE 452 Software Design and Architectures
CS 447/E&CE 453 Software Testing, Quality Assurance and Maintenance

Two of: (Option applications)
CS 444 Compiler Construction
CS 452 Real-time Programming
CS 454 Distributed Systems
CS 457 System Performance Evaluation
CS 466 Algorithm Design and Analysis
CS 486 Introduction to Artificial Intelligence
CS 488 Introduction to Computer Graphics
E&CE 428 Computer Communications Networks
E&CE 429 Computer Structures
E&CE 457 Applied Artificial Intelligence
E&CE 485 Computer Control Applications

One of: (Option linkage to societal issues)
CS 492 The Social Implications of Computers
CS 494 Computers and the Law of Information Technology
ME 401 Law for the Professional Engineer
GEN E 411 Engineering Law
PHIL 207 Science, Technology, and Society
PHIL 215  Professional and Business Ethics
PHIL 315  Ethics and the Engineering Profession
STV 100  Society, Technology and Values: Introduction
STV 202  Design and Society
STV 402  Technology and Canadian Society

One of: (Option linkage to business issues)
BUS 111W  Introduction to Business Organization
BUS 121W  Functional Areas of the Organization
GEN E 452  Technical Entrepreneurship
HRM 200  Basic Personnel Administration
M SCI 211  Organizational Behaviour
M SCI 311  Organizational Design and Technology

One of: (Option linkage to reasoning methodologies)
PHIL 145  Critical Thinking
PHIL 200J  Intentional Logic
PHIL 241  Intermediate Logic
PHIL 242  Extensions and Applications of Elementary Logic
PHIL 245  Critical Thinking 2
PHIL 443  Creative Thinking, Problem Solving and Decision Making
PMATH 330  Introduction to Mathematical Logic 1

Option linkage: one additional course from the three linkage lists above or one course chosen from the suggested communications courses listed below. (Students should be aware that these courses may have enrollment limits, or may not fit their schedules).

DRAMA 223  Public Speaking
DRAMA 224  Interpersonal Communication
DRAMA 225  Interviewing
DRAMA 324  Small Group Communication
ENGL 109  Introduction to Academic Writing
ENGL 140R  The Use of English 1
ENGL 209  Writing Strategies
ENGL 210E  Technical Writing
ENGL 210F  Business Writing
ENGL 219  Contemporary Usage
ENGL 309E/DRAMA 323  Speech Writing
ENGL 335  Creative Writing 1
ENGL 376R  Applied English Grammar 1
ENGL 392A  Theories and Practices of Documentation
ENGL 392B  The Rhetoric of Text and Image

Honours 'X' with Computer Science Minor
See “Academic Programs” on page 13:3 for a complete description of Minor program requirements.

All of
CS 134  Principles of Computer Science
CS 334  Data Types and Structures

One of
CS 230  Introduction to Computers and Computer Systems
CS 246  Software Abstraction and Specification

Five additional CS half-credits.

Mathematics
Computer Science
Honours Mathematics

Note
Honours students in faculties other than Mathematics wishing a “Minor” in Computer Science should consult the section “Combination Honours Programs Leading to a Degree with Another Faculty”.

Pure Mathematics

Mathematics is both an art and a science, and Pure Mathematics lies at its heart. Many study Pure Mathematics for the pursuit of knowledge for its own sake and because of its beauty, while others want a strong foundation for graduate work or with a view to applying their knowledge. Pure Mathematics courses explore the boundary of Mathematics and pure reason; they stimulate the mind, promise intellectual growth, and are an asset to any program. We hope to impart in our students a love for learning, and to develop their abilities to work independently and to think critically and creatively. This is achieved with small classes and a supportive atmosphere in which all students are challenged to fulfill their academic potential.

Pure Mathematics graduates have been successful in a wide variety of careers. Many go into industry as the skills they have acquired are recognized by employers as being valuable and transferable. Others go into education at all levels or continue their studies at graduate school in either Mathematics or some other discipline.

Pure Mathematics comprises a broad spectrum of Mathematics. Interests of the Department include algebra, number theory, analysis, geometry, topology, logic and functional equations, and range from the very classical to the most modern. The Department offers several programs. All are available to both co-op and regular students. Many students have found it rewarding to combine Pure Mathematics with another mathematical discipline, and for such students joint programs are available.

Students from other departments, especially those considering pursuing graduate work (in any area of Mathematics), are encouraged to speak with a Pure Mathematics advisor about which Pure Mathematics courses would be particularly important, interesting and beneficial for them. A more detailed description of the Department and its programs may be found in the Pure Mathematics Undergraduate Handbook, available upon request.

Honours Pure Mathematics

In conjunction with the common degree requirements in Table I in “Degree Requirements” on page 13:4, this program requires at least 26 math half-credits. These overall requirements must include the Faculty core courses outlined in Table II in “Degree Requirements” on page 13:5 and the following courses:

All of
PMATH 343  Abstract Algebra 1
PMATH 344  Abstract Algebra 2
PMATH 351  Real Analysis
PMATH 352  Complex Analysis
PMATH 353  Fourier Analysis
PMATH 367  Set Theory and General Topology
One of
   PMATH 441 Algebraic Number Theory
   PMATH 444 Non-Commutative Algebra
   PMATH 446 Group Theory
   PMATH 448 Commutative Algebra

One of
   PMATH 451/AM 431 Measure and Integration
   PMATH 452 Topics in Complex Analysis
   PMATH 453/AM 432 Functional Analysis

Three additional 400-level PMATH half-credits

All of
   C&O 230 Introduction to Combinatorics

Two additional 400-level math half-credits

Joint Honours Pure Mathematics

See "Academic Programs" on page 13:2 for a complete description of Joint program requirements.

All of
   PMATH 343 Abstract Algebra 1
   PMATH 344 Abstract Algebra 2
   PMATH 351 Real Analysis
   PMATH 352 Complex Analysis

One of
   PMATH 353 Fourier Analysis
   PMATH 367 Set Theory and General Topology

Three additional 400-level PMATH half-credits

One additional 300- or 400-level Group 2 PMATH half-credit

Notes
   The following requirements and recommendations also apply for the Joint Honours partners indicated:
   1. AM: PMATH 333 required, PMATH 451, 453 strongly recommended
   2. C&O: at least one of PMATH 444, 446, 448 is strongly recommended
   3. CS: one of PMATH 432, 444, 446, and 448 is required
   4. STAT: PMATH 451 required

Honours 'X' with Pure Mathematics Minor

See "Academic Programs" on page 13:3 for a complete description of Minor program requirements.

All of
   PMATH 343 Abstract Algebra 1
   PMATH 344 Abstract Algebra 2
   PMATH 351 Real Analysis
   PMATH 352 Complex Analysis

Two additional 300- or 400-level Group 2 PMATH half-credits.

Mathematics
Pure Mathematics
Statistics

Statistics

Statistics is the branch of modern applied mathematics which deals with the collection and analysis of data. Statistical methods are extensively used in Biology, Medicine, Health Sciences, Agriculture, Business, Economics, Engineering, and many other fields. Claims based on statistical arguments appear daily in the press, and it is difficult to assess these intelligently without some knowledge of statistical methods.

The statistician's first job is to determine what data to collect, and how to collect it so that it will be without bias or distortion. These problems are dealt with in the Design of Experiments and Sample Surveys. Statistical Inference is concerned with inferring what the population is like on the basis of a small amount of data (the sample). The link between population and sample is provided by Probability Theory, which forms an important part of the Statistics curriculum. Often the purpose of collecting data is to assist in reaching a decision, so the field of Decision Theory is also a part of Statistics.

Many other areas of pure and applied mathematics find applications in Statistics. Calculus and linear algebra are used extensively in the undergraduate program; abstract algebra, combinatorics, difference and differential equations, analysis, and measure theory are required in more advanced work. Most statistical analyses involve the computer, so a good background in computing is highly desirable.

Honours Statistics

In conjunction with the common degree requirements in Table I in "Degree Requirements" on page 13:4, this program requires at least 26 math half-credits. A maximum of ten STAT half-credits at the 300- or 400-level may be included in the 40 half-credits presented for a degree. These overall requirements must include the Faculty core courses outlined in Table II in "Degree Requirements" on page 13:5 and the following courses:

All of
   STAT 330 Statistical Theory and Methods
   STAT 331 Applied Linear Models
   STAT 332 Sampling
   STAT 333 Applied Probability
   STAT 430 Experimental Design
   STAT 450 Estimation and Hypothesis Testing

One additional 400-level STAT half-credit

Four of
   ACTSC 431 Risk Theory
   ACTSC 432 Loss Distributions and Credibility Theory
   AM/PMATH 331 Real Analysis
   AM/PMATH 332 Complex Analysis
   AM 351 Ordinary Differential Equations
   AM 353 Partial Differential Equations 1
   AM 451 Introduction to Dynamical Systems
   C&O 330 Combinatorial Enumeration
   C&O 350 Linear Optimization
CS 337  Introduction to Numerical Analysis
PMATH 334  Introduction to Rings and Fields
PMATH 353  Fourier Analysis
PMATH 452  Topics in Complex Analysis

Three additional 300- or 400-level math half-credits

Joint Honours Statistics
See “Academic Programs” on page 13:2 for a complete description of Joint program requirements.

All of
STAT 330  Statistical Theory and Methods
STAT 331  Applied Linear Models
STAT 333  Applied Probability
STAT 450  Estimation and Hypothesis Testing

One additional 300-level STAT half-credit
Two additional 400-level STAT half-credits
Two additional 300- or 400-level math half-credits not included among the courses used to satisfy the requirements of the other Joint Honours department.

Honours Applied Statistics with Engineering Electives (Co-operative only)
The requirements for this program include those for the Honours Statistics program described above. In addition, the non-math half-credits must include one of the groups of Engineering courses listed below. Where necessary, PHYS 121/122 and CHEM 120/123 should normally be taken in Year One. The Engineering courses are taken in Years Two to Four.

Group
Chemical
CH E 021, 023, 026, 031, 037, 041
CHEM 120/123, PHYS 121/122
Civil (transportation)
CIV E 126, 292, 340, 342, 343, 344
PHYS 121/122
Groups of courses in Fluid Mechanics and Hydrology, and Water Quality Control are also available*.
Management Sciences
M SCI 211, 261, 311, 432, 452, 461
Mechanical
M E 215, 219, 250, 321, 351 and one of 340, 348
PHYS 121/122
Groups of courses in Automation, Production, Materials, Solid Body Mechanics and Thermofluids are also available*.
Systems Design
SY DE 281, 364, 364, 432, 544, 555
PHYS 121/122

* Details are available in the Statistics Undergraduate Studies Handbook.

Note
An Option in Statistics for students in the Faculty of Engineering is described in “Complementary Studies Requirements”.

Honours 'X' with Statistics Minor
See “Academic Programs” on page 13:3 for a complete description of Minor program requirements.

Three of
STAT 330  Statistical Theory and Methods
STAT 331  Applied Linear Models
STAT 332  Sampling
STAT 333  Applied Probability

Two additional 300- or 400-level STAT half-credits.

FACULTY HONOURS PROGRAMS:
REQUIREMENTS

Business-Related Programs
The Faculty of Mathematics, in co-operation with the School of Accountancy and the Departments of Economics and Management Sciences at the University of Waterloo (UW) and the School of Business and Economics at Wilfrid Laurier University (WLU), offers three unique Honours programs, Mathematics/Management Administration, Mathematics/Chartered Accountancy, and Mathematics/Management Accountancy, which combine mathematics with accounting and business-related disciplines. In addition, two of the departmental Honours programs, Operations Research and Computer Science/Information Systems, combine more specialized study in the mathematical sciences with similar business-oriented courses.

In addition to providing excellent background preparation for careers in industry, all of these programs can lead to post-graduate studies in business-oriented disciplines. The Mathematics/Chartered Accountancy undergraduate program, in particular, is specifically designed to be a prelude to UW's two-term Master of Accountancy (MAcc) graduate degree program in the Faculty of Arts.

Required BUS Courses At WLU
In the program requirements which follow, courses with prefix BUS are offered by WLU's School of Business and Economics. Course descriptions, including prerequisites and the terms in which these courses are normally available to UW students, can be found in the “Math Students' Handbook”. Copies are available in the Mathematics Undergraduate Office (MC 5115).

BUSINESS ADMINISTRATION
The Mathematics/Business Administration programs provide an opportunity to combine courses in Actuarial...
Science, Computer Science, Optimization, and Statistics with courses in Accounting, Business, Economics, and Management Science. Graduates of these programs are well prepared to use sophisticated analytical techniques in the solution of business-related problems and adapt to the rapidly changing modern business environment.

Honours Mathematics/Business Administration Option – Systems Management Package

In conjunction with the common degree requirements in Table I in "Degree Requirements" on page 13:4, this program requires at least 20 math half-credits. These overall requirements must include the Faculty core math courses outlined in Table II in "Degree Requirements" on page 13:5 and the following courses:

All of
- C&O 350 Linear Optimization
- CS 330 Management Information Systems
- CS 338 Computer Applications in Business: Databases
- CS 432 Business Systems Analysis
- STAT 331 Applied Linear Models

All of
- C&O 351 Network Flow Theory
- C&O 370 Deterministic OR Models
- STAT 332 Sampling
- STAT 443 Forecasting

One of the above four C&O and STAT courses may be replaced by an additional 300- or 400-level CS half-credit

One additional free-choice math half-credit

All of
- ACC 122 Understanding and Using Managerial Accounting Information
- BUS 111W Introduction to Business Organization
- BUS 121W Functional Areas of the Organization
- BUS 352W Marketing I
- BUS 481W Business Policy I
- BUS 491W Business Policy II
- ECON 101 Introduction to Microeconomics
- ECON 102 Introduction to Macroeconomics
- ECON 371 (or ACC 371) Business Finance 1
- ECON 372 (or ACC 372) Business Finance 2
- M SCI 211 Organizational Behaviour
- M SCI 311 Organizational Design and Technology
- MTHEL 100 Commercial and Business Law for Mathematics Students

One of
- BUS 440W New Venture Creation
- ECON 220 The Principles of Entrepreneurship

One of
- BUS 443W International Financial Management
- ECON 231 Introduction to International Economics

Two additional half-credits chosen from:
- BUS 362W Marketing II
- BUS 443W International Financial Management
- BUS 454W Managing Human Resources in Canada
- BUS 462W Business Marketing Management

Honours Mathematics/Business Administration Option – Risk Management and Insurance Package

In conjunction with the common degree requirements in Table I in "Degree Requirements" on page 13:4, this program requires at least 20 math half-credits. These overall requirements must include the Faculty core math courses outlined in Table II in "Degree Requirements" on page 13:5 and the following courses:

All of
- ACTSC 231 Mathematics of Finance
- ACTSC 232 Introduction to Actuarial Mathematics
- CS 330 Management Information Systems
- CS 338 Computer Applications in Business: Databases

Three 400-level ACTSC half-credits, one of which may be replaced by ACTSC 363

Three of
- C&O 350 Linear Optimization
- C&O 370 Deterministic OR Models
- STAT 331 Applied Linear Models
- STAT 333 Applied Probability
- STAT 443 Forecasting

One of the above three courses may be replaced by an additional 400-level ACTSC half-credit

All of
- ACC 122 Understanding and Using Managerial Accounting Information
- BUS 111W Introduction to Business Organization
- BUS 121W Functional Areas of the Organization
- BUS 352W Marketing I
- BUS 481W Business Policy I
- BUS 491W Business Policy II
- ECON 101 Introduction to Microeconomics
- ECON 102 Introduction to Macroeconomics
- ECON 371 (or ACC 371) Business Finance 1
- ECON 372 (or ACC 372) Business Finance 2
- M SCI 211 Organizational Behaviour
- M SCI 311 Organizational Design and Technology
- MTHEL 100 Commercial and Business Law for Mathematics Students
- MTHEL 305A General Life Insurance 1
- MTHEL 305B General Life Insurance 2

One of
- BUS 440W New Venture Creation
- ECON 220 The Principles of Entrepreneurship

One of
- BUS 443W International Financial Management
- ECON 231 Introduction to International Economics

Honours Mathematics/Business Administration Option – Economics Package

In conjunction with the common degree requirements in Table I in "Degree Requirements" on page 13:4, this program requires at least 20 math half-credits. These overall requirements must include the Faculty core math courses outlined in Table II in "Degree Requirements" on page 13:5 and the following courses:

All of
- ACC 122 Understanding and Using Managerial Accounting Information
- BUS 111W Introduction to Business Organization
- BUS 121W Functional Areas of the Organization
- BUS 352W Marketing I
- BUS 481W Business Policy I
- BUS 491W Business Policy II
- ECON 101 Introduction to Microeconomics
- ECON 102 Introduction to Macroeconomics
- ECON 371 (or ACC 371) Business Finance 1
- ECON 372 (or ACC 372) Business Finance 2
- M SCI 211 Organizational Behaviour
- M SCI 311 Organizational Design and Technology
- MTHEL 100 Commercial and Business Law for Mathematics Students
- MTHEL 305A General Life Insurance 1
- MTHEL 305B General Life Insurance 2

One of
- BUS 440W New Venture Creation
- ECON 220 The Principles of Entrepreneurship

One of
- BUS 443W International Financial Management
- ECON 231 Introduction to International Economics

Two additional half-credits chosen from:
- BUS 362W Marketing II
- BUS 443W International Financial Management
- BUS 454W Managing Human Resources in Canada
- BUS 462W Business Marketing Management
requirements must include the Faculty core math courses outlined in Table II in "Degree Requirements" on page 13:5 and the following courses:

All of
- C&O 350 Linear Optimization
- CS 330 Management Information Systems
- CS 338 Computer Applications in Business: Databases
- CS 432 Business Systems Analysis
- STAT 331 Applied Linear Models

All of
- C&O 351 Network Flow Theory
- C&O 370 Deterministic OR Models
- STAT 332 Sampling
- STAT 443 Forecasting

One of the above four C&O and STAT courses may be replaced by an additional 300- or 400-level CS half-credit

One additional free-choice math half-credit

All of
- ACC 122 Understanding and Using Managerial Accounting Information
- BUS 111W Introduction to Business Organization
- BUS 121W Functional Areas of the Organization
- BUS 352W Marketing I
- BUS 481W Business Policy I
- BUS 491W Business Policy II
- ECON 101 Introduction to Microeconomics
- ECON 102 Introduction to Macroeconomics
- ECON 201 Microeconomic Theory I
- ECON 202 Macroeconomic Theory 1
- ECON 301 Microeconomic Theory 2

One of
- BUS 440W New Venture Creation
- ECON 220 The Principles of Entrepreneurship

One of
- M SCI 211 Organizational Behaviour
- M SCI 311 Organizational Design and Technology

One of
- ACC 121 Understanding and Using Financial Accounting Information (see Note 1 below)
- MTHEL 100 Commercial and Business Law for Mathematics Students
- An additional 300- or 400-level ECON half-credit (see Notes 1 and 2 below)

Four additional 300- or 400-level ECON half-credits (see Note 2 below)

**Notes**

1. ACC 121 is no longer open to students with credit for OAC Accounting (or the equivalent), and the revised prerequisite for ACC 122 is "ACC 121 or OAC Accounting". Students without OAC Accounting will have to complete ACC 121, as their choice from the "One of" list above, in order to have the prerequisite for ACC 122. Students having credit for OAC Accounting will have to select MTHEL 100 or an additional senior Economics course instead of ACC 121.

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**Mathematics**

Business-Related Programs

2. For their selection of 300- or 400-level ECON courses and two free-choice elective courses, students may wish to consider tailoring their choices to one of the Economics specialization areas. See page 9:22. It is recommended that students wishing to leave open the option of pursuing graduate-level study in Economics should include ECON 302, 401, 402 in their choice of 300- or 400-level ECON courses and select AM/PMA T 331 as their free-choice math course. A decision to also pursue one of the Economics specialization areas mentioned above will likely require that students take more than the minimum 40 half-credits required for their BMath/Bus degree. As an alternative, such students may also wish to consider one of the Mathematics Departmental Joint Honours programs with Economics. See page 9:21.

**ACCOUNTING**

The Honours Mathematics/Chartered Accountancy and Mathematics/Management Accountancy programs provide a strong background in Computer Science, Optimization, and Statistics combined with an extensive professionally-oriented sequence of Accounting courses. Graduates of these programs are well prepared to play a leading role in the increasingly important development and utilization of computer-based accounting information systems, the analysis of the information provided by such systems, and the subsequent decision-making processes and allocation of resources so crucial to an organization's success in the modern business world.

Both Mathematics/Accountancy programs involve four co-op work terms, the first of which occurs in the Winter term immediately following the Fall 2A academic term (see the "Work/Study Sequence" chart). Students are exempted from paying co-op fees for their 1A and 1B terms.

During their first three terms of study, MMath/Accountancy students are not designated either as Chartered Accountancy or Management Accountancy, since the two programs have a common curriculum for the 1A, 1B and 2A terms. During the 2A term, however, when they are preregistering for their 2B courses, students must make a choice as to which Accountancy program they wish to pursue.

**Honours Mathematics/Chartered Accountancy**

( **Co-operative only** )

In conjunction with the common degree requirements in Table I in "Degree Requirements" on page 13:4, this program requires at least 20 math half-credits. These overall requirements must include the Faculty core math courses outlined in Table II in "Degree Requirements" on page 13:5 and the following courses:

All of
- C&O 350 Linear Optimization
- C&O 351 Network Flow Theory
- C&O 370 Deterministic OR Models
- CS 330 Management Information Systems
One additional math half-credit (ACTSC 221 — Mathematics of Investment is recommended)

All of

ACC 128 Core Concepts of Accounting Information 1
ACC 131 Management
ACC 228 Core Concepts of Accounting Information 2
ACC 232 Communicating Information for Decision Making
ACC 371 Managerial Finance 1
ACC 372 Managerial Finance 2
ACC 382 Cost Management Systems
ACC 392 Intermediate Financial Accounting
ACC 401 Accounting Theory
ACC 451 Audit Strategy
ACC 461 Taxation 1
ACC 462 Taxation 2
ACC 491 Advanced Financial Accounting
ECON 101 Introduction to Microeconomics
ECON 102 Introduction to Macroeconomics
MTHEL 100 Commercial and Business Law for Mathematics Students

Two additional math or non-math ("free-choice") half-credits

Notes
1. To graduate with an Honours BMaW/Accounting degree, students in this program must achieve a cumulative average of at least 70% based upon all the non-math courses explicitly required in the program. This average will include all grades in these courses, whether passed, failed, or repeated.

2. To remain eligible to continue in this program, students must normally have a cumulative average of at least 70% based upon all the non-math courses taken to date which are explicitly required in the program. This average will include all grades in these courses, whether passed, failed, or repeated. This criterion will apply beginning at the end of the 2A term and each term thereafter to graduation.

3. The average requirements for explicitly required non-math courses in Notes 1 and 2 above are in addition to the overall cumulative average (CAG) and major average (MAV) requirements specified in Table I in “Degree Requirements” see page 13:4 (which includes the degree requirements common to all BMaW Honours programs) and described in detail in sections 1 through 4 under “Faculty Policies” see page 13:25.

4. There is no flexibility for altering the academic/work-term sequence prescribed for the Mathematics/Accountancy programs (see the “Work/Study Sequence” chart) because of limited term offerings and structured prerequisites for most ACC courses. Since deviations from this sequence can cause a delay in graduation of as much as one calendar year, alterations should not be considered without careful consultation with the program’s Faculty Advisor.

5. The order in which required non-math courses in this program are taken is very important, and there is little room for flexibility (for the same reasons in Note 4 above). At preregistration time each term, students should be sure to consult with the program’s Faculty Advisor.

6. Students may not repeat an ACC course in which they have obtained a grade of C- or higher. ACC courses completed with a D+, D, or D- grade may be repeated at most once, but only with approval from the School of Accountancy.

7. Students who do not have credit for OAC Accounting, or the equivalent, must successfully complete ACC 101 (as a prerequisite for subsequent required ACC courses) in their 1A term.

8. Students who have attempted, to the satisfaction of the Mathematics Faculty Standings and Promotions Committee and the Department of Co-operative Education and Career Services, to gain employment for all four available work terms, but are successful in so doing for only three work terms, will be eligible for a Co-op degree, provided all their work terms have been satisfactory; they have three satisfactory work reports, and they have completed all academic graduation requirements for the program. (Students who are successful in gaining acceptable employment for all four work terms will require the normal four satisfactory work terms and work reports to be eligible for a Co-op degree.)

9. Students who meet all academic graduation requirements for this program, but who do not meet the minimum requirements for a Co-op degree (see preceding Note 8) may, at the discretion of the Mathematics Faculty Standings and Promotions Committee, be granted a Regular Honours BMaW/Accounting degree.

Eligibility for UW's Master of Accounting (MAcc - CA Studies) Program
BMaW graduates of the Honours Mathematics/Chartered Accountancy program who satisfy the additional requirements listed below are eligible to enrol in the School of Accountancy's Master of Accounting (MAcc) degree program in the Faculty of Arts. This eight-month graduate program begins in the Winter term immediately following completion of the 4B Fall term in the BMaW undergraduate program.

- All of
  MSCI 211 Organizational Behaviour
  PHIL 215 Professional and Business Ethics
  One English writing-skills course (one of ENGL 210C, 210E, 210F, or an approved equivalent)

One of
  ECON 331 International Trade
  ENV S 220 (or ECON 357) Environmental Economics
  PSCI 231 Government and Business in Canada
• Meet all University of Waterloo Graduate School entry requirements, including a minimum cumulative, all-inclusive, overall average of 75% in their undergraduate course work.

Two of the courses above that are required for entry to the MAcc graduate program may be taken as the "Two additional free-choice half-credits" in the BMath undergraduate degree requirements listed earlier. The remaining two courses, above and beyond the 40 courses required for the BMath degree, can be incorporated by taking a sixth on-campus course (at no extra tuition cost) during two of the academic terms (an option available only to students with strong academic records) or by taking two Distance Education courses during Co-op work terms. Although Mathematics Faculty policy does not normally permit students to take Distance Education courses during Co-op work terms if the courses are explicitly required in their program, exceptions are usually made for Chartered Accountancy students taking more than the minimum 40 courses required for their BMath Honours degree. (At the present time, ACTSC 221, ECON 101, ECON 102 and PHIL 215 are available by Distance Education.)

Students who successfully complete the Chartered Accountancy MAcc program are exempt from all additional professional educational requirements set by the Institute of Chartered Accountants of Ontario (ICAO) and may write the nation-wide Uniform Final Examination (UFE) at the first opportunity following graduation, normally in September immediately following August completion of the MAcc program.

BMath graduates of the Honours Mathematics/Chartered Accountancy program who do not complete the MAcc program, but still wish to qualify to write the UFE, will first need to complete some additional Accounting courses elsewhere following graduation and satisfy the various additional professional certification requirements of the ICAO from which students completing the MAcc program are exempted.

Honours Mathematics/Management Accountancy (Co-operative only)

In conjunction with the common degree requirements in Table I in "Degree Requirements" on page 13:4, this program requires at least 20 math half-credits. These overall requirements must include the Faculty core math courses outlined in Table II in "Degree Requirements" on page 13:5 and the following courses:

All of
C&O 350 Linear Optimization
C&O 351 Network Flow Theory
C&O 370 Deterministic OR Models
CS 330 Management Information Systems
CS 338 Computer Applications in Business: Databases
CS 432 Business Systems Analysis
STAT 331 Applied Linear Models
STAT 332 Sampling
STAT 443 Forecasting

One additional math half-credit (ACTSC 221 – Mathematics of Investment is recommended)
These courses would be above and beyond the 40 courses required for the BMath degree.

- ACC 480 Selected Problems and Cases in Managerial Accounting
- ACC 487 Management Accounting Policy Analysis and Integration
- ACC 488 Project
- ECON 331 International Trade
- ENV S 220 (or ECON 357) Environmental Economics
- PHIL 215 Professional and Business Ethics
- PSCI 231 Government and Business in Canada

There are several ways of incorporating these extra courses into the program of study. The most common way is for students to spread their course selection over nine on-campus terms rather than the customary eight terms. This is normally done by enrolling for the Winter term following completion of the 4B Fall term. (Co-op fees do not apply for this extra term.) Extending the program in this way does not delay graduation or professional certification, since the SMAC Entrance Examination is normally written in June immediately after University graduation in May, with the SMAO's two-year Professional Program commencing the following September.

The alternatives to taking a ninth full-time study term to incorporate the extra recommended courses are to take Distance Education courses during Co-op work terms and/or extra courses during selected academic terms on campus. Students with strong academic records are permitted to take six courses per term (at no extra tuition cost) rather than the standard load of five. Although Mathematics Faculty policy does not normally permit students to take Distance Education courses during Co-op work terms if the courses are explicitly required in their program, exceptions are usually made for Management Accountancy students taking more than the minimum 40 courses required for their BMath Honours degree. (At the present time, ACTSC 221, ECON 101, ECON 102 and PHIL 215 are available by Distance Education.)

When considering these various alternatives, students should plan ahead as much as possible, pay close attention to the terms when various courses are available, and consult with their Faculty Advisor on a regular basis.

**Mathematics/Teaching Option**

The Co-operative Mathematics Teaching Option is an integrated program offered jointly by the Faculty of Mathematics at the University of Waterloo and the Faculty of Education at Queen's University. This program combines an academic program in mathematics, teaching experience in secondary schools, and professional training, with the graduate fully qualified as a secondary school mathematics teacher in Ontario.

Students interested in the program should enrol in the Mathematics Honours Co-operative Program in Year One, and will be considered for admission to the Teaching Option in Year Two on the basis of two interviews and satisfactory academic and work-term performance.

Work-term arrangements in this Option differ from other Co-operative programs because of the nature of the program. (Consult the “Work-Study Sequence”) Details concerning this and the Faculty of Education component are available from the Academic Advisors or the Coordinator for this Option.

**Honours Mathematics/Teaching Option (Co-operative only)**

In conjunction with the common degree requirements in Table I in “Degree Requirements” on page 13:4, this program requires at least 24 math half-credits. The math half-credits submitted for the degree must include at least eight 300- or 400-level math half-credits, and students are encouraged to gain as much mathematical breadth as possible. These overall requirements must include the Faculty core courses outlined in Table II in “Degree Requirements” on page 13:5 and the following courses:

- All of ACTSC 221 Mathematics of Investment
- One of AM 250 Modelling with Ordinary Differential Equations
  AM 343 Discrete Models in Applied Mathematics
- All of C&O 230 Introduction to Combinatorics
  C&O 350 Linear Optimization
- One of C&O 380 Mathematical Discovery and Invention
  C&O 480 History of Mathematics
- All of CS 230 Introduction to Computers and Computer Systems
- One of CS 330 Management Information Systems
  CS 334 Data Types and Structures
  CS 337 Introduction to Numerical Analysis
  CS 338 Computer Applications in Business: Databases
  CS 430 Applications Software Engineering
  CS 436 Distributed Computer Systems
Mathematics
Inter-Departmental Program

Inter-Departmental Program

The purpose of this program is to provide students in the Faculty of Mathematics with breadth of studies at the Honours level. Students who do not enrol in a departmental or Faculty Honours program must satisfy the requirements of the Inter-Departmental Program if they wish to graduate with a BMath Honours degree.

Honours Mathematics: Inter-Departmental Program

In conjunction with the common degree requirements in Table I in “Degree Requirements” on page 13:4, this program requires at least 26 math half-credits. The 300- and 400-level math half-credits presented for a degree may not include more than six with the same prefix. These overall requirements must include the Faculty core courses outlined in Table II in “Degree Requirements” on page 13:5 and the following courses:

All of

- AM 250 Modelling with Ordinary Differential Equations
- AM PMATH 331 Real Analysis
- AM PMATH 332 Complex Analysis
- AM PMATH 333 Applied Probability

One of

- AM PMATH 334 Introduction to Rings and Fields
- AM PMATH 336 Introduction to Group Theory

All of

- AM PMATH 330 Introduction to Mathematical Logic
- AM PMATH 340 Elementary Number Theory
- AM PMATH 360 Geometry

One of

- STAT 331 Applied Linear Models
- STAT 332 Sampling
- STAT 333 Applied Probability

Two of

- AM AMATH 330 Real Analysis
- AM AMATH 332 Complex Analysis
- AM PMATH 334 Introduction to Rings and Fields
- AM PMATH 336 Introduction to Group Theory
- STAT 430 Experimental Design

Two additional 400-level math half-credits with 300-level prerequisites.

Note

Students in the Faculty Inter-Departmental Honours program may not pursue a Minor designation or Joint/Double
Honours program within the Faculty of Mathematics. However, they are encouraged to pursue a Minor or Joint Honours program with an academic discipline in another faculty.

THREE-YEAR GENERAL PROGRAM: REQUIREMENTS

Who is Eligible?
This version of the General Program was implemented starting with students admitted to the Faculty in the Fall term 1993. Students who were registered as degree candidates in the Faculty prior to Fall 1993 will be required to satisfy earlier three-year General Program requirements as outlined in the 1992/93 Undergraduate Calendar.

In conjunction with the degree requirements in Table I in “Degree Requirements” on page 13:4, this program requires a total of 30 half-credits, including at least 16 math half-credits and a minimum of ten non-math half-credits. The math half-credits must include the following:

The nine General core courses
- MATH 107 Calculus 1
- MATH 108 Calculus 2
- MATH 125 Applied Linear Algebra 1
- MATH 126 Applied Linear Algebra 2
- G&O 227 Introduction to Optimization Models
- CS 112 Introduction to Computer Programming
- CS 212 Programming Principles and Practice
- STAT 220 Introduction to Statistical Methods 1
- STAT 221 Introduction to Statistical Methods 2

Seven of
- ACTSC 221 Mathematics of Investment
- AM 250 Modelling with Ordinary Differential Equations
- AM 343 Discrete Models in Applied Mathematics
- G&O 220 Introductory Combinatorics
- CS 230 Introduction to Computers and Computer Systems
- CS 330 Management Information Systems
- CS 334 Data Types and Structures
- CS 338 Computer Applications in Business: Databases
- PMATH 330 Introduction to Mathematical Logic
- PMATH 340 Elementary Number Theory
- PMATH 360 Geometry
- STAT 321 Applied Regression Analysis
- STAT 322 Application of Sampling Surveys

For math course selection, students registered in the General program may enrol only in courses in the above list and in the General core courses.

Notes
1. Advanced or Honours courses may be used in lieu of General courses to satisfy General degree requirements, provided that the courses were taken while registered in an Honours program.
2. MATH 135 may be substituted for one of the courses on the “Seven of” list, provided that the course was taken while registered in an Honours program.

COMBINATION HONOURS PROGRAMS LEADING TO A DEGREE IN ANOTHER FACULTY: REQUIREMENTS

Joint Honours Programs with Mathematics

A 'Joint Honours with Mathematics' program is available for Honours students in other faculties in conjunction with any discipline 'Z', in a faculty other than Mathematics, that chooses to make a 'Joint Honours Z with Mathematics' designation available to its students. Students interested in a particular discipline should consult with the department concerned for specific course requirements.

The Faculty of Mathematics course requirements consist of a total of 14 math half-credits with a minimum average of 60%. These overall requirements must include the following specific courses:

All of
- MATH 135 Algebra
- MATH 136 Linear Algebra 1
- MATH 137 Calculus 1
- MATH 138 Calculus 2
- MATH 235 Linear Algebra 2
- MATH 237 Calculus 3

All of
- STAT 230 Probability
- STAT 231 Statistics

One pair of
- CS 102 Introduction to Programming for Scientific Applications
- CS 212 Programming Principles and Practice
- or
- CS 112 Introduction to Computer Programming
- or
- CS 212 Programming Principles and Practice
- or
- CS 230 Introduction to Computers and Computer Systems

Four additional math half-credits which qualify for BMath degree credit.

Students wishing to specialize in one particular area of mathematics should consult the Undergraduate Advisor of the appropriate department in the Faculty of Mathematics for advice in selecting their “additional” math half-credits.

Note
Courses listed above must be taken as specified through the Faculty of Mathematics. Exceptions for students who have transferred from other universities will be considered by the Faculty of Mathematics. Such students should put their requests in writing, provide course descriptions, and submit the request to the Mathematics Undergrad Office, MC 5115.
Minor in Mathematics

A 'Minor in Mathematics' is available for Honours students in other faculties. This Minor requires a total of ten math half-credits with a minimum average of 60%. These overall requirements must include the following specific courses:

All of
- MATH 135 Algebra
- MATH 136 Linear Algebra 1
- MATH 137 Calculus 1
- MATH 138 Calculus 2

Two of
- STAT 220 Introduction to Statistical Methods 1
- STAT 221 Introduction to Statistical Methods 2
- STAT 321 Applied Regression Analysis
- STAT 322 Application of Sampling Surveys

One pair of
- CS 102 Introduction to Programming for Scientific Applications
- CS 212 Programming Principles and Practice

or
- CS 112 Introduction to Computer Programming
- CS 212 Programming Principles and Practice

or
- CS 212 Programming Principles and Practice
- CS 230 Introduction to Computers and Computer Systems

Two additional math half-credits which qualify for BMath degree credit.

Notes
1. Students do not officially register for a Mathematics Minor. Such students register in the appropriate Honours program and request an official Mathematics Minor designation when they complete an 'Intention to Graduate' form.
2. Courses listed above must be taken as specified through the Faculty of Mathematics. Exceptions for students who have transferred from other universities will be considered by the Faculty of Mathematics. Such students should put their requests in writing, provide course descriptions, and submit the request to the Mathematics Undergrad Office, MC 5115.

Minor in Computer Science

A 'Minor in Computer Science' is available for Honours students in faculties other than Mathematics. This Minor requires a total of ten half-credits, with a minimum average of 60%, which must consist of the following specific courses:

One half-credit Calculus course
One half-credit Algebra course

One of
- CS 102 Introduction to Programming for Scientific Applications
- CS 112 Introduction to Computer Programming

All of
- CS 212 Programming Principles and Practice
- CS 230 Introduction to Computers and Computer Systems
- CS 334 Data Types and Structures

Four of
- CS 330 Management Information Systems
- CS 337 Introduction to Numerical Analysis
- CS 338 Computer Applications in Business: Databases
- CS 430 Applications Software Engineering
- CS 432 Business Systems Analysis
- CS 436 Distributed Computing Systems
- CS 457 System Performance Evaluation

Notes
1. Students who have significant experience programming in a language such as Pascal, C, or Turing will be permitted to substitute a third- or fourth-year CS course from the above "Four of" list for CS 102 or CS 112.
2. Students do not officially register for a Computer Science Minor. Such students register in the appropriate Honours program and request an official Computer Science Minor designation when they complete an 'Intention to Graduate' form.
3. Non-CS majors are permitted to take a maximum of one Computer Science course per term during years one and two and two CS courses per term during years three and four.
4. Courses listed above must be taken as specified through the Faculty of Mathematics. Exceptions for students who have transferred from other universities will be considered by the Faculty of Mathematics. Such students should put their requests in writing, provide course descriptions, and submit the request to the Mathematics Undergrad Office, MC 5115.
FACULTY POLICIES

The degree requirements described below apply only to students whose initial registration as BMath degree candidates was Fall/94 or later.

1. AVERAGES FOR ALL STUDENTS

Students' academic standing is determined by their cumulative average (CAV), their term average (TAV), and their failure count. The cumulative average is calculated over all terms of registration in the Faculty, and the term average is calculated for the most recent term.

Both averages will include the grades for all courses, whether passed, failed, or repeated, with the stipulation that failing grades of less than 32% and grades of DNW (did not write) will be counted as 32% in the calculation of averages. The actual failing grade will appear on a student's record.

A student may not retake a particular passed course more than once.

2. MAJOR AVERAGES FOR HONOURS STUDENTS

Unless stipulated otherwise below, the major average (MAV) for an Honours student will be based upon all 300/400-level math courses.

- For the Math/Accounting and Math/Business programs, the major average will be based upon all 300/400-level math courses and all 300/400-level ACC or BUS courses respectively.
- For all Computer Science major programs that do not involve a second major discipline within the Faculty, the major average will be based upon CS 134 and all CS major courses.
- For all Joint and Double Honours programs within the Faculty that involve Computer Science as one of the major disciplines, both major averages must involve Computer Science as one of the major disciplines.

All major averages will include all grades in the specified courses, whether passed, failed, or repeated, with the stipulation that failing grades of less than 32% and grades of DNW (did not write) will be counted as 32% in the calculation of averages.

3. ACADEMIC STANDING WITHIN THE FACULTY

3.1 To remain in the Faculty of Mathematics, a student may not fail more than eight half-credit courses.

3.2 To remain in an Honours program, a student may not fail more than four half-credit courses.

3.3 A student's standing is assessed after each term of registration. Subject to 3.1 and 3.2,
- if CAV ≥ 60%, a student is "In Good Standing";
- if CAV < 60%, a student is "On Academic Probation."

3.4 After a full-time term on academic probation,
- a) students must be in good standing, or have TAV ≥ 65%, to continue in their program.
- b) A student in an Honours program who does not satisfy 3.4 (a), but has CAV ≥ 50%, may transfer to the General program, subject to 3.1.
- c) Otherwise, withdrawal from the Faculty of Mathematics is required.

3.5 A student may be required to withdraw from the Faculty of Mathematics if, in the opinion of the Standings and Promotions (S&P) Committee, the student is unlikely to profit from further study in the Faculty or is not making progress toward fulfilling the course requirements for a BMath degree.

4. MAJOR AVERAGE CONTINUATION REQUIREMENT FOR HONOURS PROGRAMS

At the end of each academic term, commencing with the 2A term for Computer Science major programs and the 3A term for all other programs, Honours students must normally have a cumulative major average (as defined in section 2 earlier) of at least 65% to remain eligible to continue in their program. For all Joint and Double Honours programs within the Faculty that involve Computer Science as one of the major disciplines, both major averages must satisfy this requirement.

Students with a cumulative major average less than 65%, but at least 60%, may be allowed, at the discretion of their major Department(s) or the Faculty Programs Committee as appropriate, to continue on a conditional basis in their program in an attempt to raise their cumulative major average to 65%. Students who fail to do so after one full-time academic term (or the equivalent) will normally be required to withdraw from their program. Third- or fourth-year students who are unable to satisfy the admission/continuation standard for some other Honours program will normally be required to transfer to the three-year General program.

5. CONDITIONS FOR REMAINING IN CO-OP

5.1 Students who are eligible to continue in their academic program may remain in Co-op, providing that they are making satisfactory progress towards meeting the Faculty's minimum requirements for work terms and work reports.

5.2 An Honours Co-op student who is eligible to continue in the Honours program, but who elects to transfer to the General program, may remain in Co-op, space permitting.

5.3 An Honours Co-op student who is required to transfer to the General program may remain in Co-op if TAV ≥ 60%, space permitting.

6. COURSE DROP POLICY

6.1 Students may drop courses without academic penalty during the first four weeks of lectures in a term.

6.2 Students may withdraw from at most one course between the end of the fourth week and the end of the tenth week of lectures in each of their first three terms of
full-time university registration. The course will remain on a student's record and will be assigned a grade of WD. This grade will count as a course attempt, but will not be included in the student's averages or credit/failure counts. Forms to withdraw from a course are available from the Mathematics Undergraduate Office. Students who have been enrolled for fewer than three full-time terms in another faculty or post-secondary institution may use this provision only on a pro-rated basis.

7. EXAMINATIONS
7.1 The Faculty of Mathematics constitutes the examining body for all examinations and, through the Standings and Promotions (S&P) Committee, approves all decisions concerning grades and academic standing.

7.2 Final examinations are held only during the official examination periods. In addition, instructors may not hold tests in the last five teaching days of the lecture schedule or during the study break prior to each examination period.

7.3 The Faculty of Mathematics does not grant Supplementary Examinations for students who fail courses.

Further details concerning University examination requirements may be found in "Examination Regulations", or in the booklet, “University of Waterloo Policy Statements.”

8. GRADES
8.1 Numerical grades in the range 0-100 are assigned in all courses in the Faculty of Mathematics. The minimum passing mark in all courses is 50.

8.2 If a student does not write a final examination and does not give a properly documented reason (e.g. illness), the instructor will either submit a grade of DNW (did not write) or submit a numerical grade based on the term work, with a grade of zero for the exam.

8.3 In exceptional circumstances, for example, an examination missed due to illness (see 12.2 to follow), an instructor may assign a grade of INC (course incomplete). A grade of INC will not be assigned simply because a student is concerned that he/she will otherwise fail the course. A grade of INC which is not cleared by the deadline set by the instructor, which will be no later than eight months after the end of term, will be automatically converted to a DNW. Students should not register (again) in a course for which they have received an INC.

8.4 Grades are not official until student grade reports have been issued by the Registrar's Office. However, once the official examination period is over, instructors are encouraged to post their lists of unofficial grades, by ID number only, on their office doors. Faculty policy does not permit instructors to release grades during the examination period.

8.5 Students in the Faculty of Mathematics may not register for official Audit (AUD) status in a course.

9. GRADE APPEALS
A student may find that the grade received for a course is significantly lower than anticipated following the final exam. In this situation, the student may informally ask the instructor to check the calculation of the final grade. Further, after the final grade reports are issued, the student may request to have the final exam re-marked by submitting a Math Faculty Grade Appeal Form to the Registrar's Office. These forms may be obtained from the Registrar's Office or the MUO. As part of this process, the student may ask to see a copy of his/her final exam.

It should be noted that failing grades are automatically reviewed by the instructor, and in a multi-section course, the examinations are marked in common by all instructors so that students in all sections are treated on a common basis. Students should be aware that a grade may decrease as a result of a request for a re-mark.

If, following a grade appeal, a student has serious concerns about how her/his grade was assigned, the student should discuss the matter with the Associate Dean for Undergraduate Studies. In such a situation, the Student Grievance Policy permits a student to request a formal reassessment. A copy of this document (UW Policy #70) may be obtained from UWinfo.

10. VOLUNTARY WITHDRAWAL FROM A TERM
Any student may voluntarily withdraw within the first four weeks of the term, in accordance with the course drop policy. Students who voluntarily withdraw prior to or during the full refund period (see "Withdrawals") will not have the term recorded on their academic record. Students who voluntarily withdraw from their studies after the full refund period and before the end of the fourth week of classes, will have this noted on their transcripts with the statement "Voluntary Withdrawal From Term (effective date) - No Academic Penalty". A student who withdraws late will normally receive grades of DNW in all courses for that term.

A first-year student who has never been previously registered at a degree-granting post-secondary institution will normally be permitted to withdraw from all her/his courses without academic penalty as late as the last official day of lectures for her/his first term. Such students must re-apply for admission for a subsequent term, thereby competing with new applicants for admission.

A Mathematics student who has completed at least one term of study and who has been inactive (i.e., not been registered as a BMath degree candidate at the University of Waterloo, or on an approved Letter of Permission) for more than four consecutive academic terms must apply for re-admission by writing to the Assistant Registrar, Faculty of Mathematics. A resume covering the inactive period, including official transcripts from any post-secondary institutions attended in the interim, must be included. If the student is re-admitted, Faculty policies in effect at the time of re-admission will apply, unless stated otherwise by the Faculty when re-admission is approved.
11. PETITIONS AND THE STANDINGS AND PROMOTIONS (S&P) COMMITTEE
On occasion, due to illness or other circumstances beyond a student's control, it may be appropriate for a student to make a petition requesting that an exception be made to a Faculty or University regulation. All such petitions are considered by the S&P Committee, which consists of a representative from each department and each area of study, and is chaired by the Associate Dean for Undergraduate Studies. Petitions should be made on a Petition form (Form D) obtainable from the Mathematics Undergraduate Office, and should be submitted to the Registrar's Office together with supporting documents (e.g., a medical certificate). It is often useful to discuss the situation with an Academic Advisor before making a petition.

12. ILLNESS

12.1 Illness During the Term
If a student becomes seriously ill during the term, it may be desirable for her/his course load to be reduced or for the student to withdraw completely from the academic term. If this occurs after the official course drop deadline, the student should submit a petition to the S&P Committee, supported by a medical certificate, requesting permission to drop one or more courses. It is essential for the student to assess the situation and take the appropriate action immediately. Petitions of this nature must be made before the end of the lecture period.

12.2 Illness During the Exam Period
• If a student becomes ill during the exam period and as a result misses an exam, he/she must provide a medical certificate to the Mathematics Undergraduate Office (MUO) as soon as possible, but no later than the end of the exam period. The MUO staff will send a copy of the certificate to the appropriate instructor(s). The instructor may assign a grade of INC (incomplete) for the affected course if that is appropriate. In this case, the student must contact the instructor in order to determine how the course is to be completed. This will usually mean writing the exam when the course is next offered, but the instructor may choose to arrange for a deferred exam. In exceptional circumstances, the instructor may assign a grade of AEG (Aegrotat, credit granted, but no mark assigned because of illness).

• If a student becomes ill during an exam and is unable to continue, he/she should inform the chief proctor before leaving the exam and then proceed as in the above. If a student completes an exam, the grade obtained will normally stand.

12.3 Medical Certificates
The certificate should describe the nature of the illness, the degree of incapacity, and the precise period of absence or incapacitation. If an off-campus doctor is consulted, the certificate must be provided on the doctor's official letterhead.

13. POLICIES CONCERNING COURSES

13.1 Course Load Policy
The standard course load for students in the Math Faculty is five half-credit courses per term. Students who have a cumulative average of 60% or more may request permission from their advisor to enrol in a sixth course. The intention is to permit students to take additional courses beyond the 40-course degree requirement and thereby gain greater breadth in their education. However, students should not plan to enrol in six courses with a view to graduating in fewer than eight terms, since it is Faculty policy that students must complete eight full-time terms in order to graduate with an Honours degree.

13.2 Adding Courses
The last day to add a course or change sections in an already-scheduled course is two weeks after the official beginning of lectures.

13.3 Course Prerequisites
At any time prior to the completion of lectures, if it is discovered that a student is taking a course offered by the Faculty of Mathematics without having previously completed the course prerequisites stated in the University Undergraduate Calendar, the student is subject to having her/his registration in that course purged from university records. Such purging may be done at the request of the course instructor, the department offering the course, and/or the Faculty of Mathematics, but not without the consent of the instructor.

13.4 No-Credit/Overlap Courses
Some courses offered within the University may not be taken for credit towards a BMath degree, since they have been designed for students in faculties other than Mathematics. These courses are identified on the "Course No-Credit List". Other courses offered by various departments throughout the University deal with similar subject matter. In these instances, at most one entry from a group of overlapping courses may count for credit towards a BMath degree. These courses are identified on the "Course Overlap List". Both of these lists are published annually in the "Math Students' Handbook" available in the Mathematics Undergraduate Office. It is the student's responsibility to be aware of the contents of these lists.

13.5 Distance Education Courses
A student who is registered full-time in the Faculty of Mathematics may not normally enrol in a distance education course that term. However, distance education courses may be taken on a part-time basis by Regular and Co-op students during terms off campus. Co-op students on a work term are limited to one half-credit course, unless they have written support from their employer to take two half-credit courses. It should be noted that no explicitly specified course in an Honours program may normally be taken through distance education.

13.6 Courses at Other Universities (Letters of Permission)
Students "In Good Standing" are normally permitted to take non-math courses at other universities on a part-time
basis during terms off campus, provided the courses are not explicitly required for their particular program. Students wishing to take courses at other universities must submit a completed "Letter of Permission" form to the Registrar's Office before taking each course. The Standings and Promotions (S&P) Committee will not approve courses taken elsewhere for BMath degree credit if prior approval has not been obtained.

All courses taken on a Letter of Permission will be recorded on Faculty of Mathematics Student Examination Reports with a grade of 'CR' (credit) or 'NCR' (no credit) as appropriate. Co-op students on work terms are limited to one half-credit course, unless they have written support from their employer to take two half-credit courses.

It will be the student's responsibility to ensure that an official transcript from the host institution is sent to the UW Registrar's Office within two months of the completion of the course. Otherwise, a grade of NCR (which counts as a failure) will be automatically recorded. Any changes a student wishes to make to an authorized Letter of Permission must be approved in advance by the S&P Committee.

14. CO-OP REGULATIONS

14.1 Co-op Degree Requirements
Co-operative mathematics students are expected to follow the normal alternating academic/work-term sequence appropriate to their program from admission through to graduation (see "Work/Study Sequence" table). Students admitted at the 1A level, with the exception of those in the Math/Accounting Programs, will normally have eight academic terms and six work terms. Such students must successfully complete all academic degree requirements, write at least four satisfactory work reports, and follow an approved academic/work-term sequence, which will normally include at least five satisfactory work terms. Students may not end their academic/work-term sequence with a work term. Students must satisfy all Honours degree requirements within one calendar year after the termination of their approved academic/work-term sequence, or they will normally be eligible only for a Regular Honours degree.

14.2 Re-arranging Academic/Work-term Sequences
Student requests to re-arrange academic/work-term sequences must be directed to the Standings and Promotions Committee on special forms available from the Registrar’s Office, Co-operative Education and Career Services, and the Mathematics Undergraduate Office. Such requests will normally be approved if all of the criteria listed on the form are met. Students who alter their academic/work-term sequence without first obtaining written approval may be required to withdraw from the Co-op program. It is the student's responsibility to deal with any timetabling difficulties which may arise and to preregister for subsequent terms.

15. TRANSFER STUDENTS

15.1 Residency/Registration Requirement
Students must normally complete at least 50% of the minimum number of math half-credits and at least 50% of the total number of half-credits required for their BMath degree program while registered in the Faculty of Mathematics. Students transferring into a Co-operative program must normally complete at least 50% of the total number of Co-op work terms required and at least two of the four required work reports while registered in the Faculty of Mathematics.

15.2 Transfer Credits
Transfer students will normally be given transfer credit for relevant courses taken previously if (i) a mark of at least 60% or equivalent has been obtained. (ii) a mark of at least 50% has been obtained in a University of Waterloo non-math course or in a University of Waterloo mathematics course specifically designated for mathematics students. A transfer failure will normally be assigned if a mark is less than 50%. Credit may not be granted for a course covering only part of the material contained in a corresponding required UW course. Grades for transferred courses will not count in averages.

15.3 Transferring into a Co-op Program
Students with math transfer credits beyond first year are not eligible for the Co-op program.

15.4 Double Counting of Courses for BMath Degree Credit
The Faculty of Mathematics will normally count for BMath degree credit a maximum of 50% of the courses that a student has previously used, or is using simultaneously, to obtain a degree from another UW faculty or at another university.
Faculty of Science

Measuring colour density with a Spectronic 601.
Faculty of Science

The Faculty of Science consists of four departments: Biology, Chemistry, Earth Sciences and Physics, and the School of Optometry.

Since the first students were enrolled in Fall, 1959, the Faculty has grown to 2300 undergraduates and 375 graduate students pursuing full-time studies, and another 1400 undergraduate and graduate students in part-time studies.

Degrees

The degree of Bachelor of Science (BSc) is awarded on the successful completion of the three-year General and four-year Honours programs. The degree Doctor of Optometry (OD) is awarded upon the successful completion of a four-year professional program.

Programs

Biochemistry, Biology, Chemistry, Earth Sciences and Physics programs are available in both the Regular and Co-operative system of study. In the Co-operative system, students alternate four-month study terms on campus with four-month work terms in industry, business or government, in an area related to their studies.

The Faculty of Science also offers Honours Science and Business (Co-op or Regular) and Environmental Science (Co-op or Regular) programs, and four-year Honours and three-year General non-specialized programs. In addition, an Honours BSc in Psychology is offered in co-ordination with the Department of Psychology. A small number of students may be accepted into the BSc Psychology program in the Co-operative system of study.

Graduate programs leading to the degrees of MSc and PhD are discussed in the University of Waterloo Graduate Studies calendar.

Interdisciplinary Programs

Students can elect to take an Interdisciplinary Option which will be designated on the transcript and diploma. Consult Chapter 14 of the Calendar for information. The options include:

- Canadian Studies
- Cognitive Science
- Environmental Economics
- Human Resources Management
- International Studies
- Legal Studies
- Liberal Science
- Management Studies
- Middle East Studies
- Peace and Conflict Studies
- Print Journalism
- Russian and East European Studies
- Society, Technology and Values
- Speech Communication
- Studies in Personality and Religion
- Studies in Sexuality, Marriage and the Family
- Women's Studies

Admission

The admission categories, requirements and procedures for all programs are outlined in the "Admissions" section of this Calendar.

Transfer Students

Students may be accepted for transfer from other programs in the University or from other universities. Their programs will be evaluated in terms of the number of credits allowed and the number remaining for a degree. Normally transfer students will be required to complete a minimum of 50% of the course work while registered in the Faculty of Science. The Fourth Year of all Honours programs in Science, must be completed at the University of Waterloo. Credits will be transferred without a cumulative average and only for relevant courses with a 60% or better mark. Students applying to transfer to Co-operative programs in the Faculty of Science will not normally be admitted above the Year Two Term B level.

Admission as a Mature Student

Applicants are normally required to obtain standing in OAC Calculus and one of OAC Chemistry or Physics or their equivalent, in order to have the proper background for first-year University courses in these areas. To discuss admissibility, applicants are advised to contact the Assistant Registrar, Faculty of Science.

English Language Proficiency Requirement

All Faculty of Science students entering degree programs in September, 1982 or later, must write the English Language Proficiency Examination (ELPE) which is scheduled during registration week, with the exception of entrants with 80% or better in OAC English 1 taken in the most recent academic year, in the Province of Ontario. These students will not be required to write the ELPE examination.

Students writing the ELPE must achieve a passing grade of 50% or successfully complete the writing assignments of the University of Waterloo Writing Clinic in order to fulfill degree requirements.

Note

Students who arrange a special sitting of the ELPE outside the scheduled dates will be assessed an administrative charge.

WHMIS (Workplace Hazardous Materials Information System)

All students who have registered for any Faculty of Science course with a laboratory component, will need proof that they have attended a WHMIS session in order to enter the laboratory.
Program and Course Selection

First-Year Programs (Regular and Co-operative)
The normal minimum course load for a full-time student in Year One Science is five lecture courses plus required labs per term. At least two of these must be lecture credits from the Year One offerings in two different disciplines from the Faculty of Science.

Students are encouraged to select an Arts elective (preferably English or Psychology). Students whose secondary school OAC average was 70% or better may select six lecture courses if they wish.

Courses should be chosen either with a specific Year Two goal in mind or to prepare for Year Two programs. The required and recommended Year One selections for Year Two Honours programs and Optometry can be found in the table "Year One Science Program Selections".

Course and Program Changes
1. Students may add or drop courses during the first two weeks of the Fall, Winter and Spring terms upon having the appropriate change form completed.

2. Courses may be dropped after the normal two weeks change period with adequate cause but not after November 1, March 1 or July 1 for Fall, Winter and Spring courses. The permission of the instructor and the appropriate Undergraduate Officer or the Associate Dean must be obtained. Courses which have not been dropped officially will receive a DNW grade.

3. Students may not drop a laboratory course without written clearance from the lab supervisor (faculty member or senior demonstrator). Students not checking out of such courses remain liable for the full value of the locker kit issued to them.

4. Students may withdraw from the University as late as the official course drop date without penalty on their record. If however, a student chooses to withdraw to avoid a number of failures, he or she will likely be disqualified for re-admission. Students who voluntarily withdraw prior to or during the full refund period will not have the term recorded on their academic record.

Students who voluntarily withdraw from their studies after the first three weeks of classes and before any deadlines set by their faculty, will have this noted on their transcripts with the statement "Voluntary Withdrawal From Term (effective date) – No Academic Penalty". See "Withdrawals" for details.

Eligibility for Courses
Students must ensure they have the appropriate course prerequisites and where applicable corequisites stated in the course descriptions in the Calendar.

Overlap Courses
Where substantial overlap exists between two courses, credit will be granted for only one even if they are not listed as antirequisites.

Some Science Departments offer both Honours and General equivalent courses. It is the student's responsibility to calculate subject matter. Credit will only be given for one of such overlapping courses (e.g. CHEM 266 or 284; PHYS 111/112 or 121/122).

This rule also applies to courses offered by various Departments throughout the University which sometimes deal with similar subject matter (e.g. STAT 204 or PSYCH 200). ECON 211 overlaps any First Year Calculus or Linear Algebra course).

Distance Education Courses
Only in exceptional cases should Distance Education courses be taken by students in a term in which they are full-time students. Regular and Co-op students during their terms off-campus may take distance education courses on a part-time basis. Only in exceptional cases can Honours students take a core course by distance education.

Letters of Permission
Students in good academic standing and whose total number of transfer credits is less than the maximum permitted may be allowed to take an elective course at another university during a term off-campus to count as credit towards a degree. A student wishing to do so must complete the 'Letter of Permission' form available at the Registrar's Office (for a fee) and have it authorized by the Associate Dean or an appropriate Undergraduate Officer. The Letter of Permission must be obtained before taking the course.

In General Science and Honours Science – Program 1 degree programs, courses at other universities equivalent to courses offered by the Faculty of Science, or required mathematics courses, are not elective courses, and may not be taken on a Letter of Permission.

A course taken on a Letter of Permission will be given credit as long as the mark obtained is 60% or better. No grade will be assigned.

Audit
The Faculty of Science neither records nor recognizes Audits for students in Science or any other Faculty.

Enrolment in a Graduate Course
Normally, a student may obtain credit toward a graduate degree in the Faculty of Science for not more than a one term graduate course. Undergraduate students enrolling in a graduate course must, normally, have an 80% average and have completed three years of study. Approval of the instructor and the graduate officer of the department in which the course is offered must be obtained.

Credit for the graduate course toward a graduate degree will not be given unless the student attains an A average in her/his major subjects in the fourth year.

Reduced Program
The General Science and most Honours degrees (with the exception of co-op programs) may be taken on a reduced program basis.
A student in good standing who "stops out" of any program for more than a year must have departmental approval before returning to that program. Students are cautioned that carrying a reduced course load might jeopardize the possibility of further professional studies.

Upgrading of BSc Degree
Normally a student may not upgrade a General BSc or its equivalent to a Waterloo Honours BSc. However, from time to time such conversion privileges may be allowed in exceptional cases on the recommendation of the department(s) concerned and with the approval of the Examinations and Standings Committee. Rulings of the Committee in any particular case on the conditions to be met for such conversion may include time limits.

Teacher Certification In Ontario
The Ontario Teacher's Certificate may be granted by the Ministry of Education and Training after the successful completion of a program taken at an approved Ontario Faculty of Education. The Faculties of Education require that applicants hold an acceptable university degree (BA or BSc or equivalent, three- or four-year General or Honours). Those students interested in seeking admission to a Faculty of Education should contact the appropriate University.

Future Regulations
Normally, students will be given advance warning of changes in regulations, but the Faculty reserves the right to make changes without notice where necessary.

Examinations and Standings
The following regulations govern the practice of the Faculty of Science in regard to final examinations, standing and make-up examinations. These regulations also apply to part-time students and special programs. For further details consult "University Examination Regulations". Students should note that the Faculty of Science normally operates under a "credit-weight system" in which student progress is measured by credits successfully completed rather than by years. (The only exceptions to this are Honours Earth Sciences programs. These programs follow the term course system.) Students who have passed fewer than five credits successfully will be considered Year One students; those with at least five but fewer than ten, Year Two; those with at least ten but fewer than 15, Year Three; and those with 15 or more, Year Four.

Final Examinations
1. The Faculty constitutes the examining body for all examinations. All examination results are considered by the Examinations and Standings Committee and subsequently by the Faculty Council. After the results have been considered by these bodies, they will be issued to individual students by the Registrar. Appeals against faculty decisions made under these regulations should be made in writing to the Registrar's Office within one month of the official announcement of marks.

2. Final examinations are held in December, April, or August. The time normally allowed for each examination is three hours.

3. In all courses each student is required to submit, in such form and at such time as may be determined by the instructor, evidence of satisfactory participation in term work. The marks obtained for work during term are used, in part, in determining standing. The ratio in which marks for term work and written examinations are combined is at the discretion of the individual departments. To pass a course, a student must obtain a minimum of 50% in the combined term and examination marks. Some courses and/or instructors may not require final examinations; in such cases term work only will be used in determining a final grade.

4. Failure to write an examination is considered a failure to pass. A student who defaults a final examination, except for a properly certified reason, shall have no make-up examination privileges and must repeat the work in class. If a student fails to write for health reasons, a Doctor's certificate, covering the precise period of absence, must be filed in the Registrar's Office within one week after the examination should have been written.

5. In cases where a course (failed or passed) is repeated, both marks will be used in calculating the student's cumulative averages. If a passing grade is achieved more than once in the same course, it will still only count as one course passed towards the total necessary for graduation. Students in good standing will not normally repeat courses they have passed.

6. No course or its equivalent may be repeated more than once.

7. All examinations which receive a failing grade are automatically re-read.

8. Make-up examination privileges may be granted to students in good standing where failure to pass is attributable to extraordinary circumstances, especially medical or health-related problems. The student must have satisfied all term-work requirements in the course and must have the permission of the Examinations and Standings Committee.

Co-operative Program Evaluation
Students in Co-operative programs will be evaluated by the rules shown, modified where necessary to suit their special needs. In particular:

1. Evaluation in Year One will be made at the end of term 1B on the entire year's work. Students not meeting requirements of their program will be transferred to another Science program (Regular system) in good standing, if possible.

2. Assessment will be made on a term-by-term basis during Years Two and Three. Terms 4A and 4B will
normally be assessed as a unit at the end of the 4B term when both terms are taken consecutively from September to April. Normally a student may take no more than two upper year terms on a part-time or reduced program basis and must have special permission from her/his department to do so.

3. A student is expected to follow the work-term sequence from the point of entry, subject to the minimum requirements for graduation within the individual programs. The minimum number of related work terms required is normally four. The minimum number of satisfactory work terms required is normally four.

Standing

Grades
Marks in individual courses will be reported as numerical marks on the scale 0 to 100. A mark of 50 or better is necessary to pass and receive credit for a course. For Science students, any grade of less than 32 will be recorded on the marks report and permanent transcript but for averaging purposes a grade of 32 will be used, equivalent to the weighting factor for the F- on the common system.

Conditional Standing
A student who marginally fails to meet the required standards of any program will be placed on conditional standing for one term only. During this period the student must regain standing in that program or withdraw from it. Conditional standing will be granted only once in any particular program.

Required to Withdraw
A student will normally be required to withdraw from the Faculty of Science after failing more than 2.0 credits in any academic year (or equivalent), or after failing to achieve an overall cumulative average of at least 55% and a cumulative average of 55% in all Science courses, or if unlikely to profit from further study, in the opinion of the Examination and Standings Committee.

Students who have been "Required to Withdraw" from the Faculty of Science may not apply for re-admission for at least two academic terms.

After two terms have elapsed, a formal application may be submitted to the Registrar's Office. Applicants must include a typewritten statement along with their application outlining why they are now likely to succeed, and a supporting letter from, for example, an employer, religious leader, or professional person.

Re-admission is not automatic. All such applicants will be assessed in competition with new applicants and on the probability of their future success.

Re-admission when granted will be with conditional standing.

Terminology
INC (either term work, lab work, examination, etc., are incomplete). A course for which the grade designation INC has been given must be completed within two terms of taking the course or the INC automatically becomes a mark of 32. If a graduating student has an INC, it will be recorded as 32 on the transcript. Students should not register in an INC course. They should see the instructor to arrange completion of the course.

AEG (aegrotat) - signifies the student's work or examination was incomplete because of illness and the instructor is satisfied that the student should receive credit for the course but a numerical mark could not be set.

CR - Credit granted where performance was satisfactory but no specific mark is given and AEG is not appropriate.

NCR - Credit is not granted where performance was unsatisfactory but no specific mark is given.

DNW - Final examination not written in a course that has not been dropped officially whether the course has been attended or not. Unless a DNW grade is replaced by an INC or AEG grade for medical or extenuating circumstances it will be weighted for averaging purposes as a mark of 32 (equivalent to F- on the common grading system) in determining standing.

AEG or CR will count as a course passed towards the total necessary but will not count in the cumulative averages.

"Attempt" is a course completed, whether passed or failed, or recorded as INC or DNW. Courses dropped before the official deadline are not considered as attempts and do not appear on the transcript.

Overall standing will be determined at the end of a term or a year by the cumulative average of all courses taken while in the Faculty of Science at any time (whether passed or failed).

Course
A course may refer to a lecture course, a laboratory course, or a lecture-laboratory course which includes both lecture and laboratory.

Most laboratory courses are designated by the letter L following the course number.

Participation courses in Dance, Fine Arts, Drama and Music are considered to be laboratory courses.

Credit
Credit values are assigned for lecture and laboratory courses as designated in the course descriptions.

Dean's Honours List
The Faculty of Science has a Dean's Honours List to recognize outstanding academic achievement.

To be eligible students must have completed a term of an Honours Program with a cumulative average and an overall average for the completed term of at least 60% have carried a full course load, and not have an INC, DNW or failed course.

The award will be noted on the student's transcript, and the student will receive a congratulatory letter and certificate from the Dean.

Students graduating with a cumulative overall average of 80% or better in an Honours Program will "Graduate on the Dean's Honours List" and will have this noted on their transcripts.
Alumni Gold Medalist
An Alumni Gold Medal is presented annually (usually at Spring Convocation) to a student who has demonstrated outstanding academic performance on completion of an undergraduate program.

Appeals, Petitions and Re-Assessment
An appeal may be initiated by a student who believes that an error in academic judgement or procedure has occurred. Belief that an examination included material outside the proper content of the course, or that the instructor refused to accept receipt of legitimate medical evidence are examples of grounds for appeal.

A petition is appropriate if a student seeks relief from normal University or Faculty rules and regulations for reasons beyond his or her control, e.g. illness or bereavement.

YEAR ONE SCIENCE PROGRAM SELECTIONS – Regular Programs

<table>
<thead>
<tr>
<th>Major Field of Study</th>
<th>Required Courses in Year One</th>
</tr>
</thead>
<tbody>
<tr>
<td>Biology (see Notes 3 and 5)</td>
<td>Three or four 200-level term courses in Biology, CHEM 120/123, 120L/123L, CS 102</td>
</tr>
<tr>
<td>Biochemistry (see Notes 3 and 5)</td>
<td>BIOL 230, 239, MATH 127/128, CHEM 121/125, 120L/123L, 129, PHYS 111/111L or 121/121L, and 112/112L</td>
</tr>
<tr>
<td>Biology and Chemistry</td>
<td>Three 200-level term courses in Biology, MATH 127/128, CHEM 121/125, 120L/123L, 129, PHYS 121/121L or 111/111L</td>
</tr>
<tr>
<td>Biology/Business Economics (see Note 3)</td>
<td>Four 200-level term courses in Biology, CHEM 120/123, 120L/123L, ECON 101/102, ACC 123, CS 102</td>
</tr>
<tr>
<td>Biology and Geography (see Notes 3 and 4)</td>
<td>Two 200-level courses in Biology, two term courses in Geography, CHEM 120/123, 120L/123L, CS 102</td>
</tr>
<tr>
<td>Chemistry (see Note 5)</td>
<td>CHEM 121/125, 120L/123L, 129, MATH 125, 127/128, PHYS 121/112, 121L/112L</td>
</tr>
<tr>
<td>Chemical Physics (see Note 5)</td>
<td>CHEM 121/125, 120L/123L, 129, PHYS 010, 121/122, 121L/122L, MATH 127/128, 125 or 136</td>
</tr>
<tr>
<td>Environmental Chemistry</td>
<td>CHEM 121/125, 120L/123L, 129, PHYS 121/112, 121L/112L, MATH 127/128, ENV S 195, two 200-level term courses in Biology</td>
</tr>
<tr>
<td>Earth Sciences (Geology Option) (see Note 3)</td>
<td>EARTH 121/122, 121L/122L, CHEM 120/123, 120L/123L, PHYS 121/122, 121L/122L, CS 102, MATH 107/108, one unrestricted term course</td>
</tr>
<tr>
<td>Earth Sciences (Geography Option) (see Note 3)</td>
<td>EARTH 121/122, 121L/122L, CHEM 120/123, 120L/123L, GEOG 101/102, CS 102. Either PL IYG 111/112, 111L/112L or BIOL 111/112 or equivalent elective</td>
</tr>
<tr>
<td>Environmental Science Program 1 (see Notes 3 and 5)</td>
<td>BIOL 211, 250, CHEM 120/123, 120L/123L, 129, MATH 107/108, EARTH 121/121L, SCI 040 (ENS)</td>
</tr>
<tr>
<td>Environmental Science Program 2 (see Notes 3 and 5)</td>
<td>BIOL 250, CHEM 120/123, 120L/123L, 129, PHYS 121/122, 121L/122L, MATH 127/128, SCI 040 (ENS)</td>
</tr>
<tr>
<td>Geochemistry (see Note 5)</td>
<td>CHEM 120/123 (or 121/125), 120L/123L, 129, EARTH 121/122, 121L/122L, PHYS 121/122, 121L/122L, MATH 127/128</td>
</tr>
<tr>
<td>Optometry (consult &quot;Requirements for Admission&quot; for full list of prerequisites for admission to Optometry) (see Note 5)</td>
<td>BIOL 230, 211, CHEM 120/123, 120L/123L, PHYS 121/122, 121L/122L, MATH 107/108, PSYCH 101</td>
</tr>
<tr>
<td>Physics (see Notes 1 and 5)</td>
<td>PHYS 010, 121/122, 121L/122L, MATH 125/126, 127/128, CHEM 120/123, 120L/123L</td>
</tr>
<tr>
<td>Psychology (see Note 5)</td>
<td>Two 200-level term courses in Biology, CHEM 120/123, 120L/123L, PHYS 111/112, 111L/112L or 121/122, 121L/122L, MATH 107/108, PSYCH 101, one Psychology elective</td>
</tr>
<tr>
<td>Honours Science and Business (see Notes 3 and 5)</td>
<td>2.0 Science lecture credits from the Year One offerings in Chemistry, Earth Sciences, Physics or two 200-level term courses in Biology, MATH 107/108, BUS 111W/121W, CS 102, SCI 040 (BUS)</td>
</tr>
<tr>
<td>General Science, Honours Science Program 1 (see Notes 3 and 5)</td>
<td>2.0 Science lecture credits from the courses offered to Year One students in Biology, Chemistry, Earth Sciences and Physics. (Refer to &quot;Academic Programs Degree Requirements&quot;).</td>
</tr>
</tbody>
</table>
## YEAR ONE SCIENCE PROGRAM SELECTIONS — Co-operative Programs

<table>
<thead>
<tr>
<th>Major Field of Study</th>
<th>Required Courses in Year One</th>
</tr>
</thead>
<tbody>
<tr>
<td>Co-operative Biology (see Notes 2, 3 and 5)</td>
<td>Three or four 200-level term courses in Biology, CHEM 120/123, 120L/123L, CS 102</td>
</tr>
<tr>
<td>Co-operative Biology/Business Economics (see Note 2)</td>
<td>Same as Biology/Business Economics — Regular</td>
</tr>
<tr>
<td>Co-operative Biochemistry (see Note 2)</td>
<td>BIOL 230, 239 and one 200-level term course in Biology plus one free elective (in Stream 8); BIOL 230 and two 200-level term courses in Biology, plus PHYS 112/112L (in Stream 4); CHEM 121/125, 120L/123L, 129, MATH 127/128, PHYS 121/121L or 111/111L</td>
</tr>
<tr>
<td>Co-operative Biology and Chemistry (see Note 2)</td>
<td>Three 200-level term courses in Biology, CHEM 121/125, 120L/123L, 129, MATH 127/128, PHYS 121/121L or 111/111L</td>
</tr>
<tr>
<td>Co-operative Chemistry (see note 2)</td>
<td>CHEM 121/125, 120L/123L, 129, MATH 125, 127/128, PHYS 121/112, 121L/112L</td>
</tr>
<tr>
<td>Co-operative Environmental Chemistry (see Note 2)</td>
<td>Same as Environmental Chemistry — Regular</td>
</tr>
<tr>
<td>Co-operative Earth Sciences (Environmental Hydrogeology Option) (see Note 3)</td>
<td>EARTH 121/122, 121L/122L, CHEM 120/123, 120L/123L, PHYS 121/122, 121L/112L, MATH 107/108</td>
</tr>
<tr>
<td>Co-operative Earth Sciences (Geology Option) (see Note 3)</td>
<td>EARTH 121/122, 121L/122L, CHEM 120/123, 120L/123L, PHYS 121/122, 121L/112L, CS 102, MATH 107/108</td>
</tr>
<tr>
<td>Co-operative Earth Sciences (Geophysics Option) (see Note 3)</td>
<td>EARTH 121/122, 121L/122L, CHEM 120/123, 120L/123L, PHYS 121/122, 121L/112L, CHEM 120/123, 120L/123L, CS 102, MATH 115 or 125</td>
</tr>
<tr>
<td>Co-operative Environmental Science Program 1 (see Notes 3 and 5)</td>
<td>BIOL 211, 250, CHEM 120/123, 120L/123L, 129, MATH 107/108, EARTH 121/121L, SCI 040 (ENS)</td>
</tr>
<tr>
<td>Co-operative Environmental Science Program 2 (see Notes 3 and 5)</td>
<td>BIOL 250, CHEM 120/123, 120L/123L, 129, PHYS 121/122, 121L/122L, EARTH 121/121L, MATH 127/128, SCI 040 (ENS)</td>
</tr>
<tr>
<td>Co-operative Geochemistry (see Notes 2 and 5)</td>
<td>CHEM 120/123 or 121/125, 120L/123L, 129, EARTH 121/122, 121L/122L, PHYS 121/122, 121L/122L, MATH 127/128</td>
</tr>
<tr>
<td>Co-operative Physics (see Notes 1, 2 and 5)</td>
<td>PHYS 010, 121/122, 121L/122L, MATH 125/126, 127/128, CHEM 120/123, 120L/123L</td>
</tr>
</tbody>
</table>

**Notes**

1. Honours Physics and Co-op Physics students may select MATH 137/138 instead of MATH 127/128 if they have more than an 80% average in OAC mathematics and physics. MATH 137/138 is the appropriate choice for students intending to graduate with a Minor in Mathematics and similar substitutions for MATH 125/126 may be appropriate. Consult Mathematics Minor requirements.

2. Students with little computer programming experience are recommended to take CS 102 as an elective in Year One.

3. Students wishing a Biophysics Option with the Honours Physics program are advised to include BIOL 111/112 in their program.

4. Students intending to apply to this program should make the course selections as outlined, but admission to the program will be made at the Year Two level.

5. **Recommended Electives for Year One**

   - Biology: EARTH 121/122, 121L/122L; PHYS 111/112, 111L/112L
   - Biochemistry (Biotechnology Option): (This program begins in Year Three.) BIOL 240 in Year One
   - Biology and Environment and Resource Studies: (This program begins in Year Two.) One ERS course each term
   - Chemistry (Math Option): (This program begins in Year Two.) One CS elective in Year One or Year Two
   - Geochemistry: ENV S 196
   - Chemical Physics: ENGL 109, 140; PHIL 215
   - Environmental Science Program 1 and 2: BIOL 273, CS 102, GEOG 102; BIOL 240 should be completed by the end of Year Two
   - Optometry: SOC 101 or one PSYCH 102A-Z offering
   - Physics: Year One Chemistry may be replaced by Year One Biology or Earth Sciences courses. Students with little or no computer programming experience are recommended to take CS 102 as an elective in Year One.
   - Honours Psychology/Science: One of PSYCH 207, 211, 263, 257, or 261
   - Honours Science and Business: MATH 125
   - Honours Science Program 1: MATH 107/108, CS 102
ACADEMIC PROGRAMS AND DEGREE REQUIREMENTS

General Programs

THREE-YEAR GENERAL PROGRAM
The three-year General program allows students to specialize to a limited extent in a particular subject area or to pursue a broad range of Science subjects. However, students graduate with the “General Science” degree with no area of specialization designated.

Students must maintain an overall cumulative average of 55% and a cumulative average of 55% in all Science courses to be able to continue in Years Two and Three of the General Science program. Students are encouraged to take at least 2.0 credits from non-science areas, such as Arts or Mathematics. Normally, 5.0 lecture credits are taken per year.

In order to graduate with a three-year General degree, the following requirements must be met:

1. Successful completion of 15.0 credits with a cumulative overall average of 55% and 55% in all Science courses. Of the 15.0 credits:
   - 14.0 must be lecture credits;
   - at least 7.5 must be Science credits, and 2.0 of these must be lecture credits from the Year One offerings in two different disciplines;
   - at least 7.5 must be at or above the 200-level;
   - at least 1.0 credit must be in Mathematics.

2. No more than 3.0 SCI credits may be applied to the three-year General degree.

3. No more than 5.0 failed credits will be allowed.

4. A minimum of 3.0 lecture credits must be obtained per academic year, with no more than 2.0 failed credits allowed.

Year One
5.0 lecture credits, and associated laboratory credits. At least two of (a), (b), (c) or (d) must be taken:

   a) BIOL 111/112, or two 200-level term Biology courses;
   b) EARTH 121/122 plus labs;
   c) CHEM 120/123 plus labs or CHEM 121/125 plus labs;
   d) PHYS 111/112 plus labs or PHYS 121/122 plus labs.

It is recommended that the required Mathematics credit be taken in Year One.

Note

200-level Biology courses used to satisfy Year One Science requirements may not be used to satisfy upper year requirements.

Years Two and Three
5.0 credits of which two or three should normally be in Science.

Science
Academic Programs and Degree Requirements
General Programs
Honours Programs

Notes
1. A student required to withdraw from an Honours program in Chemistry who enrolls in the General program is permitted to take no more than two lecture courses in Chemistry during the first term of study as a General degree student.

2. General program students may not take Honours Chemistry core courses. Nor may they take 400-level courses and certain 300-level courses without the consent of the instructor.

Honours Programs

The Faculty of Science offers two different types of Honours degrees – the Honours Science programs, and the Honours Major programs.

Minors with Honours Programs
A Minor in each of the four disciplines, Biology, Chemistry, Earth Sciences and Physics is available to Honours students in another department. See individual departmental sections for further information about the requirements.

Liberal Science Option
Students in any UW program may enrol in the Liberal Science Option. This Option provides an opportunity to gain some generalist education in science, and to address a number of aspects of the interaction of science and technology with society. If the requirements are fulfilled, the Option will be recorded on students’ transcripts upon graduation.

Students considering the Liberal Science Option should record their proposed Option program for approval by the Liberal Science Advisor in the Science Undergraduate Office.

In order to have a Liberal Science Option recorded, the following requirement must be met: successful completion of six approved term courses with an average of 60%, including:

1. Three Liberal Science core courses or approved alternatives.

2. Three other term courses proposed by the student and approved.

Students will submit written statements showing how the three Liberal Science core courses and three other courses form a coherent Option related to their main program and overall educational plans. Appropriate courses may be found both in regular academic departments and in interdisciplinary programs such as Women’s Studies, and Society, Technology and Values.

Liberal Science Core Courses
SCI 260, 261, 263, 265, 267

Teaching Option with Queen’s University
In the Co-operative Biology, Biochemistry, Chemistry and Physics programs it is now possible to replace one work
term with an academic term at the Faculty of Education at Queen's University, and to gain teaching experience during other work terms. Graduates are awarded a BEd degree from Queen's University as well as a BSc degree from the University of Waterloo.

Application for admission is made during the 2A academic term in one of the Co-operative programs listed above.

Students must have 5.0 credits in the first teaching subject and 4.0 credits in the second teaching subject. Teachable subjects include Biology, Chemistry, Physics and Mathematics. Only 1.0 credit in courses with a Biochemistry theme may be used in Chemistry as a teachable subject (e.g. CHEM 333), PSYCH 101 and one other 0.5 credit Psychology course (not PSYCH 212) must be included as elective courses during the four years of the program, and PSYCH 101 should be completed by the end of the 2B term.

HONOURS SCIENCE PROGRAMS

The Honours Science program allows students to study sciences in greater depth than permitted in the General Science program, but without as intense a degree of specialization as required in the more specialized programs such as Honours Biology, Honours Chemistry, etc. Students desiring a somewhat broader background in the sciences might find this program more suitable than the more traditional specialized programs. However, students contemplating graduate study in the traditional disciplines following their undergraduate studies are advised to pursue the more specialized Honours programs.

There are three programs available that will lead to the degree of Bachelor of Science (Honours Science), plus an Honours Science and Business program and two Environmental Science programs. They are:

Program 1: Non-specialized (see below).

Program 2: Biology specialization (see "Biology").

Program 4: Earth Sciences specialization (see "Earth Sciences").

Honours Science and Business (see "Honours Science and Business").

Honours Environmental Science Programs 1 and 2 (see "Honours Environmental Science").

Honours Science Program 1 (Non-Specialized)

Admission to, and continuance in, Honours Science Program 1 requires a cumulative overall average of 60% and a cumulative average of 60% in all Faculty of Science courses.

In order to graduate in the Honours Science (non-specialized) program, the following requirements must be met:

1. Successful completion of 21.0 credits, exclusive of Year One lab credits, with a cumulative overall average of 60%, and a cumulative average of 60% in all Faculty of Science courses. Of the 21.0 credits that are required:
   - at least 19.0 credits must be lecture credits;
   - at least 12.0 credits must be Faculty of Science credits. At least 8.0 of the 12.0 must be at or above the 200-level. At least 4.0 of the 8.0 other than any SCI credits must be at the 300- or 400-level.

2. At least 1.0 credit must be in Mathematics.

3. No more than 5.0 failed credits are allowed.

4. No more than 3.0 SCI credits may be applied to the program.

5. The Admissions Committee may approve part-time Distance Education status in this program for mature students if other commitments (e.g. employment) prevent full-time study. Approval will not be granted unless appropriate laboratory experience has been gained at the post-secondary level, through employment, or unless such experience will be gained during the degree program.

Year One

5.0 lecture credits, exclusive of laboratory credits.† At least two of (a), (b), (c), or (d) must be taken:

- a) BIOL 112 and one 200-level Biology course or two 200-level Biology courses;
- b) CHEM 120/123 Physical and Chemical Properties of Matter/Chemical Reactions, Equilibria and Kinetics plus labs or CHEM 121/125 plus labs;
- c) EARTH 121/122 The Planet We Live On/The Planet We Live Off plus labs;
- d) PHYS 121/122 Physics 1 and 2 plus labs or PHYS 121/122 Mechanics, Wave Motion and Heat 1 and 2 plus labs.

† First year Chemistry, Physics, and Earth labs cannot be used for credit towards an Honours Science Program 1 degree.

Years Two, Three and Four

Normally, 3.0 or 4.0 Science credits are taken in each of Years Two, Three and Four.

Honours Science and Business

Program Advisor: Professor H.M. Morrison

As high technology plays an increasingly greater role in society, there will be a growing need for graduates who have competence in the combined disciplines of science and business. The knowledge and skills which will be required by managers have never been greater. The modern manager must have a knowledge of finance, economics, accounting, marketing and organizational behaviour as well as the quantitative methods so deeply ingrained in the scientific method. A quantitative overview of science and acquired skills in the scientific method will be extremely useful in identifying and solving problems in the increasingly technology-oriented business world. Collection and efficient handling of relevant data are crucial in the decision-making process.

For those students leaning towards administration in industry, the following program is recommended. The business, economics, accounting, finance and mathematics courses required in this program mirror some of the
Honours Programs

Courses taken in graduate MBA programs. Credit for some of these courses may be allowed by some of the admitting universities offering MBA degrees.

This program is offered in both Regular and Co-operative systems of study. Students wishing to apply to the Co-op program should preregister in March of their first year.

Admission to, and continuance in, Honours Science and Business requires a cumulative average of 65% in both Science and non-Science courses.

In order to graduate in the Honours Science and Business program the following requirements must be met:

1. Successful completion of 22.0 credits, exclusive of Year One lab credits, with cumulative averages of 65% in both Science and non-Science courses. Of the 22.0 credits required:
   - at least 20.0 credits must be lecture credits;
   - at least 12.0 credits must be Faculty of Science credits. At least 8.0 of the 12.0 must be at or above the 200-level. At least 4.0 of the 8.0 other than any SCI credits must be at the 300- or 400-level.

2. No more than 5.0 failed credits are allowed.

3. No more than 2.0 SCI credits may be applied to the program.

4. The following courses must be included:

   **Year One**
   - Two first-year Science courses *
   - BUS 111W/121W Introduction to Business Organization/Functional Areas of the Organization
   - MATH 107/108 Calculus 1 and 2
   - CS 100 Introduction to Computer Usage or elective **
   - CS 102 Introduction to Programming for Scientific Applications
   - SCI 040 (BUS) Business Seminar

   **Year Two**
   - ECON 101/102 Microeconomics/Macroeconomics
   - CS 212 Programming Principles and Practice
   - One first-year Science course *
   - SCI 040 (BUS) Business Seminar

   **Year Three**
   - M SCI 211 Organizational Behaviour
   - M SCI 331 Operations Research 1
   - CS 330 Management Information Systems
   - SCI 040 (BUS) Business Seminar

   **Year Three or Four**
   - SCI 333 Science and Business Senior Seminar

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**Year Four†**

- M SCI 431 Operations Research 2 or M SCI 432 Introduction to Product Management
- SCI 040 (BUS) Business Seminar

*first-year Science course sequences are:
- any two 200-level Biology courses
- CHEM 120/123 plus labs or 121/125 plus labs
- EARTH 121/122 and 121L/122L
- PHYS 121/121L, 122/122L or 111/111L, or 112/112L, or 121/121L, 112/112L

At least three of the above course sequences must be taken.

** Students with no computer literacy should take CS 100 before CS 102
† Normally, 2.0-3.0 Science credits should be taken each year

**Recommended electives are:**
- MTHEL 100, MATH 125, one of ECON 221, STAT 202 or 204; M SCI 261, 311, 461, BUS 352W, 454W

Honours Environmental Science

Program 1 Advisor: Professor D. Barton (Biology)
Program 2 Advisor: Professor J.J. Sloan (Chemistry)

Students wishing to follow this program in the Co-operative system of study should first speak to Professor Barton (Program 1) or Professor Sloan (Program 2), and to Mr. R.A. Pullin of the Department of Co-operative Education and Career Services.

Admission to, and continuance in, both Environmental Science programs requires a cumulative average of 60% in both Science and non-Science courses. In order to graduate with the degree Honours BSc (Environmental Science) the following requirements must be met:

1. Successful completion of 20.0 lecture credits plus any corequisite lab credits. At least 12.0 credits must be Faculty of Science credits. At least 8.0 of the 12.0 must be at or above the 200-level. At least 4.0 of the 8.0 other than any SCI credits must be at the 300- or 400-level.

2. No more than 5.0 failed credits are allowed.

3. No more than 2.0 SCI credits may be applied to the degree.

Program 1: Fundamental science and current environmental concerns. The emphasis is on knowledge and skills needed to solve complex problems.

Program 2: Has an atmospheric science focus, offering an understanding of processes potentially dangerous to the atmosphere, including photochemical smog, acid rain, hydrocarbon emissions, ozone depletion, the greenhouse effect and the physics of atmospheric transport and radiation balance.
Environmental Science Program 1

**Year One***
- BIOL 211 Introductory Vertebrate Zoology
- BIOL 240 Fundamentals of Microbiology
- BIOL 250 Ecology
- CHEM 120 Physical and Chemical Properties of Matter
- CHEM 120L Chemical Reaction Laboratory 1
- CHEM 123 Chemical Reactions, Equilibria and Kinetics
- CHEM 123L Chemical Reaction Laboratory 2
- CHEM 129 Introductory Spectroscopy
- EARTH 121 The Planet We Live On
- EARTH 121L Introduction to Earth Sciences Laboratory 1
- MATH 107/108 Calculus 1 and 2
- SCI 040 (ENS) Environmental Science Seminar
- One elective (0.5 credit)

*Recommended Electives:* BIOL 241, 273; CS 102; STAT 202; GEOG 102

**Year Two***
- BIOL 210 Introductory Invertebrate Zoology
- BIOL 221 Plant Biology 2 - The Diversity of Plants
- CHEM 223/223L Analytical Chemistry
- CHEM 223L Analytical Chemistry Laboratory 1
- ENV S 201 Introduction to Environmental and Planning Law
- ERS 241 Introduction to Environmental and Social Impact Assessment
- GEOG 201 Geomorphology and Soils or EARTH 342 Applied Geomorphology
- SCI 040 (ENS) Environmental Science Seminar
- Two electives (1.0 credit)

*Recommended Electives:* BIOL 241, any of ENGL 210C, 210E or 210F

**Years Three and Four**
- BIOL 454 Environmental Toxicology 1
- BIOL 457 Analysis of Communities or BIOL 458 Population Biology
- CHEM 357 Physical Biochemistry, CHEM 404 Chemistry of Aquatic Systems or CHEM 406 Environmental Organic Chemistry
- CIV E 375 Water Quality Engineering
- EARTH 123 Introduction to Hydrology
- EARTH 358 Environmental Geology for Earth Scientists
- SCI 040 (ENS) Environmental Science Seminar
- Fourteen electives (7.0 credits)

*Recommended Electives:* BIOL 447, 450, 455, 456; CHEM 254; CIV E 472, 486; EARTH 456, 458; EARTH 438 A/B

* BIOL 240, Fundamentals of Microbiology should be completed by the end of Year Two.

Environmental Science Program 2

**Year One***
- PHYS 111/112 Physics 1 and 2, 111L/112L replaces BIOL 211 and one elective, from Program 1.

**Year Two***
- AM 250 Modelling with Ordinary Differential Equations or MATH 228 Differential Equations for Physics and Chemistry
- BIOL 230 Introductory Cell Biology
- BIOL 241 Introduction to the Microbial World
- CHEM 223/223L Analytical Chemistry
- CHEM 266 Basic Organic Chemistry 1
- PHYS 222/222L Electricity and Magnetism 1 and 2
- PHYS 222L Electricity and Magnetism Lab 1
- SCI 040 (ENS)
- Three electives (1.5 credits)

*Recommended Electives:* PHYS 259, ERS 241, GEOG 102, ENV S 195 and ENV S 201; Any of ENGL 210C, 210E or 210F.

**Years Three and Four**
- BIOL 454 Environmental Toxicology 1
- CHEM 237 Introductory Biochemistry
- CHEM 254 Chemical Thermodynamics 1
- CHEM 303 Ionic Equilibria
- CHEM 305 Atmospheric Chemistry and Physics
- EARTH 123 Introductory Hydrology
- EARTH 358 Environmental Geology for Earth Scientists
- SCI 040 Seminar (ENS)
- Thirteen electives (6.5 credits)

*Recommended Electives:* AM 251, 343; BIOL 455, 456, 457; CHEM 212, 313, 357, 412; ENV S 220, ERS 317, ERS 352, GEOG 102, 120, 208, 309; M E 351, 459, 571; PHYS 480.

**HONOURS CO-OPERATIVE ENVIRONMENTAL SCIENCE - PROGRAM 1**

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### Honours Co-operative Environmental Science - Program 2

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**Note**

BIOL 240 should be completed by the end of Year Two.

* Year 2 Recommended Electives: PHYS 259/259L, ENVS 195, 201, ERS 241, GEOG 102; any of ENGL 210C, 210E, 210F.
* Year 3 and 4 Recommended Electives: AM 251, 343; BIOL 455, 456 or 457; CHEM 212, 313, 357, 412; ENVS 220, ERS 317, 352, GEOG 102, 120, 208, 309; ME 351, 459, 571; PHYS 480.

** Courses shown in 3A and 3B can be interchanged with courses taken in 4A and 4B.
DEPARTMENTAL PROGRAMS

Biology

The following programs are offered in the Biology department:

Honours Major Programs

Regular:
Honours Biology
Honours Biochemistry
Honours Biochemistry (Biotechnology Option)
Honours Biology and Chemistry
Honours Biology/Business Economics
Honours Biology and Environment and Resource Studies
Honours Biology and Geography

Co-operative:
Honours Co-operative Biology
Honours Co-operative Biochemistry
Honours Co-operative Biochemistry (Biotechnology Option)
Honours Co-operative Biology and Chemistry
Honours Co-operative Biology/Business Economics

Honours Science Program 2 (with specialization in Biology)

Honours Science Program 2 (Pre-Health-Professions Option)

Minor in Biology

HONOURS MAJOR PROGRAMS REGULAR

Honours Biology

Program Advisors: Professors W.R. Hawthorn, M. Griffith, R. Smith, and Mr. N. Scott

Admission to, and continuance in, Honours Biology requires a cumulative average of 60% and a cumulative average of 65% in all Biology courses.

In order to graduate in the Honours Biology program, the following requirements must be met:

1. Successful completion of 21.0 credits.
2. At least a 0.75 credit in Biochemistry and a 0.75 credit in Organic Chemistry.
3. By the end of Year Two, students must have completed CS 102.
4. Mandatory courses as listed below.

Also, any student who fails a Biology course during second or third year will not be permitted to continue in the program unless reinstated by the department.

Year One
1.5 Biology credits from the following: BIOL 210, 211, 220, 221, 230, 239, 240, 241, 250, 273
CHEM 120/120L and 123/123L
Five electives (2.5 credits)

Note
Students who enter Year Two of Regular Honours Biology with 1.0 Biology credit from Year One are advised to complete the remaining 4.0 credits of 200-level Biology courses by the end of Year Two. This will usually mean that these students will have six lecture courses during one term of Year Two. BIOL 240 should be taken before BIOL 241.

Year Two
3.5 Biology credits from the following: BIOL 210, 211, 220, 221, 230, 239, 240, 241, 250, 273
CHEM 266T/266L and 237/237L
STAT 202

Biology Themes
During third and fourth year, students may wish to specialize in certain recognized areas of biological sciences such as:

- Animal and Plant Physiology
- Aquatic Ecology
- Cell/Molecular Biology and Biotechnology
- Evolutionary Biology and Biosystematics
- Microbiology
- Pre-Health-Professions
- Terrestrial Ecology

Appropriate 400-level courses have been selected to fit each of these areas, yet it is perfectly acceptable for any student to decide on an independent selection of courses, according to individual interests. Consult a Biology Undergraduate Officer for more details.

Year Three
At least 3.5 credits from the 400-level Biology courses (excluding BIOL 301)
Three electives (1.5 credits)

Recommended Electives: Chemistry courses

Year Four
At least 3.0 credits from the 400-level Biology courses
Four electives (2.0 credits)

† Students contemplating a "Minor in Chemistry" must take Honours-level Chemistry courses. CHEM 266, 267 and 228 will not count towards the Minor; the appropriate acceptable courses are CHEM 264, 265 and 223/223L respectively. Students are urged to check their plans for this Minor with the Undergraduate Officer in Chemistry.
Honours Biochemistry

Program Advisors: Professors L.J. Brubacher (Chemistry), and M. Globus and B. Greenberg (Biology)

This program allows specialization in either biochemistry with a chemical emphasis, or biochemistry with a physiological, molecular biological or microbiological emphasis. The program is also available in the Co-operative system of study.

Professional Standing: The program in Biochemistry fulfills the academic requirements for professional membership in the Chemical Institute of Canada.

Admission to, and continuance in, Honours Biochemistry requires a cumulative average of 60% and a cumulative average of 65% in Biology courses.

In order to graduate in the Honours Biochemistry program, the following requirements must be met:

1. Successful completion of 22.75 credits (including all required labs in Chemistry and Physics).
2. Mandatory courses as listed below.
3. 7.0 credits from recommended Years Three and Four electives.

Note
Students who elect to take BIOL 240 and 241 are advised that the preferred sequence is BIOL 240 followed by 241.

Year One
BIOL 230, 239
CHEM 121/120L and 125/123L, 129
PHYS 121/121L or 111/111L, and 112/112L
MATH 127/128
Elective (0.5 credit)

Year Two
1.5 credits from 200-level Biology courses
CHEM 212, 223, 223L, 224L, 254, 264, 265, 265L
STAT 202
Elective (0.5 credit)

Year Three
BIOL 436, 437
CHEM 233, 333, 334L, 357, 368, 368L
Four electives* (2.0 credits) from Groups below
CHEM 233 and 333 are to be taken concurrently in the Fall term.

Year Four
Ten electives* (5.0 credits)† from Groups below

* Years Three and Four electives (7.0 credits from Groups A, B, and C, with at least 5.5 credits from Groups A and B, of which not less than 4.0 credits are from Group A.)

Group A
BIOL 429, 432X, 433X, 434, 438, 490, 440, 441, 442, 490A/B
CHEM 432, 433, 434, 435, 492A/B†

Group B
CHEM 312, 313, 329, 311, 412, 413, 425, 464, 465
PHYS 480

Group C
Free electives (not more than 1.5 credits)
† Students electing CHEM 492A/B must earn 7.5 credits from groups A, B and C, with 5.5 credits in Year Four.

Honours Biochemistry (Biotechnology Option)
For program information see "Honours Co-operative Biochemistry (Biotechnology Option).

Honours Biology and Chemistry
For program information see "Honours Co-operative Biology and Chemistry".

Honours Biology/Business Economics
Program Advisors: Professor M. Globus (Biology) and Professor E. Carvalho (Economics)

As technological developments are introduced at an ever-increasing pace, there is a strong demand for individuals with a depth of understanding of both the science of Biology and its implementation in the world of business and government. Decision makers often need to appreciate the underlying scientific issues as well as the economic ramifications of their decisions. Students interested in an interdisciplinary approach may wish to consider the Honours Biology/Business Economics program which is designed to prepare students for careers at the interface of the Biological Sciences and Business or Government, encompassing such diverse fields as food and agriculture, natural resources, biotechnology, the health-related industries and environmental toxicology.

This program is offered in both Regular and Co-operative systems of study. Admission to, and continuance in, Honours Biology/Business Economics requires a cumulative Biology average of 65%, a cumulative Economics average of 70% and a cumulative overall average of at least 65%.

In order to graduate in the Honours Biology/Business Economics program, the following requirements must be met:

1. Successful completion of 21.0 credits.
2. Of the 21.0 credits required, 12.0 credits must be in Science:
   - 9.0 credits approved by the Department of Biology;
   - 3.0 credits in Chemistry including CHEM 120/120L, 123/123L, 266/266L and 237/237L.
3. 7.5 credits must be taken in Economics, Accounting and Business.
5. 1.0 elective credit.
6. Mandatory courses are listed below.
Year One
2.0 Biology credits from: BIOL 210, 211, 220, 221, 230, 239, 240, 241, 250, 273
CHEM 120/120L and 123/123L
ECON 101 and 102
ACC 123
CS 102

Year Two
2.0 Biology credits from: BIOL 210, 211, 220, 221, 230, 239, 240, 241, 250, 273
CHEM 266/266L and 237/237L
ECON 201, 202, 211 and 221

Year Three
2.5 credits in Biology at the 400-level
ECON 231, and 344 or 355
ACC 231
0.5 credit from the following: ECON 301, 302, 321, 341, 344, 345, 361, 401, 402, 403, BUS 352W†
plus 0.5 credit elective (ENGL 209 is recommended)

Year Four
2.5 credits in Biology at the 400-level
2.0 credits from ECON 301, 302, 321, 341, 344, 345, 361, 401, 402, 403, BUSINESS 352W†
plus 0.5 credit elective

* Students with no computer literacy should take CS 100 before CS 102.
** BUS 352W is recommended.
† WLU course

Honours Biology and Environment and Resource Studies

Honours Biology and Geography
Program Advisor: Professor D. Barton (Biology)

Admission to these programs will be made at the Year Two level.

Admission to, and continuation in, either program requires an overall cumulative average of 60% with a cumulative average of 70% in the Faculty of Environmental Studies courses, and a cumulative average of 65% in Biology courses.

In order to graduate in either program, the following requirements must be met:

1. Successful completion of 21.0 credits.
2. By the end of Year 2, students should have completed the ten introductory Biology courses at the 200-level, and CS 102.
3. Thirteen 400-level Biology courses.
4. Four satisfactory workterm reports.
5. Mandatory courses as listed below.

Note to All 1A Students
BIOL 230 is recommended for first year. BIOL 240 should be taken before 241.

Note to All 1B Students
Students should be aware that BIOL 239 and 273 must be taken during either the Winter or Spring terms in even-numbered years and BIOL 211, 221 and 241 must be taken during either the Winter or Spring terms in odd-numbered years.

Biology Themes
During third and fourth year, students may wish to specialize in certain recognized areas of biological sciences such as:
Animal and Plant Physiology
Aquatic Ecology
Cell/Molecular Biology and Biotechnology
Evolutionary Biology and Bioinformatics
Microbiology
Pre-Health-Professions
Terrestrial Ecology

Appropriate 400-level courses have been selected to fit each of these areas, yet it is perfectly acceptable for any

Science
Biology

Since proper course selection in either program is critical, contact Professor D. Barton, Biology, for further details.

HONOURS MAJOR PROGRAMS CO-OPERATIVE

Honours Co-operative Biology
Program Advisors: Professors W.R. Hawthorn, M. Griffith, R. Smith and Mr. N. Scott

The University of Waterloo offers a Co-operative Biology program designed to equip the graduating student with two years of work-related experience as well as a degree in Honours Biology. Applicants for Co-op Biology must fulfill the normal admission requirements for the Faculty of Science. The program has academic and work terms scheduled as shown in "The Department of Co-operative Education and Career Services". During the work terms, students are assessed on their performance and are also required to write work reports. The program is aimed at making the student competitive in the job market without precluding entry into graduate school.

Admission to, and continuation in, Honours Co-operative Biology requires a cumulative average of 60% and a cumulative average of 65% in all Biology courses. In order to graduate in the Honours Co-operative Biology program, the following requirements must be met:

1. Successful completion of 21.0 credits.
2. By the end of Year 2, students should have completed the ten introductory Biology courses at the 200-level, and CS 102.
3. Thirteen 400-level Biology courses.
4. Four satisfactory workterm reports.
5. Mandatory courses as listed below.

Note to All 1A Students
BIOL 230 is recommended for first year. BIOL 240 should be taken before 241.

Note to All 1B Students
Students should be aware that BIOL 239 and 273 must be taken during either the Winter or Spring terms in even-numbered years and BIOL 211, 221 and 241 must be taken during either the Winter or Spring terms in odd-numbered years.

Biology Themes
During third and fourth year, students may wish to specialize in certain recognized areas of biological sciences such as:
Animal and Plant Physiology
Aquatic Ecology
Cell/Molecular Biology and Biotechnology
Evolutionary Biology and Bioinformatics
Microbiology
Pre-Health-Professions
Terrestrial Ecology

Appropriate 400-level courses have been selected to fit each of these areas, yet it is perfectly acceptable for any
student to decide on an independent selection of courses, according to individual interests. Consult a Biology Undergraduate Officer for more details.

Stream 8
(Students who take Year 1B during Winter Term)

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Honours Co-operative Biochemistry
Program Advisors: Professor L.J. Brubacher (Chemistry) and Professor M. Globus and B. Greenberg (Biology)

This program allows specialization in either biochemistry with a chemical emphasis, or biochemistry with a physiological or microbiological emphasis. The program is also available in the Regular system of study.

**Professional Standing**
The program in Biochemistry fulfills the academic requirements for professional membership in the Chemical Institute of Canada.

Admission to, and continuance in, Honours Co-operative Biochemistry requires a cumulative average of 60%, a cumulative average of 60% in Chemistry courses, and a cumulative average of 65% in Biology courses.

In order to graduate in the Honours Co-operative Biochemistry program, the following requirements must be met:

1. Successful completion of 22.75 credits (including all required labs in Chemistry and Physics).
2. Normally, a student must have been enrolled full-time in two out of three years, one of which must be either Year Two or Three, and the other must be Year Four.
3. Mandatory courses as listed below.
4. 7.0 credits from recommended Years Three and Four electives.
5. Four satisfactory work-term reports.

**Note**
Students should be aware that BIOL 239 must be taken in the Winter term, or in the Spring term of an even-numbered year. Students who elect to take BIOL 240 and 241 are advised that the preferred sequence is BIOL 240 followed by 241.
Stream 8
(Students who take Year 1B in Winter Term)

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</tr>
<tr>
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<td>CHEM 223/223L</td>
<td>CHEM 265/265L</td>
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<td>PHYS 112/112L</td>
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<tr>
<td>CHEM 264</td>
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<table>
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<tr>
<th>Work Term</th>
<th>Year 3A</th>
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<tbody>
<tr>
<td>BIOL 436</td>
<td>BIOL 439</td>
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<tr>
<td>CHEM 357</td>
<td>CHEM 368/369L</td>
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<td>Electives* (1.0 credit)</td>
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<tr>
<td>CHEM 333/334L</td>
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<td>STAT 202</td>
<td>CHEM 368/369L</td>
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Stream 4 and Stream 8
(Students who take Year 1B in Spring Term)

<table>
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<td>PHYS 121/121L</td>
<td>MATH 128</td>
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<td>MATH 127</td>
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<tbody>
<tr>
<td>BIOL 239</td>
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<tr>
<td>BIOL – 0.5</td>
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<tr>
<td>200-level credit</td>
<td>CHEM 368/369L</td>
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<tr>
<td>CHEM 212</td>
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<td>from Groups below</td>
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<tr>
<td>CHEM 223/223L</td>
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<td>CHEM 264</td>
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<table>
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<td>CHEM 357</td>
<td>BIOL 437</td>
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<td>CHEM 333/334L</td>
<td>STAT 202</td>
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</tr>
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<td>Elective (0.5 credit)</td>
<td>from Groups below</td>
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Stream 4
In Years One and Two, this Option follows the same sequence of courses as in the Honours Co-operative Biochemistry program, except that students must include BIOL 240, 241, and 273 in their program. Students should take BIOL 240 in Year 1A, BIOL 273 in Year 1B, and BIOL 241 in Year 2A as the BIOL electives.

<table>
<thead>
<tr>
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<th>Spring</th>
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<tbody>
<tr>
<td><strong>Year 2B</strong></td>
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<td>See (above)</td>
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<td>BIOL 440</td>
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<td>CHEM 368/368L</td>
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<td>BIOL 439</td>
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<tr>
<td>BIOL 439</td>
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<td>CHEM 357/334L</td>
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Stream 4 and Stream 8

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<td>CHEM 121/120L</td>
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<td>MATH 127</td>
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<td><strong>Year 1B</strong></td>
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<td>BIOL - 0.5</td>
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<tr>
<td>200-level credit</td>
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<td>CHEM 125/123L</td>
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<tr>
<td>CHEM 212</td>
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<td>CHEM 224L, 233</td>
</tr>
<tr>
<td>CHEM 223/223L</td>
<td></td>
<td>CHEM 268/266L</td>
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<tr>
<td>CHEM 254</td>
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<td>PHYS 112/112L</td>
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<td>CHEM 284</td>
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<td>CHEM 357</td>
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<td>CHEM 368/368L</td>
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<td><strong>Work Term</strong></td>
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</tbody>
</table>

Honours Co-operative Biology and Chemistry

Program Advisors: Professor L.J. Brubacher (Chemistry) and Professor M. Globus (Biology)

This program provides a strong grounding in both Biology and Chemistry. Those interested in teaching, or, in certain areas of research at the interface between Biology and Chemistry such as bio-organic synthesis, chemical epidemiology, ecophysiology, environmental toxicology may wish to select this program. Such students should consult one of the program advisors for assistance in designing a program to suit their specific interests. Students should choose the 200-level Biology courses which are prerequisites for the 400-level topics they wish to study.

Students who elect to take BIOL 240 and BIOL 241 are advised that the preferred sequence is BIOL 240 followed by BIOL 241. Although this program is presented in the Co-operative format, it is also available in the Regular system of study.

Admission to, and continuance in, Honours Co-operative Biology and Chemistry requires a cumulative average of 60%, a cumulative average of 60% in Chemistry courses, and a cumulative average of 65% in Biology courses. In order to graduate in the Honours Co-operative Biology and Chemistry program, the following requirements must be met:

1. Successful completion of 22.75 credits (including all required labs in Chemistry and Physics).

2. Normally, a student must have been enrolled full-time in two out of three years, one of which must be either Year Two or Three, and the other must be Year Four.

3. Mandatory courses as listed below.

4. 2.0 credits from Years Three and Four electives∗.

5. 2.0 credits free electives.

Stream 8
(Students who take Year 1B in Winter Term)

<table>
<thead>
<tr>
<th>Fall</th>
<th>Winter</th>
<th>Spring</th>
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<tbody>
<tr>
<td><strong>Year 1A</strong></td>
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<td><strong>Year 2A</strong></td>
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<td>CHEM 121/120L</td>
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<td>CHEM 125/123L</td>
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<td>CHEM 224L, 233</td>
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<td>PHYS 112/112L</td>
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<td>CHEM 268/266L</td>
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<td>Elective (0.5 credit)</td>
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<td><strong>Work Term</strong></td>
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<td><strong>Year 3B</strong></td>
</tr>
<tr>
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<td>BIOL - 1.0</td>
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<td>CHEM 357</td>
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<td>CHEM 368/368L</td>
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### Stream 4

**Students who take Year 1B in Spring Term**

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<td>CHEM 129</td>
<td>PHYS 121/121L or</td>
</tr>
<tr>
<td>111/111L</td>
<td>MATH 128</td>
<td>MATH 127</td>
</tr>
<tr>
<td><strong>Work Term</strong></td>
<td><strong>Work Term</strong></td>
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<tr>
<td><strong>Year 1A</strong></td>
<td><strong>Year 1B</strong></td>
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<td>BIOL – 0.5</td>
<td>Work Term</td>
<td>200-level credit</td>
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<tr>
<td>200-level credit</td>
<td>BIOL – 1.0</td>
<td>CHEM 212</td>
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<td>CHEM 224/223L</td>
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<td>CHEM 237/237L</td>
</tr>
<tr>
<td>CHEM 254</td>
<td>CHEM 368/368L</td>
<td>CHEM 255/255L</td>
</tr>
<tr>
<td>STAT 202</td>
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<td>Elective (0.5 credit)</td>
</tr>
<tr>
<td><strong>Work Term</strong></td>
<td><strong>Work Term</strong></td>
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<tr>
<td><strong>Year 1B</strong></td>
<td><strong>Year 2A</strong></td>
<td></td>
</tr>
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<td>BIOL – 0.5</td>
<td>BIOL – 1.0</td>
<td>200-level credit</td>
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<td>200-level credit</td>
<td>200-level credit</td>
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<td>Elective (0.5 credit)</td>
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<tr>
<td>STAT 202</td>
<td>Elective (0.5 credit)</td>
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### Stream 4 and Stream 8

**Year 4**

- BIOL – 2.5 400-level credits
- CHEM 312
- Electives* (1.0† credit)
- Electives (1.0† credit)

*Selected from 400-level BIOL courses or CHEM 313, 323, 341, 342, 343, 344, 345, 346, 347, 348/B†

† Students electing CHEM 492A/B must earn 2.5 credits from the electives* above.

### Honours Co-operative Biology/Business Economics

**Program Advisors:** Professor M. Globus (Biology) and Professor E. Carvalho (Economics). See “Honours Biology/Business Economics”.

### HONOURS SCIENCE PROGRAM 2

(With Specialization in Biology)

**Program Advisors:** Professors W.R. Hawthorn, M. Griffith, R. Smith, and Mr. N. Scott.

Admission to, and continuance in, Honours Science Program 2 requires an overall cumulative average of 60% and a cumulative average of 65% in Biology courses.

In order to graduate in the Honours Science program, with specialization in Biology, the following requirements must be met:

1. Successful completion of 21.0 credits. Of the 21.0 credits that are required:
   - at least 19.0 must be lecture credits;
   - at least 13.5 must be Faculty of Science credits.

2. At least 0.75 credit of biochemistry and 0.75 of organic chemistry.

3. 1.0 credit in MATH is required, of which 0.5 must be CS 102.

4. No more than 3.0 SCI credits may be applied to the program.

5. Mandatory courses as listed below.

   **Year One**
   - 1.0 credit from the following: BIOL 210, 211, 220, 221, 230, 239, 240, 241, 250, 273
   - CHEM 120/120L and 123/123L
   - CS 102
   - Electives (2.5 credits)

   **Year Two**
   - 3.0 credits from BIOL 210, 211, 220, 221, 230, 239, 240, 241, 250, 273
   - CHEM 266/266L and 237/237L
   - Electives (1.0 credit)

   **Year Three**
   - At least 3.0 credits from the 400-level Biology courses
   - 0.5 credit in Science
   - Electives (1.5 credits)

   **Year Four**
   - 4.0 Science credits at least 2.0 of which are Biology credits from the 400-level
   - Electives (1.0 credit)

† Students contemplating a “Minor in Chemistry” must take Honours-level Chemistry courses.

HONOURS SCIENCE PROGRAM 2
(Pre-Health-Professions Option)

**Program Advisors:** Professors W.R. Hawthorn, M. Griffith, R. Smith and Mr. N. Scott.

This program combines the Honours Science Program 2 core with specific courses in biology, chemistry, physics and statistics. Electives are recommended from health, kinesiology, physics, psychology, science, and sociology.

It is suitable preparation for work in medicine, dentistry, physiotherapy, occupational therapy, pharmacy, radiotherapy, and chiropractic, or for the student whose interests develop into graduate study in the health disciplines.

Students are strongly urged to consult the admission requirements of the professional schools of interest to aid their choice of electives.

Admission to, and continuance in, Honours Science Program 2 (Pre-Health-Professions Option) requires an overall cumulative average of 60% and a cumulative
average of 65% in Biology courses. In order to graduate with this Option, the following requirements must be met:

1. Successful completion of 21.75 credits; of the 21.75 credits that are required:
   - at least 19.0 must be lecture credits;
   - at least 13.5 must be Faculty of Science credits.

2. No more than 3.0 SCI credits may be applied to the program.

3. Mandatory courses as listed below.

4. A minimum of 4.0 lecture credits from the recommended electives.

5. For students interested in Optometry at the University of Waterloo, see Optometry.

MINOR IN BIOLOGY
In order to graduate with a Minor in Biology, the following requirements must be met:

1. Successful completion of 5.0 Biology credits, at least 2.5 of which must be at the fourth-year level.

2. A minimum average of 65% is required in Biology courses.

3. Students are advised to see an Undergraduate Advisor in the Department of Biology.

### Science

**Biology**

**Chemistry**

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**HONOURS SCIENCE PROGRAM 2**

**(PRE-HEALTH-PROFESSIONS OPTION)**

<table>
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Recommended electives: HLTH 101, PSYCH 101

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<td>BIOL 470*</td>
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Recommended electives: HLTH 220, SOC 248, 249

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<td>BIOL 436</td>
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<td>CHEM 267/267L</td>
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Recommended electives: KIN 300, HLTH 341, 349

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Recommended electives: HLTH 442

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**Note**

A Pre-Health-Professions Option is also offered by the Department of Health Studies, and a suitable set of preparatory courses may be taken within a Kinesiology degree program.

* Prerequisites BIOL 210 and 211 for 470 are not required for students enrolled in the Honours Science Program 2 (Pre-Health-Professions Option).

† Students contemplating a "Minor in Chemistry" must take Honours-level Chemistry courses. CHEM 266, 267 and 228 will not count towards the Minor; the appropriate acceptable courses are CHEM 264, 265 and 223/223L respectively. Students are urged to check their plans for this Minor with the Undergraduate Officer in Chemistry.

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**Chemistry**

The following programs are offered in the Chemistry department:

**Honours Major Programs**

**Regular:**

- Honours Biochemistry* (joint with Biology Department)
- Honours Biochemistry* (Biotechnology Option) (joint with Biology Department)
- Honours Biology and Chemistry* (joint with Biology Department)
- Honours Chemistry* (joint with Biology Department)
- Honours Chemistry (with Options)
  - Mathematics Option*
  - Thesis Option*
- Honours Chemical Physics* (joint with Physics Department)
- Honours Environmental Chemistry*
- Honours Geochemistry*

**Co-operative:**

- Honours Co-operative Biochemistry* (joint with Biology Department)
- Honours Co-operative Biochemistry* (Biotechnology Option) (joint with Biology Department)
- Honours Co-operative Biology and Chemistry* (joint with Biology Department)
- Honours Co-operative Chemistry*

**Honours Co-operative Chemistry (with Options)**
  - Mathematics Option*
  - Thesis Option*
Honours Co-operative Chemical Physics* (joint with Physics Department)
Honours Co-operative Environmental Chemistry*
Honours Co-operative Geochemistry*

Minor in Chemistry
* These programs fulfill the academic requirements for professional membership in The Chemical Institute of Canada.

Notes to all Honours Chemistry Students
1. Students whose major field is Chemistry may not take these courses for credit: CHEM 218, 219, 228, 266, 267, 316, 366.

Technical Electives with Chemistry Content

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Other Recommended Electives
Statistics
STAT 204, 304, MTHEL 102

Writing
ENGL 210C or E

Environment
ERS 337

Law
PSCI 291, 292, ENV S 201, ACC 231

Management Science
M SCI 211

Business (WLU)
BUS 352, 362, 382, 383

Economics
ECON 101, 102, 201, 202

Accounting
ACC 121, 122

Computing
CS 212, 230, GEN E 121

Critical Thinking
PHIL 145

Microprocessors
E & CE 222, 223, 427, PHYS 353

2. The middle digit of most course numbers indicates the subdiscipline within which the course lies:
X0X trans- or inter-subdisciplinary courses
X1X inorganic chemistry
X2X analytical chemistry
X3X biochemistry
X5X physical chemistry
X6X organic chemistry
X7X polymer chemistry
X9X individualised courses (research projects, etc.)

Electives
The following chart outlines proposed offerings of technical electives with Chemistry content from which Honours students should choose their required electives.
HONOURS MAJOR PROGRAMS REGULAR

Honours Biochemistry
(see "Biology")

Honours Biochemistry (Biotechnology Option)
(see "Biology")

Honours Biology and Chemistry
(see "Biology")

Honours Chemistry
Program Advisors: Professors G.E. Toogood and M.F. Tchir

Admission to, and continuance in, Honours Chemistry requires a cumulative average of 60% and an average of 60% in all Chemistry lecture courses each term.

In order to graduate with an Honours Chemistry degree, the following requirements must be successfully completed:

1. 24.5 credits including 5.5 lab credits.
2. In Years Three and Four, students must choose six courses from the list of Technical Electives with Chemistry content (see chart above).
3. One of PHYS 222/222L, 252/252L, 256/256L, 259/259L.
4. Students are encouraged to include in their program an ethics course such as STV 100, PHIL 226, 215, SCI 263, 265.
5. Failure of more than one course in the field of specialization will result in the requirement to withdraw from the program. Students may petition for re-admission; such re-admission is at the discretion of the Chemistry Undergraduate Committee and exceptional circumstances must justify it.
6. Mandatory courses as listed below.

Year One

Fall
CHEM 120L Chemical Reaction Laboratory 1
CHEM 121 Physical and Chemical Properties of Matter
MATH 125 Applied Linear Algebra 1
MATH 127 Calculus 1 for Honours Physics and Chemistry
PHYS 121 Mechanics, Wave Motion and Heat 1
PHYS 121L Mechanics, Wave Motion and Heat Laboratory 1
One elective (0.5 credit)

Winter
CHEM 123L Chemical Reaction Laboratory 2
CHEM 125 Chemical Reactions, Equilibria and Kinetics
CHEM 129 Introductory Spectroscopy
MATH 128 Calculus 2 for Honours Physics and Chemistry
PHYS 112 Physics 2
PHYS 112L Physics 2 Laboratory
One elective (0.5 credit)

Year Two

Fall
CHEM 010 General Chemistry Seminar
CHEM 223 Analytical Chemistry
CHEM 223L Analytical Chemistry Laboratory 1
CHEM 254 Chemical Thermodynamics 1
CHEM 254L Physical Chemistry Laboratory 1
CHEM 264 Organic Chemistry 1
MATH 228 Differential Equations for Physics and Chemistry
PHYS elective (0.75 credit) (Fall or Winter, see note 3 above)

Winter
CHEM 010 General Chemistry Seminar
CHEM 212 Structure and Bonding
CHEM 224L Analytical Chemistry Laboratory 2
CHEM 256 Introductory Quantum Mechanics
CHEM 265 Organic Chemistry 2
CHEM 265L Organic Chemistry Laboratory 1
Two electives (1.0 credit)

Year Three

Fall*
CHEM 010 General Chemistry Seminar
CHEM 312 Transition Metal Chemistry
CHEM 312L Inorganic Chemistry Laboratory
CHEM 359 Kinetics and Dynamics
CHEM 362 Mechanistic Organic Chemistry
Two electives (1.0 credit)

Winter*
CHEM 010 General Chemistry Seminar
CHEM 313 Chemistry of Inorganic Solid State Materials
CHEM 323 Analytical Instrumentation
CHEM 358 Statistical Thermodynamics
CHEM 358L Physical Chemistry Laboratory 2
CHEM 368 Synthetic Organic Chemistry
CHEM 368L Senior Organic Chemistry Laboratory
One elective (0.5 credit)

Year Four

CHEM 010 General Chemistry Seminar
CHEM 492A Advanced Laboratory
CHEM 492B Advanced Laboratory
Eight electives (4.0 credits)

* CHEM 312L, 358L and 368L may be taken in either of the 3A or 3B terms, and may be taken with, before or after CHEM 312, 358, 359 and 368.

Honours Chemistry (with Options)

HONOURS CHEMISTRY (Mathematics Option)
Program Advisor: Professor F.R. McCourt

This program combines the Honours Chemistry core with an enriched background in mathematics. It is suitable preparation for work in Theoretical Chemistry or Chemical Physics, or for the student whose interests and abilities lie in a mathematical direction.

Students wishing to follow this program on the Co-operative system of study should first speak to Professor
Admission to, and continuance in, Honours Chemistry (Mathematics Option) requires an overall cumulative average of 60%. In addition, a 60% average must be obtained each term in all Chemistry lecture courses. A 60% average is required in all Mathematics courses.

In order to graduate with an Honours Chemistry (Mathematics Option) degree, the following requirements must be successfully completed:

1. 23.5 credits including 4.5 lab credits.
2. In Year Two, one of PHYS 222/222L, 252/252L, 256/256L, 259/259L.
3. Students are encouraged to include in their program an ethics course such as STV 100, PHIL 215, 226, SCI 263, 265.
4. Failure of more than one course in the field of specialization will result in the student being required to withdraw from the program. Students may petition for re-admission; such re-admission is at the discretion of the Chemistry Undergraduate Committee and exceptional circumstances must justify it.
5. Mandatory courses as listed below.

**Year One**

**Fall**
- CHEM 120L Chemical Reaction Laboratory 1
- CHEM 121 Physical and Chemical Properties of Matter
- MATH 125 Applied Linear Algebra 1 (or MATH 115 Linear Algebra for Engineering, or MATH 136 Linear Algebra 1 for Honours Mathematics, Winter)
- MATH 127 Calculus 1 for Honours Physics and Chemistry
- PHYS 121 Mechanics, Wave Motion and Heat I
- PHYS 121L Mechanics, Wave Motion and Heat Laboratory 1
- One CS elective (0.5 credit)

**Winter**
- CHEM 123L Chemical Reaction Laboratory 2
- CHEM 125 Chemical Reactions, Equilibria and Kinetics
- CHEM 129 Introductory Spectroscopy
- MATH 128 Calculus 2 for Honours Physics and Chemistry
- PHYS 112 Physics 2
- PHYS 112L Physics 2 Laboratory
- One elective (0.5 credit) (MATH 126 recommended)

**Year Two**

**Fall**
- CHEM 010 General Chemistry Seminar
- CHEM 223 Analytical Chemistry
- CHEM 223L Analytical Chemistry Laboratory 1
- CHEM 254 Chemical Thermodynamics 1
- CHEM 254L Physical Chemistry Laboratory 1
- CHEM 264 Organic Chemistry 1
- MATH 227P Calculus 3 for Honours Physics (or MATH 217 Calculus 3 for Chemical Engineering, or AM 231 Calculus 4)
- MATH 228 Differential Equations for Physics and Chemistry

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**HONOURS CHEMISTRY (Thesis Option)**

Program Advisor: Professor S. Collins

Students who have achieved an average of 60% in all Chemistry courses, and 80% over all course taken, may request to complete their degrees with a reduced course load and an increased research load. Admission is by interview after completion of Year Two in any Honours Chemistry or Biochemistry program, Regular or Co-operative.

**Years One and Two**

As at present in any Honours Chemistry or Biochemistry program
Years Three and Four

For students enrolled in any Honours Chemistry Program at the end of Year Two: CHEM 323 and completion of core course requirements in two of three subdisciplines outside the thesis area and one of CHEM 496A-E, plus research courses, CHEM 392A/B and CHEM 495A/B. (A typical sequence of required courses for a student completing a degree in this program and specializing in, for example, organic chemistry, would be CHEM 312/313, 358/359 and 496D).

For students enrolled in any Honours Biochemistry Program at the end of Year Two: CHEM 323, 357 and completion of core course requirements in two of three subdisciplines outside the thesis area and CHEM 496B, plus research courses, CHEM 392A/B and 495A/B. (A typical sequence of required courses for a student completing a degree in this program and specializing in biochemistry would be CHEM 312/313, 362/368 and 496B).

Student performance is assessed by an Advisory Committee at the end of each academic term. Assessment is based on research-related activities (70%) and general knowledge of Chemistry (30%), and a satisfactory performance in each category will be required.

Honours Chemical Physics (Joint with Physics Department)

Program Advisors: Professor J.W. Hepburn (Chemistry) and Professor W.K. Liu (Physics)

Chemical Physics is an emerging scientific discipline which includes roughly equal parts of both of the traditional fields of Chemistry and Physics.

Students wishing to follow this program in the Co-operative system of study should first speak to Professor Liu (Physics), Professor Hepburn (Chemistry), and to Mr. R.A. Pullin of the Department of Co-operative Education and Career Services.

Admission to, and continuance in, this program requires an overall cumulative average of 60%. In addition, a 60% average must be obtained in all Mathematics, Chemistry and Physics courses attempted in each term.

In order to graduate from this program, the following requirements must be successfully completed:

1. 21.75 credits, including 4.0 laboratory credits, or 2.5 laboratory credits plus PHYS 437A, PHYS 437B.

2. Students failing more than one Mathematics, Chemistry or Physics course will be required to withdraw from the program. Students may petition for re-admission; such re-admission is at the discretion of the Chemistry or the Physics Undergraduate Committee, and exceptional circumstances must justify it.

3. The courses identified in the core program must be taken. Students are encouraged to select electives from the lists of recommended electives, but other choices may be made in consultation with the program advisors.
Year Three

Fall

CHEM 010 General Chemistry Seminar
(or PHYS 010 Physics Seminar)
CHEM 359 Kinetics and Dynamics
PHYS 360A Intermediate Laboratory
(or CHEM 254L Physical Chemistry Laboratory 1)
PHYS 364 Mathematical Physics 1

Students wishing to take PHYS 434 in Year Four should take PHYS 334 as elective
Three electives (1.5 credit)

Winter

CHEM 010 General Chemistry Seminar
(or PHYS 010 Physics Seminar)
CHEM 312L Inorganic Chemistry Laboratory
CHEM 313 Chemistry of Inorganic and Solid State Materials
PHYS 359 Statistical Mechanics
(or CHEM 358 Statistical Thermodynamics)
PHYS 360B Intermediate Laboratory
(or CHEM 358L Physical Chemistry Laboratory 2)
Two electives (1.0 credit)

Year Four

Fall

CHEM 010 General Chemistry Seminar
(or PHYS 010 Physics Seminar)
CHEM 312 Transition Metal Chemistry
(or PHYS 435 Solid State Physics)
CHEM 452C Intermediate Quantum Chemistry
(or PHYS 434 Quantum Physics 3)
CHEM 492A Advanced Laboratory
(or PHYS 437A Research Project)
Two electives (1.0 credit)

Winter

CHEM 010 General Chemistry Seminar
(or PHYS 010 Physics Seminar)
CHEM 429B Advanced Laboratory
(or PHYS 437B Research Project (continued))
Four electives (2.0 credits)

Recommended Year Three and Year Four Electives
AM 252
CHEM 323, 452, 454
PHYS 334, 352/352L, 353/353L, 365, 371 A/B, 454

Honours Environmental Chemistry
Program Advisor: Professor J.J. Sloan

Admission to, and continuance in, Honours Environmental Chemistry requires an overall cumulative average of 60%. In addition, a 60% average must be obtained in all Chemistry lecture courses each term.

In order to graduate with an Honours Environmental Chemistry degree, the following requirements must successfully completed:

1. 22.75 credits including 3.75 lab credits.
2. Students are encouraged to include in their program an ethics course such as STV 100, PHIL 215, 226, SCI 263, 265.
3. Failure of more than one course in the field of specialization will result in the requirement to withdraw from the program. Students may petition for re-admission; such re-admission is at the discretion of the Chemistry Undergraduate Committee and exceptional circumstances must justify it.
4. Mandatory courses as listed below.

Year One

Fall

CHEM 120L Chemical Reaction Laboratory 1
CHEM 121 Physical and Chemical Properties of Matter
GEOG 102 Geography and Our Planetary Environment
MATH 127 Calculus 1 for Honours Physics and Chemistry
PHYS 121 Mechanics, Wave Motion and Heat 1
PHYS 121L Mechanics, Wave Motion and Heat 1 Laboratory

One 200-level Biology elective (0.5 credit)
(BIOL 230, 240, recommended)

Winter

BIOL 250 Ecology (or ENV S 200 Field Ecology)
CHEM 123L Chemical Reaction Laboratory 2
CHEM 125 Chemical Reactions, Equilibria and Kinetics
CHEM 129 Introductory Spectroscopy
MATH 128 Calculus 2 for Honours Physics and Chemistry
PHYS 112 Physics 2
PHYS 112L Physics 2 Laboratory

Year Two

Fall

CHEM 010 General Chemistry Seminar
CHEM 223 Analytical Chemistry
CHEM 223L Analytical Chemistry Laboratory 1
CHEM 254 Chemical Thermodynamics 1
CHEM 264 Organic Chemistry 1
ENV S 201 Introduction to Environmental and Planning Law
MATH 228 Differential Equations for Physics and Chemistry (or AM 250 Modelling with Ordinary Differential Equations)

Winter

CHEM 010 General Chemistry Seminar
CHEM 212 Structure and Bonding
CHEM 224L Analytical Chemistry Laboratory 2
CHEM 256 Introductory Quantum Mechanics
CHEM 265 Organic Chemistry 2
CHEM 265L Organic Chemistry Laboratory 1
ERS 241 Introduction to Environmental Assessment

One elective (0.5 credit) (any of ENGL 210C, 210E, 210F strongly recommended)
(continued)

Year Three

Fall
CHEM 010 General Chemistry Seminar
CHEM 237 Introductory Biochemistry
CHEM 237L Introductory Biochemistry Laboratory
CHEM 359 Kinetics and Dynamics
GEOG 309 Physical Climatology
STAT 204 Statistics for the Physical Sciences
One elective (0.5 credit)

Winter
CHEM 010 General Chemistry Seminar
CHEM 303 Ionic Equilibria
CHEM 323 Analytical Instrumentation
Three electives (1.5 credits)

Year Four

CHEM 010 General Chemistry Seminar
CHEM 305 Atmospheric Chemistry and Physics
CHEM 482A Advanced Laboratory
CHEM 492B Advanced Laboratory
Seven electives (3.5 credits)

Throughout the program the electives must include:
Four additional Chemistry courses (2.0 lecture credits)
(Recommended are: CHEM 312, 368, 404, 406, 412)
Four additional environmentally-related courses (2.0 credits)
(Recommended are: BIOL 461; CH E 572, 574; ENV S 195, 220; M E 469, 571; PHYS 480)

Honours Geochemistry

Program Advisors: Professors G.E. Toogood and S. Schiff

Admission to, and continuation in, Honours Geochemistry requires an overall cumulative average of at least 60% and an average of at least 60% in all Chemistry and Earth Science courses each term.

in order to graduate with an Honours Geochemistry degree, the following requirements must successfully be completed:

1. 19.0 lecture credits, 3.0 laboratory credits and a research project and thesis (1.0 or 1.5 credits).
2. Mandatory courses as listed below.
3. Three Chemistry and three Earth Sciences technical electives chosen from CHEM 305, 312, 313, 359, 412, 421, 425, 452D; EARTH 421, 456, 458, 459. Substitutions may be made with the approval of the Undergraduate Officers.
4. Six freely chosen courses (3.0 credits). Especially recommended are BIOL 240, 241; ENGL 210C or 210E; ENV S 196, 201; GEG 201, 303; MATH 125, 228 (or AM 250).

Science

Chemistry

Year One

Fall
CHEM 120 Physical and Chemical Properties of Matter
(or CHEM 121 Physical and Chemical Properties of Matter)
CHEM 120L Chemical Reaction Laboratory 1
EARTH 121 The Planet We Live On
EARTH 121L Introductory Earth Sciences Laboratory 1
MATH 127 Calculus 1 for Honours Physics and Chemistry
PHYS 121 Mechanics, Wave Motion and Heat 1
PHYS 121L Mechanics, Wave Motion and Heat 1 Laboratory
One elective* (0.5 credit)

Winter
CHEM 123 Chemical Reactions, Equilibria and Kinetics
(or CHEM 125 Chemical Reactions, Equilibria and Kinetics)
CHEM 123L Chemical Reaction Laboratory 2
CHEM 129 Introductory Spectroscopy
EARTH 122 The Planet We Live Off
EARTH 122L Introductory Earth Sciences Laboratory 2
MATH 128 Calculus 2 for Honours Physics and Chemistry
PHYS 122 Mechanics, Wave Motion and Heat 2
PHYS 122L Mechanics, Wave Motion and Heat 2 Laboratory

Year Two

Fall
CHEM 212 Structure and Bonding
CHEM 223 Analytical Chemistry
CHEM 223L Analytical Chemistry Laboratory 1
EARTH 231 Minenerlog
EARTH 235 Stratigraphy
MATH 217 Calculus 3 for Chemical Engineering
(or MATH 227P Calculus 3 for Honours Physics)

Winter
CHEM 224L Analytical Chemistry Laboratory 2
CHEM 254 Chemical Thermodynamics 1
CHEM 254L Physical Chemistry Laboratory 1
CHEM 264 Organic Chemistry 1
EARTH 221 Geochemistry 1
PHYS 259 Crystallography and X-Ray Diffraction
PHYS 259L Crystallography and X-Ray Diffraction Laboratory
One elective* (0.5 credit)

Year Three

Fall
CHEM 265 Organic Chemistry 2
CHEM 265L Organic Chemistry Laboratory 1
EARTH 223 Hydrology
EARTH 355 Statistical Methods in Geology
EARTH 359 Flow Through Porous Media
One elective* (0.5 credit)

Winter
CHEM 303 Ionic Equilbria
CHEM 323 Analytical Instrumentation
EARTH 238 Introductory Structural Geology
EARTH 358 Environmental Geology for Earth Scientists
EARTH 390 Methods in Geological Mapping
One elective* (0.5 credit)

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Year Four
Fall and Winter combined
CHEM 492A Advanced Laboratory
(or EARTH 436A Honours Thesis)
CHEM 492B Advanced Laboratory
(or EARTH 436B Honours Thesis)
Three electives (1.5 credits) from CHEM courses.
Recommended:
CHEM 305 Atmospheric Chemistry and Physics
CHEM 312 Transition Metal Chemistry
CHEM 313 Chemistry of Inorganic Solid State Materials
CHEM 359 Kinetics and Dynamics
CHEM 412 Radiochemistry
CHEM 421 Mass Spectrometry
CHEM 425 Special Topics in Analytical Chemistry
CHEM 452D Chemical Thermodynamics 2,
Three electives (1.5 credits) from EARTH courses.
Recommended:
EARTH 421 Geochemistry 2
EARTH 456 Groundwater Modelling
EARTH 458 Physical Hydrogeology
EARTH 459 Chemical Hydrogeology
Two electives* (1.0 credit)

Honours Major Programs Co-operative
Honours Co-operative Biochemistry
(see "Biology")
Honours Co-operative Biochemistry
(Biotechnology Option)
(see "Biology")
Honours Co-operative Biology and Chemistry
(see "Biology")
Honours Co-operative Chemistry
Program Advisors: Professors G.E. Toogood and M.F. Tohir
This program, which offers the Honours Chemistry courses integrated with six four-month work terms, extends over four and two-thirds years. (See "Co-operative Education and Career Services" for more information on the Co-operative programs.) Two streams of students study and work in alternate terms starting at the end of the 1A term, and recombine at the beginning of the 2B term.

In order to graduate with an Honours Co-operative Chemistry degree, the following requirements must be successfully completed:
1. 24.5 credits including 5.5 lab credits.

2. In Years Three and Four, students must choose six Chemistry courses from the list of Technical Electives with Chemistry Content (see chart above).
3. Normally, full-time enrollment in one of Years Two and Three.
4. Normally, full-time enrollment in Year Four.
5. A minimum of four work terms, and submission of a minimum of four satisfactory work reports.
6. Students are encouraged to include in their program an ethics course such as STV 100, PHIL 215, 226, SCI 263, 265.
7. Failure of more than one course in the field of specialization will result in the requirement to withdraw from the program. Students may petition for re-admission; such re-admission is at the discretion of the Chemistry Undergraduate Committee and exceptional circumstances must justify it.
8. Mandatory courses as listed below.

Stream 8
Year 1A (Fall)
CHEM 120L Chemical Reaction Laboratory 1
CHEM 121 Physical and Chemical Properties of Matter
MATH 125 Applied Linear Algebra 1
MATH 127 Calculus 1 for Honours Physics and Chemistry
PHYS 121 Mechanics, Wave Motion and Heat 1
PHYS 121L Mechanics, Wave Motion and Heat 1 Laboratory
One elective (0.5 credit)

Year 1B (Winter for Stream 8; Spring for Stream 4))
CHEM 123L Chemical Reaction Laboratory 2
CHEM 125 Chemical Reactions, Equilibria and Kinetics
CHEM 129 Introductory Spectroscopy
MATH 128 Calculus 2 for Honours Physics and Chemistry
PHYS 112 Mechanics 2
PHYS 112L Physics 2 Laboratory
One elective (0.5 credit)

Year 2A (Fall for Stream 8; Winter for Stream 4))
CHEM 210 General Chemistry Seminar
CHEM 212 Structure and Bonding
CHEM 223 Analytical Chemistry
CHEM 223L Analytical Chemistry Laboratory 1
CHEM 254 Chemical Thermodynamics 1
CHEM 254L Physical Chemistry Laboratory 1
CHEM 264 Organic Chemistry 1
MATH 228 Differential Equations for Physics and Chemistry

Year 2B (Spring)*
CHEM 264L Organic Chemistry Laboratory 1
CHEM 256 Introductory Quantum Mechanics
CHEM 265 Organic Chemistry 2
CHEM 265L Organic Chemistry Laboratory 1
PHYS 259 Crystallography and X-Ray Diffraction
PHYS 259L Crystallography and X-Ray Diffraction Laboratory
Two electives (1.0 credit)

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(continued)

**Year 3A** (Winter)
CHEM 010 General Chemistry Seminar
CHEM 313 Chemistry of Inorganic Solid State Materials
CHEM 323 Analytical Instrumentation
CHEM 358 Statistical Thermodynamics
CHEM 358L Physical Chemistry Laboratory 2
CHEM 368 Synthetic Organic Chemistry
CHEM 368L Senior Organic Chemistry Laboratory
One elective (0.5 credit)

**Year 3B** (Fall)
CHEM 010 General Chemistry Seminar
CHEM 312 Transition Metal Chemistry
CHEM 312L Inorganic Chemistry Laboratory
CHEM 359 Kinetics and Dynamics
CHEM 362 Mechanistic Organic Chemistry
Two electives (1.0 credit)

**Year 4A** (Fall)
CHEM 010 General Chemistry Seminar
CHEM 492A Advanced Laboratory
Four electives (2.0 credits)

**Year 4B** (Winter)
CHEM 010 General Chemistry Seminar
CHEM 492B Advanced Laboratory
Four electives (2.0 credits)

* PHYS 222, 222L; 252, 252L; or 256, 256L may be taken instead of PHYS 259, 259L, if the PHYS elective is delayed until 3B (Fall).

** CHEM 312L, 358L and 368L may be taken in either of the 3A or 3B terms, and may be taken with, before or after CHEM 312, 358 and 368.

Honours Co-operative Environmental Chemistry
Program Advisor: Professor J.J. Sloan

Admission to, and continuance in, Honours Co-operative Environmental Chemistry requires an overall cumulative average of 60%. In addition, a 60% average must be obtained in all Chemistry lecture courses each term.
In order to graduate with an Honours Co-operative Environmental Chemistry degree, the following requirements must be successfully completed:

1. 22.75 credits including 3.75 lab credits.
2. Normally, full-time enrollment in one of Years Two and Three.
3. Normally, full-time enrollment in Year Four.
4. Successful completion of a minimum of four work terms, and submission of a minimum of four satisfactory work reports.
5. Students are encouraged to include in their program an ethics course such as STV 100, PHIL 215, 226, SCI 263, 265.
6. Failure of more than one course in the field of specialization will result in the requirement to withdraw from the program. Students may petition for re-admission; such re-admission is at the discretion of the Chemistry Undergraduate Committee and exceptional circumstances must justify it.

7. Mandatory courses as listed below.

**Year 1A** (Fall)
CHEM 120L Chemical Reaction Laboratory
CHEM 121 Physical and Chemical Properties of Matter
GEOG 102 Geography and Our Planetary Environment
MATH 127 Calculus 1 for Honours Physics and Chemistry
PHYS 121 Mechanics, Wave Motion and Heat 1
PHYS 121L Mechanics, Wave Motion and Heat 1 Laboratory
One 200-level Biology elective (0.5 credit);
BIOL 250 recommended

**Year 1B** (Winter)
CHEM 123L Chemical Reaction Laboratory 2
CHEM 125 Chemical Reactions, Equilibria and Kinetics
CHEM 129 Introductory Spectroscopy
MATH 128 Calculus 2 for Honours Physics and Chemistry
PHYS 112 Physics 2
PHYS 112L Physics 2 Laboratory
One 200-level Biology elective (0.5 credit)

**Year 2A** (Fall)
CHEM 010 General Chemistry Seminar
CHEM 223 Analytical Chemistry
CHEM 223L Analytical Chemistry Laboratory 1
CHEM 254 Chemical Thermodynamics 1
CHEM 264 Organic Chemistry 1
ENV S 201 Introduction to Environmental and Planning Law
MATH 228 Differential Equations for Physics and Chemistry (or AM 250 Modelling with Ordinary Differential Equations)

**Year 2B** (Spring)
CHEM 010 General Chemistry Seminar
CHEM 224L Analytical Chemistry Laboratory 2
CHEM 256 Introductory Quantum Mechanics
CHEM 265 Organic Chemistry 2
CHEM 265L Organic Chemistry Laboratory 1
Three electives (1.5 credits); ENGL 210C strongly recommended

**Year 3A** (Winter)
CHEM 010 General Chemistry Seminar
CHEM 212 Structure and Bonding
CHEM 237 Introductory Biochemistry
CHEM 237L Introductory Biochemistry Laboratory
CHEM 303 Ionic Equilibria
ENV S 200 Field Ecology (or BIOL 250 Ecology or ERS 241 Introduction to Environmental Assessment)
One elective (0.5 credit)

**Year 3B** (Fall)
CHEM 010 General Chemistry Seminar
CHEM 359 Kinetics and Dynamics
GEOG 309 Physical Climatology
STAT 204 Statistics for the Physical Sciences 1
Two electives (1.0 credit)

(continued on next page)
Honours Co-operative Geochemistry
Program Advisors: Professors G.E. Toogood and S. Schiff

Admission to, and continuance in, Honours Geochemistry requires an overall cumulative average of at least 60% and an average of at least 60% in all Chemistry and Earth Science courses each term.

In order to graduate with an Honours Geochemistry degree, the following requirements must successfully be completed:

1. 19.0 lecture credits, 3.0 laboratory credits and a research project and thesis (1.0 or 1.5 credits).
2. Mandatory courses as listed below.
3. Three Chemistry and three Earth Sciences technical electives chosen from CHEM 305, 312, 313, 359, 412, 421, 425, 452D; EARTH 421, 456, 458, 459. Substitutions may be made with the approval of the Undergraduate Officers.
4. Six freely chosen courses (3.0 credits). Especially recommended are BIOL 240, 241; ENGL 210C or 210E; ENV S 196, 201; GEOG 201, 303; MATH 125, 228 (or AM 250).
5. A minimum of four work terms and submission of a minimum of four satisfactory work reports.
6. Normally, full-time enrollment in at least one of Years Two and Three.
7. Normally, full-time enrollment in Year Four.

(continued on next page)
Year 4A (Fall) and Year 4B (Winter) combined
CHEM 492A Advanced Laboratory
(or EARTH 436A Honours Thesis)
CHEM 492B Advanced Laboratory
(or EARTH 436B Honours Thesis)

Three electives (1.5 credits) from CHEM courses.
Recommended:
CHEM 305 Atmospheric Chemistry and Physics
CHEM 312 Transition Metal Chemistry
CHEM 313 Chemistry of Inorganic Solid State Materials
CHEM 359 Kinetics and Dynamics
CHEM 412 Radiochemistry
CHEM 421 Mass Spectrometry
CHEM 425 Special Topics in Analytical Chemistry
CHEM 452D Chemical Thermodynamics 2

Three electives (1.5 credits) from EARTH courses.
Recommended:
EARTH 421 Geochemistry 2
EARTH 456 Groundwater Modelling
EARTH 458 Physical Hydrogeology
EARTH 459 Chemical Hydrogeology

*Mandatory courses as listed under the specific programs.

MINOR IN CHEMISTRY
In order to graduate with a Minor in Chemistry the following requirements must be met.

A student with more than two failed attempts at Chemistry lecture courses will not receive a Minor in Chemistry.

The following courses must be taken, with a minimum cumulative average of 60% in these courses:
1. CHEM 120/123 or 121/125, 129.
2. A minimum of 3.0 lecture credits from 200-level or higher Honours-level Chemistry courses, of which a minimum of 1.0 lecture credit must be from 300- or 400-level Chemistry courses.
3. 0.5 lab credits beyond Year One appropriate to the lecture credits chosen.
4. The following courses will not count towards the Minor in Chemistry: CHEM 218, 219, 228, 266, 267, 316, 366.

Check details with a Chemistry Undergraduate Officer.

Earth Sciences

The following programs are offered in the Earth Sciences Department:

Honours Major Programs
Regular
Honours Earth Sciences (Geology Option)
Honours Earth Sciences (Geography Option)
Co-operative
Co-op Earth Sciences (Environmental Hydrogeology Option)
Co-op Earth Sciences (Geology Option)
Co-op Earth Sciences (Geophysics Option)

Honours Science Program 4 (with a specialization in Earth Sciences)

Minor in Earth Sciences

The first five programs provide academic preparation for students intending to pursue careers as professional geologists. Honours Science, with a specialization in Earth Sciences, provides a less intense specialization in Earth Sciences and is intended primarily for those wanting a geological background for careers in other areas, e.g. teaching, business management, civic administration, finance, specialized sales, agriculture, etc.

Honours Major Programs
Admission to, and continuance in, all Earth Sciences Honours Major Programs requires an overall cumulative average of 60%, and a cumulative major average of 65%. In order to graduate in any of the five Honours Major Programs, the following requirements must be met:

1. Successful completion of 42 one-term courses (plus additional Year One and Two labs).
2. In Year One and Two, Science courses must be taken with the lab if an optional lab is available.
3. Failure of more than one course in the field of specialization will result in the requirement to withdraw from the program.
4. Mandatory courses as listed under the specific programs.
A breakdown of course-type groupings for each program is provided below:

<table>
<thead>
<tr>
<th></th>
<th>Co-op Earth Sciences/ Geology Option</th>
<th>Co-op Earth Sciences/ Geophysics Option</th>
<th>Co-op Earth Sciences/ Hydrogeology Option</th>
<th>Regular Honours Earth Sciences/ Geology Option</th>
<th>Regular Honours Earth Sciences/ Geography Option</th>
<th>Honours Earth Sciences Program Four</th>
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<tr>
<td>100-level Science/ Math Core</td>
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<td>Earth Sciences</td>
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<td>23</td>
<td>21</td>
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<td>200-level or higher Mathematics, Science, Engineering</td>
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<td>6</td>
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<tr>
<td>Geography/ Environmental Studies</td>
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<td>–</td>
<td>1</td>
<td>–</td>
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<tr>
<td>Science/ Mathematics Electives¹</td>
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<td>Non-credit field courses</td>
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<td>2</td>
<td>2</td>
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<td>2</td>
</tr>
</tbody>
</table>

¹ Normally excludes SCI and EARTH courses (Hydrogeology Option students may take EARTH courses); optional labs must be taken. Students who plan to do graduate work in Hydrogeology are advised to take CIV 221 during their fourth year.

Students in programs other than the Geophysics Option may count one Geography remote sensing course as a Science/ Mathematics elective. Geophysics Option students may count up to three Geography remote sensing courses under this category.

**HONOURS MAJOR PROGRAMS – REGULAR**

**Honours Earth Sciences (Geology Option)**

**Year One**
- EARTH 121/121L The Planet We Live On/Laboratory
- EARTH 122/122L The Planet We Live Off/Laboratory
- CHEM 120/120L Physical and Chemical Properties of Matter/Laboratory
- CHEM 123/123L Chemical Reactions, Equilibria and Kinetics/Laboratory
- PHYS 121/121L Mechanics, Wave Motion and Heat 1/Laboratory
- PHYS 122/122L Mechanics, Wave Motion and Heat 2/Laboratory
- CS 102 Introduction to Programming for Scientific Applications
- MATH 107/108 Calculus 1/2
- One elective (0.5 credit)

**Year Two**
- EARTH 221 Geochemistry 1
- EARTH 231 Mineralogy
- EARTH 232 Petrography
- EARTH 235 Stratigraphy
- EARTH 236 Principles of Paleontology
- EARTH 238 Introductory Structural Geology
- EARTH 260 Applied Geophysics 1
- ENGL 210C Report Writing
- Two electives (1.0 credit)

**Year Three**
- EARTH 331 Igneous Petrology
- EARTH 332 Metamorphic Petrology
- EARTH 333 Introductory Sedimentology
- EARTH 336 Paleontology
- EARTH 342 Applied Geomorphology
- EARTH 345 Historical Geology
- EARTH 355 Statistical Methods in Geology
- EARTH 370 Earth Resources
- EARTH 390 Methods in Geological Mapping
- Four electives (2.0 credits)

(continued on next page)
(continued)

Year Four
EARTH 427 Crustal Evolution
EARTH 436A/B Honours Thesis
EARTH 490 Field Course

Five term courses from:
EARTH 358 Environmental Geology for Earth Scientists
EARTH 359 Flow Through Porous Media
EARTH 421 Geochemistry 2
EARTH 432 Precambrian Geology
EARTH 433 Applied Sedimentology
EARTH 434 Biostratigraphy
EARTH 435 Advanced Structural Geology
EARTH 437 Rock Mechanics
EARTH 438 Engineering Geology
EARTH 440 Quaternary Geology
EARTH 456 Groundwater Modelling
EARTH 458 Physical Hydrogeology
EARTH 459 Chemical Hydrogeology
EARTH 460 Applied Geophysics 2
EARTH 470 Metallic Mineral Deposits

Two electives (1.0 credit) not from Earth Sciences

Honours Earth Sciences (Geography Option)
In addition to the requirements for all Honours Major programs listed above, Honours Earth Sciences/Geography Option students must meet the following requirements:

1. In addition to the 42 term courses required for credit, two field courses must be taken.

2. Students must maintain a 70% average in all Geography courses.

Geography Electives
In selecting 200-, 300-, and 400-level Geography courses, students are encouraged to choose a sequence of term courses from disciplines within Geography, such as Remote Sensing, Resource Management, etc.

Year One
CHEM 120/120L Physical and Chemical Properties of Matter/Laboratory
CHEM 123/123L Chemical Reactions, Equilibria and Kinetics/Laboratory
CS 102 Introduction to Programming for Scientific Applications
EARTH 121/121L The Planet We Live On/Laboratory
EARTH 122/122L The Planet We Live Off/Laboratory
GEOG 101 Geography and Human Habitat
GEOG 102 Geography and our Planetary Environment

or:
PHYS 111/111L Physics 1/Laboratory and
PHYS 112/112L Physics 2/Laboratory

or:
BIOL 111/112 Introductory Biology 1 and 2, or equivalent, plus one elective (0.5 credit)

Year Two
EARTH 221 Geochemistry
EARTH 231 Mineralogy
EARTH 232 Petrography
EARTH 235 Stratigraphy
EARTH 236 Principles of Paleontology
EARTH 238 Introductory Structural Geology
ENV S 200 Field Ecology
GEOG 202A Location of Economic Activity

and one of
GEOG 208 Applied Climatology
GEOG 275 Introductory Air Photo Analysis and Remote Sensing or GEOG 309 Physical Climatology

One elective (0.5 credit)

Year Three
EARTH 331 Igneous Petrology
EARTH 332 Metamorphic Petrology
EARTH 333 Introductory Sedimentology
EARTH 336 Paleontology
EARTH 342 Applied Geomorphology
EARTH 345 Historical Geology
EARTH 370 Earth Resources
GEOG 275 Introductory Air Photo Analysis and Remote Sensing or
GEOG 309 Physical Climatology

Two Geography electives (1.0 credit)
Two unrestricted electives (1.0 credit)

Year Four
EARTH 427 Crustal Evolution
EARTH 436A/B Honours Thesis
EARTH 440 Quaternary Geology
EARTH 490 Field Course

plus two term courses from 400-level Earth Sciences courses

Three Geography electives (1.5 credits) from 300- or 400-level courses

One unrestricted elective (0.5 credit)

CO-OPERATIVE EARTH SCIENCES

The Co-operative Earth Sciences programs offer a good academic training, as well as considerable practical experience.

Work term reports must be submitted within three weeks of the first day of lectures of the following academic term. Normally a work-term report must be prepared during a student's first work term. Two satisfactory reports must have been received before the student commences work term 3B. Four satisfactory reports must have been received by academic term 4A.

For further information regarding the Co-operative system of study, see the section on Work/Study Sequence under the Department of Co-operative Education and Career Services.

Transfer to a Regular Honours program will be permitted if all requirements of the Co-op program have been met up to the time of the transfer.
## Co-operative Earth Sciences

### Geology Option

**Year One**
- **CHEM 120/120L** Physical and Chemical Properties of Matter/Laboratory
- **CHEM 123/123L** Chemical Reactions, Equilibria and Kinetics/Laboratory
- **CS 102** Report Writing
- **EARTH 121/121L** The Planet We Live On/Laboratory
- **EARTH 122/122L** The Planet We Live Off/Laboratory
- **PHYS 121/121L** Mechanics, Wave Motion and Heat 1/Laboratory
- **PHYS 122/122L** Mechanics, Wave Motion and Heat 2/Laboratory
- **EARTH 123/123** Report Writing
- **MATH 120** Calculus 1 and 2
  - One elective (0.5 credit)

**Year Two**

2A
- **EARTH 231** Mineralogy
- **EARTH 236** Principles of Paleontology
- **EARTH 260** Applied Geophysics 1
  - One elective (0.5 credit)

2B
- **EARTH 231** Mineralogy
- **EARTH 236** Principles of Paleontology
- **EARTH 260** Applied Geophysics 1
  - One elective (0.5 credit)

**Year Three**

3A
- **EARTH 333** Introductory Sedimentology
- **EARTH 358** Environmental Geology for Earth Scientists
- **EARTH 360** Earth Physics and Plate Tectonics
- **EARTH 370** Earth Resources
- **EARTH 390** Methods in Geological Mapping
  - Two electives (1.0 credit)

3B
- **EARTH 331** Igneous Petrology
- **EARTH 336** Paleontology
- **EARTH 342** Applied Geomorphology
- **EARTH 355** Statistical Methods in Geology
  - Two electives (1.0 credit)

**Year Four**

- Similar to the regular program in Honours Earth Sciences (see above)

**Co-operative Earth Sciences**

### Geophysics Option

This Co-op program supplements the core Geology courses with courses from Physics, Math, Computer Science and Engineering. It aims to graduate earth scientists with a strong background in the techniques of quantitative analysis particularly appropriate for geophysical exploration, hydrogeology, mathematical geology, and seatechnical careers.
(continued)

Year Four
EARTH 427 Crustal Evolution
EARTH 438A/B Honours Thesis
EARTH 460/461 Applied Geophysics 2 and 3
EARTH 490 Field Course
Two electives (1.0 credit) from Physics, Mathematics, Computer Science or Engineering
An additional three Earth Sciences courses from 300- or 400-level courses (1.5 credits)

Recommended Electives
CH E 574
CHEM 212, 219, 254, 264, 311, 312, 313, 354
CIV E 375, 376, 472, 473, 486
CS 212, 230, 316
GEOG 275, 375, 376
PHYS 246, 252, 253, 256, 259, 352, 353, 364, 365

Co-operative Earth Sciences
(Environmental Hydrogeology Option)

Year One
CHEM 120/120L Physical and Chemical Properties of Matter/Laboratory
CHEM 123/123L Chemical Reactions, Equilibria and Kinetics/Laboratory
EARTH 121/121L The Planet We Live On/Laboratory
EARTH 122/122L The Planet We Live Off/Laboratory
MATH 107/108 Calculus 1/2
PHYS 121/121L Mechanics, Wave Motion and Heat 1/Laboratory
PHYS 122/122L Mechanics, Wave Motion and Heat 2/Laboratory
Two electives (1.0 credit)

Year Two
2A
CIV E 221 Advanced Calculus or
MATH 217 Calculus 3 for Chemical Engineering
EARTH 231 Mineralogy
EARTH 235 Stratigraphy
EARTH 250 Applied Geophysics 1
EARTH 223 Hydrology

2B
CIV E 222 Differential Equations or
MATH 226 Differential Equations for Physics and Chemistry
EARTH 221 Geochemistry 1
EARTH 232 Petrology
EARTH 238 Introductory Structural Geology
GEN E 121 Digital Computation

Year Three
3A
CIV E 353 Geotechnical Engineering 1
EARTH 333 Introductory Sedimentology
EARTH 358 Environmental Geology for Earth Scientists
EARTH 390 Methods in Geological Mapping

ENGL 210C Report Writing
Two electives1 (1.0 credit)

3B
BIOL 250 Ecology or ENV S 200 Field Ecology or
ENV S 201 Introduction to Environmental Planning Law
CH E 025 Transport Processes 2 (Fluid Mechanics) or
CIV E 280 Fluid Mechanics and Thermal Sciences
CHEM 266 Basic Organic Chemistry 1 or
BIOL 240 Fundamentals of Microbiology
CIV E 486 Hydrology

EARTH 355 Statistical Methods in Geology
EARTH 359 Flow Through Porous Media

Notes
1. Six electives are prescribed of which two must be from MATH/SCI courses, two from Faculty of Arts courses, and two are unrestricted.
2. Or other approved Fluid Mechanics course (see program advisor).

HONOURS SCIENCE PROGRAM 4
(With Specialization in Earth Sciences)
Admission to, and continuance in, Honours Science Program Four requires an overall cumulative average of 60%, and a cumulative average of 65% in all Earth Sciences courses.
In order to graduate in the Honours Science program, with a specialization in Earth Sciences, the following requirements must be met:
1. Successful completion of 42 one-term courses as indicated in the table of "A breakdown of course-type groupings for each program."
2. Failure of more than one course in the field of specialization will result in the requirement to withdraw from the program.
3. No more than 3.0 SCI credits may be applied to the program.
4. Students must have been enrolled full-time in two out of three years, one of which must be either Year Two or Three, and the other must be Year Four. Year Four of the program must be taken at the University of Waterloo.
5. Mandatory courses as listed below.
Science  
Earth Sciences  
Physics

2. The required credits must include:
   - 0.5 or 1.0 credit from: EARTH 421, 432, 433, 434, 435, 438, 440, 458, 459, 470 in Year Four.

Physics

The following programs are offered in the Physics Department:
- Honours Major Programs
  - Regular
  - Honours Physics
  - Honours Chemical Physics (joint with Chemistry Department)
- Co-operative
  - Honours Co-operative Physics
- Minor in Physics

HONOURS MAJOR PROGRAMS REGULAR

Honours Physics
The Honours Physics program is in the form of a core of required courses, plus appropriate electives. The electives available in the second, third, and fourth years allow students to strengthen complementary areas of interest whether in some specific field in Physics or in some other subject area. Some examples are given below under the heading “Elective Programs”.

Admission to, and continuance in, Honours Physics requires an overall cumulative average of 60% and a 60% Physics average each year. In addition, students must have an average of at least 65% in the lecture courses PHYS 121/122, MATH 125/126, and MATH 127/128 (or equivalents) in order to be admitted to Year Two.

In order to graduate with an Honours Physics degree, the following requirements must be met:
1. Successful completion of 19.0 lecture credits plus 2.0 Physics lab credits.
2. Mandatory courses as listed below.

Year One

Fall
CHEM 120+ Physical and Chemical Properties of Matter
CHEM 120L+ Chemical Reaction Laboratory 1
MATH 125 Applied Linear Algebra 1
MATH 127 Calculus 1 For Honours Physics and Chemistry
PHYS 010 Physics Seminar
PHYS 121/121L Mechanics, Wave Motion and Heat 1
One elective (0.5 credit)*

(continued on next page)
### Year One

**CHEM 123†** Chemical Reactions, Equilibria and Kinetics  
**CHEM 123L†** Chemical Reaction Laboratory 1  
**MATH 126** Applied Linear Algebra 1

- Winter  
- CHEM 128 Calculus 2 for Honours Physics and Chemistry  
- PHYS 010 Physics Seminar  
- PHYS 122/122L Mechanics, Wave Motion and Heat 1

One elective (0.5 credit)*

### Year Two

**Fall**  
- MATH 227P Calculus 3 for Honours Physics  
- MATH 228 Differential Equations For Physics and Chemistry  
- PHYS 010 Physics Seminar  
- PHYS 239 Digital Computation  
- PHYS 252/252L Electricity and Magnetism 1  
- PHYS 256 Geometrical and Physical Optics  
- PHYS 256L Optics Laboratory

**Winter**  
- PHYS 010 Physics Seminar  
- PHYS 234 Quantum Physics 1  
- PHYS 253/253L Electricity and Magnetism 2  
- PHYS 263 Classical Mechanics  
- Two electives (1.0 credit)

### Year Three

**Fall**  
- PHYS 010 Physics Seminar  
- PHYS 334 Quantum Physics 2  
- PHYS 350 Thermodynamics  
- PHYS 360A Intermediate Laboratory  
- PHYS 364 Mathematical Physics 1  
- Electives totalling at least 0.75 credits

**Winter**  
- PHYS 010 Physics Seminar  
- PHYS 355 Statistical Mechanics  
- PHYS 365 Mathematical Physics 2  
- Two electives (1.0 credit)  
- One elective 300-level Physics lab (0.25 credit)

### Year Four

Students entering Year Four should normally take a total of 5.0 credits, which must include the following:  
- PHYS 010, 434, 435**, 441A/B, plus an additional 1.0 credit of Physics electives. PHYS 437A and 454 are strongly recommended for students intending to do graduate work. For those planning to do graduate work in Theoretical Physics, at least two from PHYS 444, 463, 464 and 475 are recommended.

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† **Year One Chemistry may be replaced by Year One Biology or Earth Sciences courses. Note that all students in Year One Science are required to have credits from at least two different disciplines from the Faculty of Science (see “Program and Course Selections”).**

* Students with little computer programming experience are recommended to take CS 102 before taking PHYS 239 in the Fall term of Year Two.

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**Students specializing in Astrophysics or Biophysics may substitute an appropriate course in one of these areas for the PHYS 435 requirement, by permission of the Undergraduate Officer.**

### Elective Programs

The "core plus electives" structure of the Honours Physics and Honours Co-operative Physics programs allow a great variety of combinations of courses to be taken. By judicious selection of elective courses, students can deepen their knowledge of theoretical or experimental physics, or emphasize particular aspects of the subject, for example solid state physics, astrophysics or biophysics. It is also possible (subject to timetable restrictions) for physics students to use their elective courses to gain expertise in other subjects, for example business administration, computing, electrical engineering or philosophy. The departmental Undergraduate Advisors are available to assist any student who wishes to build such a coherent elective program.

### Honours Chemical Physics  
(Joint with Chemistry Department)

See “Chemistry”

### HONOURS MAJOR PROGRAM CO-OPERATIVE

**Honours Co-operative Physics**

Physics is an Honours program in the form of a core of required courses, plus appropriate electives. The electives available in the second, third, and fourth years allow students to strengthen complementary areas of interest whether in some specific field in physics or in some other subject area. Some examples are given above under the heading “Elective Programs”.

Through the Co-operative part of the program students have the opportunity of exposure to practical research and development situations in Government and industry. Work opportunities, which are available on a competitive basis, are co-ordinated to complement the student's course work and interest where possible. Many work-term experiences, especially in the upper years, provide the student with a deeper insight into the meaning and methods of research as well as an incentive to develop course work. Such experience provides a contribution to the development of a scientist who cannot be learned in lecture courses, and helps prepare an individual to apply a fundamental physics background to the solution of practical problems.

See the "Department of Co-operative Education and Career Services" section for further information about the Co-operative work terms.

Admission to, and continuance in, Honours Co-operative Physics requires an overall cumulative average of 60% and a 60% Physics average in Year One and in each subsequent term. In addition, students must have an average of at least 65% in the lecture courses PHYS 121/122, MATH 125/126, and MATH 127/128 (or equivalents) in order to be admitted to Year Two.

In order to graduate with an Honours Co-operative Physics degree, the following requirements must be met:
1. Successful completion of 19.0 lecture credits plus 2.0 physics lab credits.

2. Mandatory courses as listed below.

3. A minimum of four work terms, and submission of a minimum of four satisfactory work reports.

---

**Year One**  
1A (Fall)  
CHEM 120† | Physical and Chemical Properties of Matter  
CHEM 120† | Chemical Reaction Laboratory 1  
MATH 125 | Applied Linear Algebra 1  
MATH 127 | Calculus 1 For Honours Physics and Chemistry  
PHYS 010 | Physics Seminar  
PHYS 121/121L | Mechanics, Wave Motion and Heat 1  
One elective (0.5 credit)*

1B (Winter or Spring)  
CHEM 123† | Chemical Reactions, Equilibria and Kinetics  
CHEM 123† | Chemical Reaction Laboratory 2  
MATH 126 | Applied Linear Algebra 2  
MATH 128 | Calculus 2 For Honours Physics and Chemistry  
PHYS 010 | Physics Seminar  
PHYS 122/122L | Mechanics, Wave Motion and Heat 2  
One elective (0.5 credit)*

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**Year Two**  
2A (Fall)  
PHYS 010 | Physics Seminar  
PHYS 239 | Digital Computation  
PHYS 252/252L | Electricity and Magnetism 1  
PHYS 256 | Geometrical and Physical Optics  
PHYS 256L | Optics Laboratory  
MATH 227P | Calculus 3 for Honours Physics  
MATH 228 | Differential Equations For Physics and Chemistry  
PHYS 010 | Physics Seminar  
PHYS 122/122L | Mechanics, Wave Motion and Heat 2  
One elective (0.5 credit)*

2B (Spring)  
PHYS 010 | Physics Seminar  
PHYS 234 | Quantum Physics 1  
PHYS 253/253L | Electricity and Magnetism 2  
PHYS 263 | Classical Mechanics  
Two electives (1.0 credit)

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**Year Three**  
3A (Spring)  
PHYS 010 | Physics Seminar  
PHYS 334 | Quantum Physics 2  
PHYS 358 | Thermodynamics  
PHYS 360A | Intermediate Laboratory  
PHYS 364 | Mathematical Physics 1  
Electives totalling at least 0.75 credits  
PHYS 010 | Physics Seminar  
PHYS 355 | Nuclear Physics  
PHYS 359 | Statistical Mechanics  
PHYS 365 | Mathematical Physics 2  
Two electives (1.0 credit)  
One elective 300-level Physics lab (0.25 credit)

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**Year Four**  
Students entering Year Four must take a total of 5.0 credits, which must include the following:  

*4A and B (Fall and Winter)*  
PHYS 010, 434, 435**, 441A/B, plus an additional 1.0 credit of Physics electives. PHYS 437A and PHYS 454 are strongly recommended for students intending to do graduate work. For those planning to do graduate work in Theoretical Physics, at least two from PHYS 444, 463, 464 and 475 are recommended.

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† Year One Chemistry may be replaced by Year One Biology or Earth Sciences courses. Note that all students in Year One Science are required to have credits from at least two different disciplines from the Faculty of Science (see "Program and Course Selections").

* Students with little computer programming experience are recommended to take CS 102 before taking PHYS 239 in 2A.

** Students specializing in Astrophysics or Biophysics may substitute an appropriate course in one of these areas for the PHYS 435 requirement, by permission of the Undergraduate Officer.

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**MINOR IN PHYSICS**

In order to graduate with a Minor in Physics, the following requirements must be met:

1. Successful completion of 4.5 Physics lecture credits and 1.0 Physics lab credit, with a minimum cumulative average of 60% in all Physics courses attempted.

2. Lecture credits must include: PHYS 121/122 and at least 2.5 other credits in core Physics subject areas. PHYS 222/223 may be substituted for PHYS 252/253, PHYS 226 and/or 246 may be substituted for PHYS 256, and PHYS 326 may be substituted for PHYS 234 from the Physics core.

3. Lecture credits must include at least 1.5 credits from 300- or 400-level Physics courses.

Check details with a Physics Undergraduate Officer.
Psychology

The Honours Psychology BSc program is intended for students who want to apply knowledge gained in biology, chemistry and physics to problems in neuropsychology, behavioural neuroscience, psychophysiology and cognitive science, as well as certain aspects of developmental and clinical psychology, and related disciplines, or who plan to seek professional training in medicine, perhaps with specialization in neurology, psychiatry or pediatrics. A strong background in the "natural science" areas of psychology would complement one's preparation for research or graduate work in these fields of study.

Students interested in Honours Psychology will normally be admitted at the beginning of their second year based on their academic performance in Year One, as specified below. Application for admission to Honours Psychology is made at the time of preregistration for Year Two. Normally, only students whose Year One Science average is at least 60%, cumulative overall average is 60%, and whose Psychology average is at least 75% will be admitted. Owing to resource limitations, however, fulfillment of the minimum entrance average requirements will not guarantee students admission to Honours Psychology, and a higher Psychology average may be required for admission. Please refer to 'Applying for a Psychology Major' in the Faculty of Arts for further details.

In order to remain in good standing in Honours Psychology, students must maintain a cumulative average of at least 60% in the Faculty of Science courses, a cumulative overall average of 60% and a cumulative average of at least 75% in the Psychology courses. Conditional status for one academic term only may be granted to students who fall below these criteria.

In order to graduate in Honours Psychology, students must successfully complete 23.0 credits including:

1. The Year One program as listed in the Recommended Course Sequence below.
2. The Psychology course requirements (8.5 credits) as given for the Honours Psychology BA program. See the Faculty of Arts.
3. A total of 5.0 Science credits over Years Two to Four including:
   - no more than 2.0 SCI credits.
   - at least 2.0 credits at the 300- or 400-level, exclusive of SCI credits.

Recommended Course Sequence 3

Year One
Two 200-level term courses in Biology
CHEM 120 Physical and Chemical Properties of Matter
CHEM 120L Chemical Reaction Laboratory 1
CHEM 123 Chemical Reactions, Equilibria and Kinetics
CHEM 123L Chemical Reaction Laboratory 2
MATH 107/108 Calculus 1 and 2
PHYS 111/112 Physics 1 and 2
PHYS 111L/112L Physics 1 and 2 Laboratory

Notes
1 Normally, students will take no more than one Research Course per term. Students may not use PSYCH 392 to satisfy both the Natural Science and Social Science Research Requirements. Students not doing an Honours Thesis may substitute PSYCH 465 (Applied Apprenticeship) or PSYCH 466 (Education Apprenticeship) for one of the third year Research Requirements.
2 Advanced PSYCH courses are those not used to fulfill other Psychology requirements and which have prerequisites beyond the 100-level. Advanced PSYCH courses are designated as Natural Science or Social Science in the course descriptions. A list is also provided at the beginning of the Psychology Course Offerings section.
3 Students entering the Honours Psychology Program in Year Three should consult the Psychology Undergraduate Office for further information.
Thesis
See "Thesis" in the Honours Psychology section of the Faculty of Arts.

Honours Psychology Co-operative Program
See "Honours Psychology Co-operative Program" in the Faculty of Arts.

Optometry

The School of Optometry of the Faculty of Science offers a four-year professional program leading to the degree of Doctor of Optometry. It is the only School of Optometry in Canada offering a program with English as the language of instruction. The immediate purpose of the program is to qualify individuals for the practice of optometry. Graduates are eligible to apply for registration as optometrists in the province of their choice. The program provides students with a background in general science and specialized knowledge in visual science so that they may follow a career in optometric research and teaching if they so desire. A two-year Diploma of Residency program, designed for persons with the OU degree who wish to improve and extend their clinical skills, is available. Graduate programs in Physiological Optics leading to the Master of Science degree and the Doctor of Philosophy degree are also available.

Students who have completed two years of Honours Science Regular at the University of Waterloo prior to successfully completing the Optometry program may be eligible to transfer 11.0 optometry credits to an Honours Science BSc degree. For details regarding eligibility, contact the Associate Dean of Science for Undergraduate Affairs.

As with other health care professions, graduates in Optometry must hold the certificate of the licensing body of the province in which they choose to practise.

REQUIREMENTS FOR ADMISSION

Citizenship
Applications are accepted from candidates who are Canadian citizens or from legal residents of Canada who have held Permanent Resident status for at least 12 months prior to the registration day of the Fall term. Proof of Permanent Resident status must accompany the application. In special circumstances a limited number of foreign students (one or two) may be admitted, i.e., those on student authorization.

Prerequisites
Applicants should satisfy the Admissions Committee that they are well-prepared academically for entry to the School of Optometry. A good background in Science and Mathematics is required and the disciplines of Biology/Zoology, Calculus, Chemistry, Physics and Psychology must be represented. At the University of Waterloo, a program is offered to allow prospective applicants to the first professional year the opportunity to fulfill all the required and recommended prerequisite courses. The following courses represent the minimum requirements for admission to the School of Optometry: BIOL 230, Cell Biology; BIOL 211, Vertebrate Zoology; CHEM 120/120L, Physical and Chemical Properties of Matter; CHEM 123/123L, Chemical Reactions, Equilibria and Kinetics; PHYS 121/122, 121U/122L, General Physics; (students without OAC Physics must take PHYS 111/112 and PHYS 111L/112L); MATH 107/108, Calculus; PSYCH 101, Introductory Psychology. The following courses represent a second-year program of strongly recommended courses: BIOL 201, Human Anatomy; BIOL 202, Histology, Embryology; BIOL 240, Fundamentals of Microbiology; CHEM 266/266L, Organic Chemistry; CHEM 237/237L, Biochemistry; PHYS 246/246L, Physical Optics; STAT 202, Statistics. Additional suggestions: One (per term) of any of the following courses: Computer Science, Introductory Accounting, Economics, Languages. Laboratory courses must be completed where given. To complete the pre-professional program, additional courses in the behavioural sciences, social sciences and the humanities are recommended.

Optometry Admission Test (OAT)
THE OAT MUST BE WRITTEN BY ALL APPLICANTS.

The OAT results will be accepted for two successive applications only. Candidates who have not written the OAT for two or more years will be ineligible for admission consideration. Candidates are responsible to ensure that their OAT scores are sent to the UW School of Optometry. ALL inquiries regarding this test should be addressed to:

Optometry Admission Testing Program
211 East Chicago Avenue
Chicago, Illinois, U.S.A. 60611
(312) 440-2693

Only candidates applying for advanced standing in Optometry should contact the Admissions Office of the School of Optometry regarding the OAT requirements.

Selection Factors
All applicants should note that enrolment in the first professional year is limited to 60 and that in 1994 there were approximately 350 applications for those places. Consequently, neither acceptance to nor successful completion of the pre-professional program can guarantee admission to the first professional year. Applicants are selected on a competitive basis considering scholarships, interest, motivation, general qualifications for the profession and recommendations. Applicants to Honours Science, Regular of the University of Waterloo who have completed their secondary school education in provinces other than Ontario should consult with the Science Undergraduate Officer to ensure that their background in Science and Mathematics has prepared them for Honours Science, Regular as given at the University of Waterloo.
Agreements have been established between Ontario and the provinces of Alberta, British Columbia, Manitoba, New Brunswick, Prince Edward Island and Saskatchewan through which the costs incurred in educating a limited number of students at the School of Optometry are shared with the home province. The maximum number of residents to which these agreements apply are: Alberta 7; British Columbia 5; Manitoba 3; New Brunswick 1; Prince Edward Island 1 (every 3 years); Saskatchewan 3. The School of Optometry’s Admission Committee bases its decisions on the competitive level of the candidate and therefore the Committee is not committed to, or limited by, a contract province’s allotted number of places. In each year arrangements will be made to provide an opportunity for applicants from British Columbia, Alberta, Manitoba and Saskatchewan and in New Brunswick or Prince Edward Island to be interviewed in their home provinces. Applicants from the six contract provinces must meet the same admission criteria as other applicants. Additional information may be obtained from the Admissions Office of the School of Optometry.

Application Procedures
Candidates who are currently or have previously been enrolled in any University of Waterloo course are considered internal applicants. These candidates initiate their application to the Optometry program by completing an application for internal transfer obtained from the Admissions Office at the School of Optometry. The Application for Admission to the School of Optometry, due during pre-registration week in March, can be obtained at the Optometry Admissions Office after October. In the Winter term an interview with the Admissions Committee will be arranged for some students. Prospective candidates who have never taken a course at the University of Waterloo are considered external applicants and must apply through the Ontario Universities’ Application Centre (OUAC). Such applicants should obtain the appropriate OUAC application form from the Registrar of either the University of Waterloo or any Ontario University. These forms will not ordinarily be available from the Office of the Registrar prior to October 15. The Application for Admission to the School of Optometry, due March 31, will be sent by the University of Waterloo Office of the Registrar upon receipt of its copy of the OUAC Form #105 provided that this form is received from OUAC by February 28. The Application for Admission to the School of Optometry contains six sections:

Section A: Personal ID
Section B: General Information
Section C: Academic Record
Section D: Autobiographic Sketch
Section E: 3 Confidential Assessment Forms (CAFs)
Section F: Essay

Specific instructions, including deadlines, will be outlined in the application procedures accompanying the Application.

The deadline for receipt of academic transcripts is June 15. During the Optometry program students will be requested to submit documentation of up-to-date immunization for measles, rubella, mumps, diphtheria, tetanus and hepatitis B (refer to application package for further details). Students are not allowed to participate in the optometry clinics without this documentation.

Students granted admission to the first professional year who have taken courses equivalent to those required in the professional program may apply for exemptions from these courses immediately after acceptance into the program. Details on the policy of exemptions may be obtained by writing to the Admissions Office of the School of Optometry.

Admission to Advanced Standing
Applications are not ordinarily accepted to a year more advanced than the first professional year. However, graduates from certain Commonwealth Universities who are licensed to practise optometry in their country of origin may in certain instances be admitted to a more advanced level in a program leading to the OD degree. For more information write the Admissions Office of the School of Optometry.

Note
Interviews arranged by the Admissions Office of the School are recommended in the following situations before any application will be processed:
1. Applicants with undergraduate or graduate training who have not completed prerequisites for the pre-professional program and who are considering a “make-up” year.
2. Applicants considering a “make-up” year to repeat courses for the purpose of raising grades.
3. Applicants who are engaged at present in another vocation such as teaching, engineering, research, etc., and who may find it necessary to terminate employment before the admission decision has been made.

Appointments for interviews can be made by phone or letter to the Admissions Office of the School of Optometry.

ACADEMIC COURSE REQUIREMENTS
In the Optometry program an overall 60% average as well as a mark of at least 60% in each course of the major subject (including PHYS 246 Physical Optics and BIOL 301A/B Human Physiology) must be obtained each term. In Optometry 348A/B, and 448A/B/C a mark of at least 70% will be considered a passing grade. In the Optometry program a student who fails to demonstrate clinical competence as evidenced by a failing grade in a clinical course will not be allowed to continue in the program.

Note
The final year will be composed of three clinical sessions starting with the Spring Term. Each session will be a minimum of 14.5 weeks in duration. The Spring session will commence in late April and continue until mid-August. The Fall session will commence in late August and continue until mid-December. The Winter session will
commence at the beginning of January and continue until mid-April.

Year One

Fall
BIOL 301A Human Physiology
OPTOM 100 History and Orientation
OPTOM 104 Anatomy of the Eye 1
OPTOM 105 General Pathology 1
OPTOM 106 Geometrical Optics
OPTOM 109 Visual Perception 1: Perception of Light

Winter
BIOL 301B Human Physiology
OPTOM 111 Fundamentals of Visual Optics
OPTOM 114 Anatomy of the Eye 2
OPTOM 115 General Pathology 2
OPTOM 149 Public Health Optometry
PHYS 246 Physical Optics

Year Two

Fall
OPTOM 216 Ophthalmic Optics 1
OPTOM 241 Ocular Motility
OPTOM 242 Clinical Techniques 1
OPTOM 245 Ocular Pathology 1
OPTOM 254 Physiology of the Eye
OPTOM 264 Pharmacology 1: Medications and the Eye

Winter
OPTOM 244 Neurophysiology of Vision
OPTOM 246 Ophthalmic Optics 2
OPTOM 251 Visual Perception 2: Monocular and Binocular Vision Processes
OPTOM 252 Clinical Techniques 2
OPTOM 255 Ocular Pathology 2

Year Three

Fall
OPTOM 346 Ophthalmic Optics 3
OPTOM 347 Contact Lenses 1
OPTOM 348A Optometry Clinic
OPTOM 351 Visual Perception 3: Colour Vision
OPTOM 352 Clinical Techniques 3 Strabismus and Anisokiasia
OPTOM 364 Pharmacology 2: Ocular Diagnostics and Therapy

Winter
OPTOM 342 Case Analysis and Optometric Therapies
OPTOM 348B Optometry Clinic
OPTOM 350 Practice Management and Jurisprudence
OPTOM 353 Professional Ethics and Optometric Communication
OPTOM 367 Contact Lenses 2
OPTOM 368 Gerontology and Low Vision
OPTOM 372 Pediatric Optometry and Learning Disabilities
OPTOM 374 Ocular Pathology 3

COMBINED DOCTOR OF OPTOMETRY - MASTER OF SCIENCE IN VISION SCIENCE PROGRAM

Introduction
The School of Optometry offers a combined Doctor of Optometry - Master of Science Program in response to a number of needs among which are:

1. Academic recognition of the contributions of outstanding students to original research and provision of academic enrichment for these students.

2. Provision of an introduction to postgraduate study and research for good undergraduate students who might otherwise overlook the opportunity of graduate studies.

3. Graduate training which provides an increased scientific component to clinical training and produces graduates who have a further specialization in an area of Vision Science.

4. Provision of a quicker route to the MSc for outstanding students.

GENERAL PRINCIPLES OF THE COMBINED OD - MASTER'S PROGRAM
A combined Doctor of Optometry - Master's program is one in which it is deemed academically advantageous to treat the educational process leading through the OD to the MSc degree as a continuous unit, while at the same time satisfying the requirements for both degrees. The combined program also provides the opportunity for mutual enrichment of both programs. The Vision Science background of the OD program serves as a solid precursor to research at an MSc level. The research at the MSc level broadens the application of the Vision Science component beyond that of the OD program and provides an increased scientific component to clinical training. This
program provides an alternative scheduling of the requirements of both degrees to that used when the OD is considered a terminal degree.

The following are general conditions that all such combined OD - Master's degree programs satisfy:

1. Students in the combined OD - Master's program will fulfill the degree requirements of both the OD program and the MSc program. This implies that:
   - nine terms of full-time registration at the undergraduate level and at least two terms of full-time registration at the graduate level are mandatory;
   - the graduate program must include at least four (graduate) courses and a thesis.

2. There must be complete freedom of transferability from the combined program to the OD or other undergraduate programs, or from the MSc program to the PhD program.

3. Admission to the combined program is on the basis of merit, as is continuance in the program. Students who fail to maintain sufficiently high standing will be required to revert to the OD program, or even, if their undergraduate performance so warrants, to withdraw from the University. Students do not become graduate MSc students until after completion of the OD degree. Admission to the combined program does not guarantee admission to the MSc program.

4. The culmination of the combined program is the Master's degree; this will be achieved through the completion of a research thesis and 4 graduate courses.

5. Entry to a combined OD - Master's program may occur as early as the term following completion of the first year of the OD program.

6. A combined OD - Master's degree program must have the flexibility to satisfy the requirements of individual students; at the same time it must have coherence — each student's program must be addressed towards a well-defined area of specialization in Vision Science.

STRUCTURE OF THE COMBINED OD - MASTER'S PROGRAM

Application and Admission
Admission to the combined OD - Master's degree program is restricted to students with a consistently good academic record at the end of the first year who are granted "conditional admission to the MSc program". The condition to be fulfilled is "satisfactory completion of the requirements of the OD degree with at least a cumulative B average".

In granting admission to the program both the academic record in the OD program and in the preoptometry program and any research experience will be considered. Students must have a minimum B average within the optometry program to be eligible for admission, and would normally have an A standing in their preoptometry program.

Students must have all application forms completed and be conditionally accepted into the combined program by the beginning of the 4th year. As in any program culminating in a Master's degree, a faculty supervisor is appointed on admission. Students are encouraged to consult faculty members regarding their research interests.

Course Programs
Although the supervisor advises students, all course selections and other academic administrative matters concerning each student are subject to the approval of the School's Undergraduate Officer and the Graduate and Research Committee.

The courses chosen by the student (with the advice of the supervisor and approval of the Undergraduate Officer and Graduate and Research Committee) should form a coherent series which (together with the thesis) complete the requirements of the OD and, ultimately, the Master's degrees.

In 3rd or 4th year, one or two 600 level courses may be chosen for credit to the MSc degree. These courses are in addition to the normal academic program for the OD level. Technically, it is necessary for students to register for these courses as "extras" in order to avoid counting them towards the requirements of the OD degree. Advanced standing in these courses will be granted following acceptance to the graduate program. Students will register in OPT 441/451 (Research Project).

A student proceeding to an MSc will normally complete the balance of the 4 required graduate courses in the one or two terms following 4th year.

Summer Research Terms
It is expected that most of the students proceeding to the MSc degree will be involved in summer research terms following first and second years. During these summer terms they are not required to register and they may be hired as associate researchers for the purposes of various research grants, without the restriction of student salaries. This combination can be attractive from the points of view of available research time, income generation for the student and total research cost from a grant. Work done during these summer research terms may be included in the thesis.

During summer research terms, students may register as part-time undergraduate students if they wish to pursue a graduate level course for which they are deemed to have adequate undergraduate preparation.

Fourth-Year Projects
For students in the combined OD - Master's program, OPT 441/451 (Research Projects) may be integrated with their summer terms as well as with their work following 4th year. The requirements of OPT 441/451 must be met. The thesis must contain a substantial research contribution in addition to that submitted for credit in OPT 441/451, such that the total normal research requirements of OPT 441/451 and the MSc thesis are met.
Granting of Degrees
The OD degree will be granted at the normal time, i.e. at the Spring Convocation following the 4th year. The program, however, culminates in the MSc. A minimum of two terms full-time enrollment in the MSc is required subsequent to the granting of the OD Degree. It is expected that the MSc degree will be completed more quickly than in the regular MSc program and would normally be granted at the following Spring convocation. Additional time may be required to complete the thesis or coursework.

Postgraduate Scholarships
Students in the combined OD - Master’s program may apply for graduate NSERC, OGS scholarships, etc. at the same time as their colleagues in the regular programs. They are also eligible for Optometry undergraduate scholarships during the summer terms.

Withdrawal or Failure
Students may remain in the combined OD - Master’s program provided they maintain sufficiently high academic standards. The minimum is a cumulative B average (70% in undergraduate courses to the end of 4th year, 70% in graduate courses) and no conditional standing.

A student who fails to maintain this standard will be required to withdraw from the combined degree program. In such a case, all courses taken up to the end of 4th year, including those originally intended to fulfill part of the Master’s degree requirements, will be counted towards the OD degree program elective course requirements and the marks included in the 4th year averages as appropriate. Should the student then satisfy the requirements for the OD degree, it will be granted at the next Convocation. Such students will not be permitted to enter the regular MSc program.

If a student maintains at least the minimum standard mentioned above, but decides to withdraw voluntarily from the combined OD - Master’s program, the student may choose to count courses towards the OD degree which were originally intended to fulfill part of the Master’s degree requirements. When the requirements for the OD degree have been satisfied, the OD will be granted at the next Convocation. Such a student will be allowed (at a later date) to enter the regular MSc program. For these students, graduate courses counted towards the OD degree may not be applied to the Master’s degree, but graduate courses not previously counted towards the OD degree may be counted towards the MSc with the approval of the Graduate and Research Committee.

Transfer to the PhD program
Following completion of the OD program, a combined OD/MSc student will be eligible for transfer to the PhD program on the same basis as a regular MSc student.
Interdisciplinary Programs

conducing a CD-Rom search in the Davi Centre Library.
Interdisciplinary Study at UW

Modern universities have become highly specialized in their approach to education. There are many historical, academic and professional reasons why this is so, and specialization does have many benefits for students and society. But modern universities still seek to offer students a way to achieve balance and perspective in their studies.

The University of Waterloo provides a challenging way to achieve such balance and perspective by means of its Interdisciplinary Programs. These innovative Programs enhance, complement and support the traditional disciplines while offering the benefits of an interdisciplinary approach to important issues.

The impact of technology on society is one such issue. Thus the Option in Society, Technology and Values (STV) brings together instructors and materials from several disciplines. Similarly Women's Studies makes use of many fields of study, from Anthropology and Economics to Health Studies and Sociology.

Peace and Conflict Studies, Legal Studies, Studies in Sexuality, Marriage and the Family — and the rest of the Programs — all follow a similar path, using the knowledge base, faculty members, problem-solving approaches and other resources from numerous disciplines.

Many combinations of Options, Minors, etc. with a student's major field of study are possible and actively encouraged by Program Directors. For example, a student in Honours French may choose a Canadian Studies Option.

By offering a range of Options, Minors and elective courses, UW's Interdisciplinary Programs present an opportunity for students to extend their learning beyond their major field of study. Students in all faculties are invited to register, for example, in an Option or Minor, or to take occasional Interdisciplinary courses for personal interest.

What the Programs Offer

Generally, the Interdisciplinary Programs described in this section of the Calendar offer a General or Honours Option which may be taken in conjunction with regular degree programs in any faculty of the University. Several Programs offer a Minor, a Diploma or a Certificate as well. Canadian Studies and Women's Studies also offer a three-year Major program. (See each entry for specific details.)

Courses are usually categorized as “Core,” “Approved” or “Required.”

What the Programs Require

The Programs which have Options typically require six to ten Core, Approved or related courses, all maintained at a stipulated average. To proceed through the Option, students are generally required to:

1. select the Option, e.g. International Studies, Middle East Studies, in Year Two;
2. choose courses in consultation with the respective Program Director or designated advisor; and
3. declare the Option, e.g. Management Studies, Studies in Personality and Religion, on registration documents.

For More Information

In addition to the description presented in this section, many Interdisciplinary Programs provide more details in their own brochure or other publication. For a copy of a Program brochure, or to arrange an interview, contact the respective Director.
Interdisciplinary Programs
Canadian Studies

Canadian Studies
Cognitive Science
Environmental Economics
(See “Arts” for program description.)
Human Resources Management
International Studies
Legal Studies
Liberal Science
(See “Science” for program description.)
Management Studies
Middle East Studies
Peace and Conflict Studies
Print Journalism
Russian and East European Studies
Society, Technology and Values
Speech Communication
(See “Arts” for program description.)
Studies in Personality and Religion
Studies in Sexuality, Marriage and the Family
Women’s Studies

W.R. Needham  St. Paul’s College  885-1460
P. Thagard  HH 368  UW 3594
E. Carvalho  HH 217  UW 3017
S.W. Kardasz  HH 240  UW 2584
G. Hayes  HH 109  UW 5138
C. Brunk  Conrad Grebel College  885-0220
H. Morrison  ESC 252G  UW 2063
S.W. Kardasz  HH 240  UW 2584
L. Curchin  ML 238  UW 6883
T. Yoder Neufeld  Conrad Grebel College  885-0220
D. Irish  ESC 139  UW 2500
R. Karpiak  ML 222  UW 3118
N. Balt/K. Sharpe  DC 2724/2722  UW 4816/6215
J. Tomasson Goodwin  ML 122  UW 5056
J. Gollnick  St. Paul’s College  885-1460
J.K. Rempe  St. Jerome’s College  884-8111/212
H. Lyons  PAS 3010  UW 2890

Canadian Studies
To know ourselves” is a primary reason for the existence of the Canadian Studies Program and a perennial motivation for its students. Canadian Studies is an Interdisciplinary Program sponsored by ten departments in the Faculties of Arts and Environmental Studies. Other UW departments also participate.

The Program provides an opportunity to gain insight into Canada in three ways: through courses about Canada in the student’s home discipline, through courses about Canada outside that discipline, and through Core interdisciplinary courses offered at St Paul’s United College and the UW.

The Canadian Studies Three-Year Major
Requirements for the General Degree
1. Successful completion of a minimum of 30 term courses including Faculty of Arts Group A and B requirements with an overall cumulative average of at least 60% and an overall average of at least 65% in Canadian Studies and Approved Canadian Content Courses (ACCC).
2. 14 required courses including:
   - six CDN ST courses: 101 or 102; 201, 202 and three
     from amongst CDN ST 301, 302, 311, 313, 365D,
     ECON 310, ERS 352, GEOG 322, PSCI 231, 435,
     SOC 407
   - a course that focuses on the French Canadian
     people and culture
   - a course that focuses on the First Nations people and
     cultures
   - at least two Humanities (ACCC) electives
   - at least two Social Science (ACCC) electives
   - at least two Faculty of Environmental Studies
     (ACCC) electives
3. 16 elective courses to be chosen in consultation with advisors.

Notes
1. A course in French Canadian Literature taught either in English translation or in French; or a course in French Language or French Canadian Culture. It is to be noted that the course in French Canadian Literature in translation will not contribute to fulfillment of the Faculty of Arts Aii requirements.
2. As appropriate to their respective contents and discipline base, each course approved as a Native Studies course may meet one of the Faculty of Arts Group A, Aii, Aiii, or Group B requirements. Students are advised that they may apply to take courses in the Native languages of Canada, for example, Ojibway, Cree and Mohawk, on a letter of permission from other universities. Native language courses approved for transfer will fulfill the Arts Faculty Group Aii requirements.
3. Students intending to pursue graduate work in social science areas are encouraged to take a course in statistical and/or quantitative methods. General Degree Students must satisfy the Canadian Studies requirements with an overall average of at least 65% in Canadian Studies and Approved Canadian Content Courses.
GENERAL AND HONOURS OPTION PROGRAMS
Students majoring in Anthropology, Economics, English, Environmental and Resource Studies, French, Geography, History, Political Science, Sociology, and Urban and Regional Planning are invited to consider the General or Honours Option in Canadian Studies.

Requirements for General and Honours Option

Year One
Because most UW students declare their main field of study in their second year, there are no strict Canadian Studies requirements for Year One. However, it is recommended that students intending to take the option take a French language course and CDN ST 101 or 102—they should otherwise proceed with their Faculty's Year One program.

Having chosen a main field of study (a "home discipline") from the ten departments listed above, students can then select the General Option, for those in a three-year General degree program, or the Honours Option, for those in a four-year Honours program.

Year Two
- CDN ST 201, 202
- two courses in the home discipline dealing specifically with Canada
- two term courses from outside the home discipline dealing with Canada and chosen from the approved course list (see below)
- the equivalent of four term courses chosen to meet the Honours requirement in the home discipline

Year Three
- two of CDN ST 301, 302, 310, 311, 313, 365; ECON 310, ERS 352, GEOG 322, PSCI 231, 435, SOC 407.
- two term courses in the home discipline dealing specifically with Canada
- two term courses from outside the home discipline dealing with Canada and chosen from the approved course list (see below)

Year Four – 4-Year General Program
- at least ten term courses to include
- two additional Core CDN ST term courses
- two term courses in the home discipline dealing specifically with Canada
- an additional two term courses in approved CDN ST courses

Note
General degree students intending to graduate in their home discipline and with the "Canadian Studies Option" shown on the diploma must have an average of at least 65% in Core Canadian Studies courses.

Year Four – Honours Program
- CDN ST 400A, 400B
- two term courses from outside the home discipline dealing specifically with Canada and selected from the approved course list below.

Interdisciplinary Programs
Canadian Studies

- the equivalent of four term courses chosen to meet the Honours requirement in the home discipline

Honours degree students intending to graduate in their home discipline with the "Canadian Studies Option" shown on the diploma must have an average of at least 75% in Core Canadian Studies courses.

Double Honours and Canadian Studies – Requirements
In each year beyond year one, at least two term courses that deal with Canada from each of the chosen Honours disciplines and the requisite core CDN ST courses from the Canadian Studies Option Program listed above. Students are not required to take Approved Canadian content courses outside of their two Honours areas.

General and Honours degree students will graduate at the end of year Three or Four, as appropriate, with a degree in their home discipline and with 'Canadian Studies Option' shown on the diploma.

MINOR IN CANADIAN STUDIES
Honours students may minor in Canadian Studies regardless of faculty or department. Students taking the Four Year General degree in Arts may also declare the Minor. This requires assembling a package equivalent to ten term courses. The package includes four of CDN ST 101, 102, 201, 202, 301, 302, 310, 313, 365, ECON 310, ERS 352, GEOG 322, PSCI 231, 435 and SOC 407 plus six term courses from the approved course list below.

GENERAL NON-MAJOR DEGREE (CANADIAN STUDIES)
Students in a General Non-major Degree program at UW can assemble a package of courses emphasizing Canadian Studies.

Requirements – Three-Year General Non-Major
- 30 term courses
- all the subject area requirements listed for the Non-major Degree (it is recommended that at least one term course be taken in French to satisfy the "language other than English" requirement)
- four CDN ST term courses
- eight term courses dealing with Canada and chosen from the approved course list (see below)

Requirements – Four-Year General Non-Major
- 40 term courses
- all the subject area requirements listed for the Non-major Degree (it is recommended that at least one term course be taken in French to satisfy the "language other than English" requirement)
- six CDN ST term courses
- ten term courses dealing with Canada and chosen from the approved course list (see below)

All Non-Major programs must be arranged through the Faculty of Arts Undergraduate Office.
General Non-Major students satisfying the Canadian Studies requirements with an average of at least 65% in Core CDN ST courses will graduate with a degree which shows: Arts BA Non-Major (Canadian Studies Option).

LIST OF INTERDISCIPLINARY CANADIAN STUDIES COURSES (CDN ST)
01 Landforms and Mindscapes
02 Canadian Cultural Narratives
201 Social Regionalism
*02 Cultural Regionalism
 01 Regionalism: West
 02 Regionalism: East
310 Les Francophones hors Québec
*11 Canadian Women and Religion
13 Canadian Traditional and Popular Culture
35 Special Topics
3651 Native Women in Canada in Historical Perspective
*965D Reading Course
70 Issues in Contemporary Native Communities in Canada
400/401 Research Essay

LIST OF DISCIPLINE BASED INTERDISCIPLINARY CANADIAN STUDIES COURSES (CDN ST)
ECON 310 History of Canadian Economic Development
RS 352 Current Issues in the Canadian North
EOG 322 Geographical Study of Canada: The Political Economy of Canadian Regionalism
PSCI 231 Government and Business in Canada
*SOC 435 The Politics of Canadian Resource Development
JOC 407 Canadian Sociological Thought

LIST OF PRINCIPAL CANADIAN CONTENT COURSES OFFERED BY PARTICIPATING DEPARTMENTS
The list below indicates courses tentatively scheduled for 1996-97. Refer to previous and forthcoming undergraduate Calendars for other Canadian content courses.

Anthropology (ANTH)
32 Introduction to Social and Cultural Anthropology
13 North American Prehistory
222 Archaeology of the Great Lakes Area: A Survey
230 Native Peoples of Canada
33 Inuit, Eskimo and Aleut Cultures
11 The Contemporary Canadian Indian Scene
322 Archaeology of the Great Lakes Area
351 Comparative Policies on Native Minorities
*0 Issues in Contemporary Native Communities in Canada
420 Social and Cultural Change
499 Honours Essay

Economics (ECON)
101 Introduction to Microeconomics
102 Introduction to Macroeconomics
200 Contemporary Policy Issues
310 History of Canadian Economic Development
333 Inter-regional Economics
351 Labour Economics
355 Economics of Energy and Natural Resources
363 Contemporary Canadian Problems 1

English (ENGL)
107 Introduction to Canadian Literature
205R The Canadian Short Story
214 Themes in Canadian Literature
215 Canadian Regional Literature
313 Canadian Literature to 1920
314 Canadian Poetry Since 1920
315 Canadian Prose Since 1920
316 Canadian Drama
317 Canadian Children's Literature
318 Canadian Literature Since 1967
490A-Z Special Topic Seminars in Canadian and Commonwealth Literature
495A/B Senior Honours Essay Canadian Literature Option

Environmental and Resource Studies (ERS)
241 Introduction to Environmental and Social Impact Assessment
352 Current Issues in the Canadian North

Environmental Studies (ENV S)
201 Introduction to Environmental and Planning Law
401 Environmental Law
433 People in Natural Areas

French (FR)
151 Basic French Language 1
152 Basic French Language 2
192A French Language 1: Module 1
192B French Language 1: Module 2
192C French Language 1: Module 3
203 French Phonetics
250A Spoken French
251 French Language 2: Module 1
252 French Language 2: Module 2
300A Spoken French
351 French Language 3: Module 1
352 French Language 3: Module 2
400 French Language 4A
400A Advanced Spoken French IV
452 French Language 4B
271 French Canadian Literature in Translation
376 Contemporary French Canadian Novel
471 French Canadian Literature
473 Aspects of Quebec

Geography (GEOG)
207 Water Resources of Canada
300 Geomorphology and the Southern Ontario Environment
322 Geographical Study of Canada: The Political Economy of Canadian Regionalism
### Canadian Studies

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
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<tbody>
<tr>
<td>340</td>
<td>Towns and Villages of Rural Canada</td>
</tr>
<tr>
<td>341</td>
<td>Historical Geography of Canada</td>
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<tr>
<td>422</td>
<td>Canada</td>
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<tr>
<td>461</td>
<td>Land Dereliction, Rehabilitation and New Landscape Creation</td>
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#### History (Hist)

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<tr>
<th>Course Code</th>
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<tbody>
<tr>
<td>102C</td>
<td>Origins of War in the 20th Century</td>
</tr>
<tr>
<td>102E</td>
<td>Canadian History</td>
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<tr>
<td>203</td>
<td>Modern Quebec</td>
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<td>204</td>
<td>Life on the Ontario Frontier</td>
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<td>206</td>
<td>History of Canadian Minorities</td>
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<td>207</td>
<td>Canadian Labour History</td>
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<td>209</td>
<td>Health Diseases and Medicine in Canadian History, 1500-1984</td>
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<tr>
<td>215A</td>
<td>Canadian Women in Historical Perspective: Forming Identities, 1600-1910</td>
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<td>215B</td>
<td>Canadian Women in Historical Perspective: Breaking Through, 1600-1910</td>
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<td>221</td>
<td>Race Relations in Canada: An Historical Perspective</td>
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<td>234</td>
<td>The Catholic Church in Canada Since Confederation</td>
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<td>247</td>
<td>Mennonite History: A Survey</td>
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<td>249</td>
<td>History of Canadian-American Relations Since 1914</td>
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<td>253</td>
<td>Canadian History: The Colonial Period</td>
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<td>254</td>
<td>Canadian History: The National Period</td>
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<td>273</td>
<td>Canadian Social History 1</td>
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<td>274</td>
<td>Canadian Social History 2</td>
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<td>320</td>
<td>The History of Modern Quebec</td>
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<tr>
<td>325</td>
<td>The History of Native Peoples in Canada to 1870</td>
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<td>326</td>
<td>Native Peoples in Canada: An Historical and Contemporary Perspective Since 1870</td>
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<tr>
<td>373</td>
<td>Canadian Social History: The Victorian Period and Beyond</td>
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<td>374</td>
<td>Canadian Social History: The Modern Experience</td>
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<td>385</td>
<td>Canada From Macdonald to Laurier</td>
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<td>387</td>
<td>Ontario History Since Confederation</td>
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<td>389</td>
<td>Canada in World Affairs: From Laurier to Trudeau</td>
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<tr>
<td>390</td>
<td>Shaping the Canadian City, 1880-1990</td>
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<tr>
<td>397A</td>
<td>Social History of Rural Ontario since 1850</td>
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<tr>
<td>403A/B</td>
<td>Senior Seminars in Canadian History</td>
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#### Native Studies (NATST)

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<tr>
<th>Course Code</th>
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<tbody>
<tr>
<td>370</td>
<td>Issues in Contemporary Native Communities in Canada</td>
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#### Political Science (PSCI)

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<tbody>
<tr>
<td>102M</td>
<td>Contemporary Issues in Canadian Public Policy</td>
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<tr>
<td>231</td>
<td>Government and Business in Canada</td>
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<tr>
<td>260A/B</td>
<td>Canadian Government and Politics 1/2</td>
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<td>291</td>
<td>The Canadian Legal Process</td>
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<td>292</td>
<td>Issues in Canadian Criminal Law</td>
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<td>295</td>
<td>Public Sector Management</td>
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<td>Public Administration 1</td>
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<td>Public Administration 2</td>
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<td>333</td>
<td>Administrative Law</td>
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<td>341</td>
<td>Provincial Politics</td>
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<td>342</td>
<td>Politics in Quebec</td>
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<td>343</td>
<td>Canadian Municipal Government</td>
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<td>344</td>
<td>The Politics of Local Government</td>
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<td>351</td>
<td>Federal and Consociational Political Systems</td>
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#### Interdisciplinary Programs

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<td>Canadian Constitutional Law</td>
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<td>Political Parties and Interest Groups</td>
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<td>Conflict of Political Ideology in Canada</td>
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<td>The State and Economic Life in Canada</td>
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<td>431</td>
<td>Canadian Public Policy</td>
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<td>435</td>
<td>The Politics of Canadian Resource Development</td>
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<td>442</td>
<td>Politics in Ontario</td>
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<td>443</td>
<td>Politics in Western Canada</td>
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<td>461</td>
<td>Problems in Canadian Politics 1</td>
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<td>462</td>
<td>Problems in Canadian Politics 2</td>
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#### Sociology (SOC)

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<tr>
<th>Course Code</th>
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<tbody>
<tr>
<td>101</td>
<td>Introduction to Sociology</td>
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<tr>
<td>102</td>
<td>Social Problems</td>
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<td>200</td>
<td>Marriage and the Family</td>
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<td>204</td>
<td>Sociology of Adolescence</td>
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<td>206</td>
<td>Gender Relations</td>
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<td>210</td>
<td>Sociology of Sport</td>
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<td>214</td>
<td>Class, Status and Power</td>
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<td>221</td>
<td>Social Change in Canadian Society</td>
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<td>222</td>
<td>Juvenile Delinquency</td>
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<td>223</td>
<td>Deviance: Perspectives and Processes</td>
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<td>226</td>
<td>Juvenile Justice</td>
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<td>227</td>
<td>Criminology</td>
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<td>228</td>
<td>Sociology of Corrections</td>
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<td>232</td>
<td>Technology and Social Change</td>
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<td>236</td>
<td>Social Movements</td>
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<td>241</td>
<td>Introduction to the Sociology of Work</td>
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<td>Industrial Sociology</td>
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<td>246</td>
<td>Mass Communication</td>
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<td>248</td>
<td>Health, Illness and Society</td>
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<td>Sociology of Mental Disorders</td>
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<td>252</td>
<td>Migration and Society</td>
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<td>Population in Canadian Society</td>
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<td>256</td>
<td>Ethnic and Racial Relations</td>
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<td>Political Sociology</td>
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<td>275</td>
<td>The Mennonites as a Sociological Community</td>
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<td>333</td>
<td>Canadian Multiculturalism</td>
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<td>342</td>
<td>Sociology of Industrial Relations</td>
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<td>358R</td>
<td>Canadian Ethnic and Cultural Minorities</td>
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<td>366</td>
<td>Urban Sociology</td>
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<td>370</td>
<td>Sociology of Women</td>
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<td>430</td>
<td>Political Participation</td>
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<td>407</td>
<td>Canadian Social Thought</td>
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#### Urban and Regional Planning (PLAN)

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<th>Course Code</th>
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<tbody>
<tr>
<td>190</td>
<td>Introduction to Urban and Regional Planning Concepts</td>
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<td>255</td>
<td>Planning Surveys and Analysis</td>
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<td>259</td>
<td>Regional Planning and Economic Development</td>
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<td>322</td>
<td>Canadian Regional Issues</td>
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<td>330</td>
<td>Urban Social Planning</td>
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<td>321</td>
<td>Regional Planning: Program Development and Implementation</td>
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<td>340</td>
<td>Conservation in Wildland and Resource Management</td>
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<td>341</td>
<td>Conservation/Resource Management of the Built Environment</td>
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<td>381</td>
<td>Principles of Recreation Planning</td>
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<td>383</td>
<td>Land Development Planning</td>
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<td>471</td>
<td>Planning Law</td>
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</table>
University of Waterloo Cognitive Science Program invites students to join these investigations.

Requirements
The interdisciplinary undergraduate Option gives three- and four-year general and honors students in traditional disciplines an opportunity to pursue the interdisciplinary study of mind and intelligence. To receive the Cognitive Science Option designation on the graduation diploma, students will need:
- Seven term courses: four required and three optional.
- Course selection must be approved by the Director of the Cognitive Science Program or by the Philosophy Department Undergraduate Officer.
- An overall average of 70% or better in the seven courses.

Admission
Because of enrolment limits on the required courses, only six students per year can be admitted to the Option, with selection performed by the advisory board based on each student's previous academic performance. Applications should be submitted to the Director by December first of each year, and should include a transcript of grades and a brief (one page) statement of the student's interest in cognitive science.

Required Courses
PHIL/PSYCH 256 Introduction to Cognitive Science
ENGL 306A Introduction to Linguistics or FR 303 Introduction to Linguistics
PSYCH 307 Human Cognitive Neuropsychology
PSYCH 314 Cognitive Development
SY DE 548 Design of Human-Machine Systems

Elective Courses
Three electives are to be chosen, with no more than two in the same discipline, from:
ENGL 309A Rhetoric: Principles and Practice 1
PHIL 255 Philosophy of Mind
PSYCH 314 Cognitive Development
SY DE 422 Machine Intelligence or CS 486 Introduction to Artificial Intelligence

Cognitive Science Advisory Board
The Cognitive Science Advisory Board consists of a representative from each of the five departments that have so far been involved with cognitive science at Waterloo.

Director
Paul Thagard, Philosophy

Board
Fahiem Bacchus, Computer Science
Randy Harris, English
**Interdisciplinary Programs**

- Environmental Economics
- Human Resources Management
- International Studies

**Further Information**

Please contact Paul Thagard, Department of Philosophy, University of Waterloo, Waterloo, ON N2L 3G1, (519) 888-4567, ext. 3594, Fax: (519) 746-3097, Email: pthagard@watarts.uwaterloo.ca

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**Environmental Economics**

For program description, see “Arts”.

**Human Resources Management**

Human Resources Management is a Minor program which can be taken in conjunction with many existing Honours Majors or four-year General Major programs in Arts or Honours programs in other faculties. The program is designed to provide exposure to those academic disciplines which provide the theoretical background for current management practice in the human resources area. The program should be of interest to those students who wish to pursue further education in management, or to those who plan to begin a management career at the entry-level immediately after university.

This Minor program assumes that students will develop, in depth, an interest in a major academic field or course of study and then focus this interest by pursuing Human Resources Management. The Minor may be combined with a Co-operative program in order to obtain work experience in this field.

Students in the Arts Applied Studies Co-op Program may complete the requirements of the Human Resources Management Minor and tailor their work terms to this field to add a Human Resources Management Specialization to their Honours degree.

The program of study consists of ten half-course credits that may be completed at any point in the four-year term.

**REQUIREMENTS**

(Students should check course prerequisites when planning their program.)

1. **Required Courses** (six)
   - ACC 121
   - HRM 200
   - HRM 300
   - M SCI 211 or PSYCH 338
   - PHIL 215
   - PSYCH 339

2. **Areas of Competence**

   Before graduation, all students must demonstrate to the Director competence in university-level computing, report writing and statistics. This can be accomplished through some of the elective courses below, or by submitting other comparable evidence.

3. **Elective courses** (four to be chosen)
   - ACTSC 223
   - CS 100
   - ENGL 210F
   - ECON 351
   - FR 255
   - M SCI 311 or SOC 340
   - PSCI 331
   - PSYCH 253 or 220R
   - PSYCH 254
   - PSYCH 334
   - PSYCH 392
   - SOC 241 or 243
   - SOC 382

A course in statistics (available in several departments).

Students may apply to the Director for the addition of other courses:
- All students intending to qualify for this Minor should discuss their choice of elective subjects with the Director before making decisions.
- A maximum of three courses may be double-counted toward this Minor.
- An overall average of 70% in the ten courses constituting this Minor is required.

**Further Information**

Please contact Program Director, S.W. Kardasz, HH 240, ext. 2564.

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**International Studies**

The University of Waterloo is committed to International Studies through overseas study programs in a number of departments, through research associations with overseas universities, and through the personal commitments and associations of many faculty members. This Option capitalizes on this experience. It will lead students to an understanding of the world’s diverse communities and of the cultural and political implications of achieving closer relations. The Program is expected to prove useful to those planning a career in the public service or in those parts of the private sector which have international interests. It should prove attractive also to those intending to teach in those disciplines in which new curricula are increasing the international component. Further, it will provide a background from which students might apply for admission to graduate programs in International Studies.
Requirements
The Option is available to students registered in any Honours or equivalent program in any faculty. It requires completion of ten term courses drawn from an approved list of over 120; four of these should be completed in first and second years from a group of 15. Students are expected to achieve an average of 70% in their International Studies courses in order to have the Option recognized on their degree certificate.

Students taking the Option in International Studies are advised to contact the Director at their earliest opportunity, although formal registration in the program may be postponed until, but not later than, entry into third year.

With respect to the total number of courses permitted at any given level, students remain subject to the limitations imposed by the faculty and department in which they are registered.

Curriculum
Four courses must be taken from Group One, of which two must be at the 200-level. Six courses must be taken from Group Two, of which four must be outside the student’s major department; four of the six must be at the 300- or 400-level.

Group One - Year One and Two
ECON 231 Introduction to International Economics
ERS 231 Environmental Issues in a Global Perspective
GEOG 206 The World Region and World Issues
HIST 130 The Modern World in Historical Perspective
PSCI 281 International Politics
SOC 232 Technology and Social Change
SOC 256 Ethnic and Racial Relations
PACS 201* Roots of Conflict and Violence
PACS 202* Conflict Resolution
PSCI 102F* Politics in the Third World
PSCI 102K* Mass Political Violence
PSCI 102N* The Politics of Nationalism and Ethnicity
RS 100A* Religions of the East
RS 100B* Religions of the West

*Students may use only one of these courses in each discipline to meet the requirements of four group One courses

Group Two - Years Three and Four
The list includes courses in Anthropology, Economics, Environment and Resource Studies, Environmental Studies, Geography, History, Middle East Studies, Peace and Conflict Studies, Political Science, Philosophy, Urban and Regional Planning, Religious Studies, Russian, Science and Sociology.

Further Information
Further information may be obtained from the Director, Prof. Geoffrey Hayes, Department of History, HH 109, ext. 5136.

Legal Studies
Legal Studies is an Interdisciplinary Option focusing on law primarily from a multidisciplinary perspective. Given the centrality of law to most human institutions and values, a great deal of attention has been paid to law by scholars working in a wide variety of disciplines including Accounting, Actuarial Science, Economics, Environmental Studies, History, Philosophy, Political Science, and Sociology. Students are invited to join these scholarly investigations. The liberal arts orientation of this Program emphasizes the student’s development of broadly based critical and creative intellectual skills, clarity and facility in the communication of ideas, and humane values in this examination of law as a major feature of social life. In this regard it should be noted that Legal Studies is not intended as either a necessary or a sufficient preparation for law school.

The Legal Studies Options is open to students in General or Honours programs.

Requirements
The courses in this Option are divided into three sections. The first consists of broadly based courses that are concerned with the nature and character of legal systems, reasoning and concepts; these include courses in the history of law, philosophy of law, sociology of law, and Canadian law. Students are required to take all the courses (four term courses) in this section. In the second section the courses are in general more advanced and concerned with particular aspects of the law. Students must select at least four term courses from this section. In the third section the courses are less central to the area of legal studies, but serve to bridge the gap between legal studies and particular disciplines. Students may choose up to two term courses from courses in this section that fit their General or Honours program. Students are strongly urged to consult the Legal Studies Director in making their course selections from Sections Two and Three.

Students must complete ten term courses designated Legal Studies courses from the appropriate sections. An overall average of at least 65% in these courses is necessary to graduate with the Legal Studies Option.

Courses
Section 1
Students are required to complete successfully all of the following courses:
HIST 210 History of Law
PHIL 327A Philosophy of Law - Part 1
PSCI 292 Issues in Canadian Criminal Law
SOC 370 Sociology of Law

Section 2
Students are required to complete successfully at least four term courses from the following list. Students in the
Faculty of Environmental Studies must take ENV S 201, 401, PLAN 471 plus at least one other course in Section 2.
ACC 231 Business Law
ACC 431 Advanced Studies in Legal and Ethical Issues in Accounting
ACTSC 458 Insurance Law
ENV S 201 Introduction to Environmental and Planning Law
ENV S 401 Environmental Law
HIST 101 Law and Society in the Middle Ages: 500-1000
HIST 329 Origins of the Common Law
ISS 350E Family Law and Social Work
PLAN 471 Planning Law
PSCI 291 The Canadian Legal Process
PSCI 333 Administrative Law
PSCI 363 Canadian Constitutional Law
SOC 226 Juvenile Justice
SOC 227 Criminology
SOC 228 Corrections
SOC 325 Female Sexuality and the Law
SOC 328 Sentencing as a Social Process

Section 3
Students may choose to complete successfully up to two term courses from the following list:
ACC 461 Taxation 1
ACC 462 Taxation 2
ACC 463 Taxation 3
ACC 464 Tax Policy
ACTSC 456 Taxation of Life Insurance
PACS 202 Conflict Resolution
PHIL 215 Professional and Business Ethics
PHIL 226 Ethics and the Life Sciences
PSCI 225 History of Political Theory 1
PSCI 260A Canadian Government and Politics
SOC 201 Victims and Society
SOC 222 Juvenile Delinquency
SOC 223 Deviance: Perspectives and Processes

Further Information
Please contact the Director of Legal Studies through the Philosophy Department secretary, HH 365, ext. 2449.

Liberal Science
For program description, see "Science".

Management Studies
Management Studies is a Minor Program which can be taken in conjunction with many existing Honours Majors or four-year General Major programs in Arts or Honours Programs in other faculties. Good management must be based increasingly on research and knowledge rather than intuition and experience. Hence, the academic component of this Minor is designed to provide the theoretical background relevant to current management practice, and thus should be useful in many entry-level management jobs, and as a basis for further education in management. The Minor may be combined with a Co-operative Program in order to obtain work experience in the field.

Students in the Arts Applied Studies Co-op program may complete the requirements of the Management Studies Minor and tailor their work terms to this field to add a Management Studies Specialization to their Honours degree.

The program of study consists of ten half-course credits that may be completed at any point in the four-year term.

REQUIREMENTS
(Students should check course prerequisites when planning their program.)

1. Required Courses (five)
   ACC 121
   ECON 101
   M SCI 211 or PSYCH 338
   M SCI 311 or SOC 340
   PHIL 215

2. Areas of Competence
   Before graduation, all students must demonstrate to the Director competence in university-level computing, report writing and statistics. This can be accomplished through some of the elective courses below, or by submitting other comparable evidence.

3. Elective Courses (five to be chosen)
   ACC 122
   CS 100
   CS 330 or M SCI 441
   ECON 102 or 201
   ENGL 210F
   HRM 200 or PSYCH 339
   PHIL 216
   SOC 241 or 243
   A course in statistics (available in several departments).

Students may apply to the Director for the addition of other courses.
- All students intending to qualify for this Minor should discuss their choice of elective subjects with the Director before making selections.
- A maximum of three courses may be double-counted toward this Minor.
- An overall average of 70% in the ten courses constituting this Minor is required.

Further Information
Please contact Program Director, S.W. Kardasz, HH 240, ext. 2584
The Middle East has played a vital role in the history of the world for millennia. Its past and present civilizations, languages, religions, cultures and scientific accomplishments have penetrated and become integral parts of Western civilization and culture. The Middle East continues to be a significant factor in world events today. For these reasons, the study of the Middle East remains an important and valuable academic activity.

The Middle East Studies Option provides students with an opportunity to explore the many aspects of Middle Eastern civilization, through an organized program including courses offered by Middle East Studies faculty, as well as an extensive selection of courses with Middle East content.

Students will normally enter the program in their second year, although appropriate courses taken during Year One can be applied to the Middle East Studies Option. Before preregistration, students should consult with the Director of the Middle East Studies Option and with the department involved to determine which courses will be available during the coming year.

Requirements
1. This option may be taken in combination with any general or honours program.
2. A minimum of eight term courses are required for this Option. These courses are to be distributed as follows:
   - MES 200 Introduction to the Middle East.
   - One or more term courses from the series MES 302A-D Directed Studies on the Middle East.
   - The remainder of the courses from the list below. If there are more than five courses in this category they must be taken from at least three different disciplines.
3. To meet the graduation requirements a student must maintain a minimum of 65% average overall in the Option.

Middle East Studies Courses
MES 107A Introductory Standard Arabic
MES 200 Introduction to the Middle East
MES 300A-D Special Topics on the Middle East
MES 302A-D Directed Studies on the Middle East
MES 350A-D Travel Seminars in the Middle East

Middle East Content Courses
ANTH 224 Archaeology and Growth of Cultural Complexity
ANTH 321 Studies in Archaeology of Complex Cultures
CLAS 101 Colossus – the Major Figures of Ancient Greece
CLAS 102 Colossus – the Major Figures of Ancient Rome
CLAS 201 Ancient Greek Society
CLAS 202 Ancient Roman Society
CLAS 251 Greek History
CLAS 252 Roman History
CLAS 292 Women in Classical Antiquity
CLAS 301 Ancient Myth and Religion 1
CLAS 302 Ancient Myth and Religion 2
CLAS 371 Christianity and the Roman Empire
CLAS 373 The Fall of the Roman Empire
ENGL 202A The Bible and Literature 1
ENGL 202B The Bible and Literature 2
ERS 218 Introduction to Sustainable Environmental & Resource Systems
ERS 231 Environmental Issues in a Global Perspective
ERS 360 Man and Nature
ERS 361 International Communications System and Development
FINE 110 Introduction to World Art 1
HIST 102N Introduction to African History
HIST 210 History of Law
HIST 235 History of Christianity
HIST 237 Ancient Civilization 1
HIST 259 Modern African History
HIST 304 Medieval Church History
PACS 201 Roots of Conflict and Violence
PACS 202 Conflict Resolution
PACS 200 The Politics of Nonviolence
PHIL 329 War, Peace and Justice
PSCI 281 International Politics
PSCI 282 Foreign Policy
PSCI 384 Foreign Policies of Select Middle East States
RS 100B Religions of the West
RS 100E Biblical Studies 1
RS 100F Biblical Studies 2
RS 205 The Hebrew Prophets
RS 208 Parables of Jesus
RS 216 Islam
RS 217 Judaism
RS 306 Intermediate Biblical Hebrew
RS 310 The Sacred Book of Islam
RS 318 Islam and Christianity
RS 321 The History and Culture of the Orthodox Church
RS 334 Islamic Theology, Philosophy and Mysticism
SOC 256 Race and Ethnic Relations
SOC 333 Canadian Multiculturalism
WS 200 Introduction to Women’s Studies

Note
Other courses not included in this list may be relevant to the Middle East Studies Option. However, before registration to such courses, students should consult with the Director as to the suitability of these courses to fulfill the requirements of the MES Option.

Participating faculty members are listed in the section entitled "University Faculty".

Further Information
Please contact the Director, L.A. Curchin, ML 238, ext. 6883; e-mail lacurchi@watarts.uwaterloo.ca.
Peace and Conflict Studies

Peace and Conflict Studies (PACS) is an Interdisciplinary Program of study which may be chosen by students in conjunction with a major in some other department or in a General non-major program. It provides a course of study for those who have a special interest in the causes and conditions of international, intergroup, or interpersonal conflict, and in approaches to conflict resolution or management. PACS is especially appropriate for those considering careers in conflict resolution occupations (e.g. social work, community development, public administration, law and corrections, education, or politics). The program is administered by Conrad Grebel College in co-operation with participating departments in the University of Waterloo. The participating departments presently include Environment and Resource Studies, Geography, History, Philosophy, Political Science, Psychology, Religious Studies, Social Development Studies, and Sociology.

Programs

There are four different programs open to students participating in PACS: 1) General Program Option. 2) Honours Option, 3) Honours Minor and 4) Diploma. Successful completion of any of the first three permits the student to add the subtitle (Peace and Conflict Studies) to the name of the degree earned.

All students in the PACS program will take the PACS Core Courses (described in Chapter 16) as well as a specified number of "PACS Content Courses" (listed below). If students are in a Major program they must fulfill all the requirements for the Major in their own department.

1. The General Degree Option (Peace and Conflict Studies)

The General Degree Option in Peace and Conflict Studies is available to all students in the Faculties of Arts and Environmental Studies. In addition to fulfilling the Major (normally including at least ten term courses in the Major field) or Non-Major requirements, the general degree student must meet the following PACS requirements:

- PACS 201, 202, 301, and 302.
- any six PACS Content Courses (see below).

2. Honours Option (Peace and Conflict Studies)

Students may choose straight or joint honours in any of the participating departments. Students are granted, upon completion of the program, an Honours BA or BES in their subject areas with the subtitle Peace and Conflict Studies.

In addition to fulfilling the degree requirements in the Major department, students must meet the following PACS requirements in their four-year period of study.

- PACS Core Courses 201, 202, 301, 302, 499 A/B. (The PACS 499 A/B requirement may be met by the successful completion of any Honours Research Course or its equivalent which fulfills the requirement for an Honours degree in a participating department, if the research is in an approved PACS-related field of inquiry.)

3. Honours Minor In Peace and Conflict Studies

A Minor in PACS is available to students pursuing an Honours degree in any faculty (including non-Arts faculties). The Minor consists of ten term courses chosen from among the courses approved for PACS credit in any department, and must include PACS 201, 202, 301, and 302.

4. Diploma in Peace and Conflict Studies

This program is especially designed for full or part-time students who wish to explore issues of peace and conflict but who are not necessarily seeking a university degree or already hold such a degree. Requirements are the same as the General Degree Option: 4 PACS Core Courses and six PACS Content Courses. The cumulative average in these courses must be at least 65%.

Peace and Conflict Studies Core Courses (PACS)

201 Roots of Conflict and Violence
202 Conflict Resolution
301A Liberation and Nonviolence in Latin America
301B Justice in Third World Development
301C Violence, Non-Violence and War
302A Community Conflict Resolution
302B Quest for Peace in Literature and Film
302C Creative Conflict Resolution in the Schools
302E Global Development Education
499A/B Senior Honours Essay Seminar

Peace and Conflict Studies Content Courses Offered by Participating Departments

The following PACS-related courses are offered by the participating departments and the PACS program under their own designations. Many of the 300- and 400-level courses have specific prerequisites. Students planning to pursue study in these upper level courses should use their electives wisely to ensure that the prerequisites for these courses are met. Additions or deletions may occur from time to time. Consult the complete PACS course descriptions.

Where a participating department has not designated a large enough number of courses to meet the requirements for the Honours Option in PACS, or where students find the list inadequate for their needs, students are encouraged to take the listed PACS Content Courses and/or to petition the PACS Administration to have specific courses
Interdisciplinary Programs
Peace and Conflict Studies

accepted as PACS Content Courses. This should happen before registration in the course in question is finalized. Please consult the undergraduate officer for more information.

Environment and Resource Studies (ERS)

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
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<tbody>
<tr>
<td>101</td>
<td>Issue Analysis and Problem Solving for Environmental Studies 2</td>
</tr>
<tr>
<td>218</td>
<td>Introduction to Sustainable Environmental and Resource Systems</td>
</tr>
<tr>
<td>231</td>
<td>Environmental Issues in Global Perspective</td>
</tr>
<tr>
<td>241</td>
<td>Introduction to Environmental Assessment</td>
</tr>
<tr>
<td>339</td>
<td>Biophysical and Socioeconomic Impact Assessment</td>
</tr>
<tr>
<td>352</td>
<td>Current Issues in the Canadian North</td>
</tr>
<tr>
<td>401</td>
<td>Environmental Law</td>
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Geography (GEOG)

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<th>Course Title</th>
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<tbody>
<tr>
<td>205</td>
<td>Africa</td>
</tr>
<tr>
<td>206</td>
<td>The World Regions and World Issues</td>
</tr>
<tr>
<td>225</td>
<td>Urbanization in the Third World</td>
</tr>
<tr>
<td>326</td>
<td>Gender Roles and Development Alternatives in the Third World</td>
</tr>
<tr>
<td>332</td>
<td>Health and Disease in the Third World</td>
</tr>
<tr>
<td>425</td>
<td>Africa</td>
</tr>
<tr>
<td>420</td>
<td>Sustainable Development in the Third World</td>
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History (HIST)

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<tr>
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<tbody>
<tr>
<td>102C</td>
<td>The Origins of Wars in the 20th Century</td>
</tr>
<tr>
<td>130</td>
<td>Modern World in Historical Perspective</td>
</tr>
<tr>
<td>206</td>
<td>History of Canadian Minorities</td>
</tr>
<tr>
<td>208</td>
<td>The Cold War: American-Russian Relations Since November, 1917</td>
</tr>
<tr>
<td>221</td>
<td>Race Relations in Canada: An Historical Perspective</td>
</tr>
<tr>
<td>222</td>
<td>History of Modern Revolutions</td>
</tr>
<tr>
<td>263</td>
<td>Europe: 1789-1945</td>
</tr>
<tr>
<td>325/326</td>
<td>History of Canadian Indians</td>
</tr>
<tr>
<td>346</td>
<td>Minorities in an International Perspective</td>
</tr>
<tr>
<td>348</td>
<td>Radical Reformation</td>
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</table>

Interdisciplinary PACS (PACS)

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
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<tbody>
<tr>
<td>271</td>
<td>Introduction to Peace Research 1</td>
</tr>
<tr>
<td>272</td>
<td>Introduction to Peace Research 2</td>
</tr>
<tr>
<td>350</td>
<td>Canada and the Nuclear Crisis</td>
</tr>
<tr>
<td>390 A/B</td>
<td>Field Studies in Peace and Conflict</td>
</tr>
<tr>
<td>398/399</td>
<td>Directed Readings in Peace and Conflict Studies</td>
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Philosophy (PHIL)

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<th>Course Code</th>
<th>Course Title</th>
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<tbody>
<tr>
<td>216</td>
<td>Rational Behaviour and Decision-Making</td>
</tr>
<tr>
<td>243</td>
<td>Conflict, Contract and Choice</td>
</tr>
<tr>
<td>327A</td>
<td>Philosophy of Law 1</td>
</tr>
<tr>
<td>329</td>
<td>War, Peace, and Justice</td>
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<tr>
<td>422</td>
<td>Political Philosophy 1</td>
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<tr>
<td>423</td>
<td>Political Philosophy 2</td>
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Political Science (PSCI)

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<tr>
<th>Course Code</th>
<th>Course Title</th>
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<tbody>
<tr>
<td>101A</td>
<td>Introduction to Politics</td>
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<tr>
<td>102F</td>
<td>Politics in the Third World</td>
</tr>
<tr>
<td>102K</td>
<td>Mass Political Violence</td>
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<tr>
<td>102N</td>
<td>The Politics of Nationalism and Ethnicity</td>
</tr>
<tr>
<td>225</td>
<td>Political Theory 1</td>
</tr>
<tr>
<td>226</td>
<td>Political Theory 2</td>
</tr>
<tr>
<td>281</td>
<td>International Politics 1</td>
</tr>
<tr>
<td>282</td>
<td>Foreign Policy</td>
</tr>
<tr>
<td>321</td>
<td>Marxist Theory</td>
</tr>
<tr>
<td>322</td>
<td>Marxism after Marx</td>
</tr>
<tr>
<td>350A</td>
<td>The Politics of Developing Areas 1</td>
</tr>
<tr>
<td>350B</td>
<td>The Politics of Developing Areas 2</td>
</tr>
<tr>
<td>380A</td>
<td>World Politics 1</td>
</tr>
<tr>
<td>381</td>
<td>Foreign Policies of South Asian States</td>
</tr>
<tr>
<td>382</td>
<td>Politics of Canadian Foreign Policy</td>
</tr>
<tr>
<td>452</td>
<td>Comparative Civil-Military Relations USSR-Eastern Europe</td>
</tr>
<tr>
<td>453</td>
<td>Comparative Politics of Latin America</td>
</tr>
<tr>
<td>479</td>
<td>Violence in the Political Process</td>
</tr>
<tr>
<td>481</td>
<td>Research Seminar on World Politics</td>
</tr>
<tr>
<td>483</td>
<td>Power Politics and World Order Studies</td>
</tr>
<tr>
<td>484</td>
<td>Contemporary Strategies: Theories and Policies</td>
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</tbody>
</table>

Psychology (PSYCH)

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
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</thead>
<tbody>
<tr>
<td>235</td>
<td>Psychological Perspectives on Gender and Sex</td>
</tr>
<tr>
<td>253</td>
<td>Social Psychology</td>
</tr>
<tr>
<td>254</td>
<td>Interpersonal Relations</td>
</tr>
<tr>
<td>338</td>
<td>Organizational Psychology</td>
</tr>
</tbody>
</table>

Religious Studies (RS)

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
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<tbody>
<tr>
<td>221</td>
<td>Cults and New Religious Movements</td>
</tr>
<tr>
<td>257</td>
<td>The Thought and Practice of Christian Peacemaking</td>
</tr>
<tr>
<td>263</td>
<td>Justice, Peace and Development</td>
</tr>
<tr>
<td>290</td>
<td>Gospel and Liberation</td>
</tr>
<tr>
<td>292 A/B</td>
<td>Women in the Church</td>
</tr>
<tr>
<td>322</td>
<td>Radical Reformation</td>
</tr>
<tr>
<td>351</td>
<td>Religious Perspectives on the Environmental Crisis</td>
</tr>
<tr>
<td>353</td>
<td>The Bible and Peace</td>
</tr>
<tr>
<td>354</td>
<td>War and Peace in Christian Theology</td>
</tr>
<tr>
<td>355</td>
<td>Interreligious Encounter and Dialogue</td>
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</table>

Social Development Studies

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
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<tbody>
<tr>
<td>PSYCH 221R</td>
<td>Interpersonal Interaction</td>
</tr>
<tr>
<td>SOC 327R</td>
<td>Minority Status in Canadian Society</td>
</tr>
<tr>
<td>SOC 328R</td>
<td>Canadian Ethnic and Cultural Minorities</td>
</tr>
<tr>
<td>SOCWK 355R</td>
<td>Child Maltreatment: Identification and Treatment</td>
</tr>
<tr>
<td>SOCWK 357R</td>
<td>Family Violence</td>
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<tr>
<td>SOCWK 390A/B</td>
<td>Family Violence: Advanced Seminar</td>
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Sociology (SOC)

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<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
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<tbody>
<tr>
<td>201</td>
<td>Victims and Society</td>
</tr>
<tr>
<td>206</td>
<td>Gender Roles</td>
</tr>
<tr>
<td>208</td>
<td>Education and Native Peoples</td>
</tr>
<tr>
<td>214</td>
<td>Class, Status and Power</td>
</tr>
<tr>
<td>222</td>
<td>Juvenile Delinquency</td>
</tr>
<tr>
<td>236</td>
<td>Social Movements</td>
</tr>
<tr>
<td>245</td>
<td>Interpersonal Communication</td>
</tr>
<tr>
<td>256</td>
<td>Ethnic and Racial Relations</td>
</tr>
<tr>
<td>265</td>
<td>Political Sociology</td>
</tr>
<tr>
<td>310</td>
<td>Seminar in Group Dynamics</td>
</tr>
<tr>
<td>325</td>
<td>Female Sexuality and the Law</td>
</tr>
<tr>
<td>333</td>
<td>Canadian Multiculturalism</td>
</tr>
<tr>
<td>342</td>
<td>Sociology of Industrial Relations</td>
</tr>
<tr>
<td>364</td>
<td>Social Change</td>
</tr>
</tbody>
</table>
370 Sociology of Law
378 Sociology of Women

Other PACS-Related Courses
The courses below, offered by non-participating
departments, may be counted as content courses.
GER 381 Fascism in Germany: Holocaust and
Resistance in Literature
MES 200 Introduction to the Middle East
NATST 370/CDNST 370/ANTH 370 Issues in
Contemporary Native Communities in Canada
PLAN 260 Urbanization in the Third World
PLAN 361 Special Topics in Development of the Third
World
SY DE 433 Conflict Analysis

Participating faculty members are listed in the section enti-
tled "University Faculty".

Further Information
Please contact the Undergraduate Advisor, T. Yoder
Neufeld, Conrad Grebel College, 885-0220.

Print Journalism
(with Conestoga College)

Professional journalists require an appreciation for the
written word and the technical skills to create material
suitable for the mass media. Of equal importance, they
require a strong understanding of the world, its peoples,
institutions, technologies, processes, and problems.
These two types of knowledge can be obtained by
enrolling in the concurrent Bachelor's degree/Diploma in
Journalism, offered by the University of Waterloo and
Conestoga College of Applied Arts and Technology. By ful-
filing the requirements of both programs, students gain
broad knowledge and depth in a major subject area (at the
General or Honours level) as well as the technical skills
required for careers in print journalism.

Thus, students in the Faculties of Applied Health
Sciences, Arts, Environmental Studies, Mathematics, and
Science can, by electing the requisite courses, complete
the degree requirements of their chosen field and the
requirements for the diploma. The joint program has been
developed to avoid duplication of content and to permit
completion of the Bachelor's degree and the Diploma in
minimum time:

1. The three-year General: completion of 25 University
   of Waterloo courses, including the five basic courses
   required for the option and a five-term-course special-
   ization in a specific subject area.
2. The four-year General Major or Honours: completion
   of 35 University of Waterloo courses, including the five
   basic courses required for the option and a five-term-
   course specialization ordinarily met by the student's
   major, but may also be met by a set of five-term-
   courses approved by the University of Waterloo
   Director of the Option.
3. For both 1 and 2 above, completion of the Conestoga
   College journalism program, including a one month
   work placement, as described below.
4. A student must achieve an average in the five-term-
   course specialization of at least 65%, in the five-term-
   course option requirements of at least 65%, and a B
   standing in the Conestoga College journalism program.
   The Journalism program at Conestoga College must
   be completed before the degree or the diploma will be
   conferred.
5. Students may have to exceed the minimum require-
   ments of the Option in order to satisfy departmental
   and faculty requirements. A list of recommended
   courses will be maintained by the UW Program
   Director. The Director will be able to substitute courses
   if the need arises.

Program Requirements:

1. Faculty and departmental academic requirements of
   the student's general major or honors program (with
   up to five term courses being waived in recognition of
   the Conestoga College component of the Option).
2. Five term courses from the University of Waterloo
designed to provide the basic skills and background
knowledge required for journalism as follows:
   CS 100 Introduction to Computer Usage (or other
   courses approved by the Faculty of Mathematics)
   PHIL 145 Critical Thinking
   MTHEL 102 The Uses and Abuses of Statistics
   PSYCH 292 Basic Data Analysis
   ENV S 178 Introduction to Environmental Research
   Methods
Two Courses to be Selected from Sets A, B, and C

A. One of:
   - CDN ST 201 Social Regionalism
   - PSCI 250A Canadian Government and Politics
   - SOC 221 Canadian Society

B. One of:
   - PSCI 102M Contemporary Issues in Canadian Public Policy
   - ECON 101 Introduction to Microeconomics
   - ECON 102 Introduction to Macroeconomics

C. One of:
   - SCI 219 Chemistry in Modern Society
   - SCI 263 Science and Society
   - SCI 260 The Science of Senses

COURSE REQUIREMENTS — CONESTOGA COLLEGE

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<tr>
<th>Semester 1</th>
<th>Hours/Week</th>
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<tbody>
<tr>
<td>Journalism 1A</td>
<td>6</td>
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<tr>
<td>Journalism 3</td>
<td>3</td>
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<tr>
<td>Reporting Lab 1A</td>
<td>3</td>
</tr>
<tr>
<td>Interviewing and Research</td>
<td>2</td>
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<tr>
<td>Basic Photography</td>
<td>4</td>
</tr>
<tr>
<td>Graphics - Journalism</td>
<td>5</td>
</tr>
<tr>
<td>Grammar - Journalism*</td>
<td>3</td>
</tr>
<tr>
<td>Basic Word Processing</td>
<td>3</td>
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<tr>
<td><strong>Total</strong></td>
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<tr>
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<th>Hours/Week</th>
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<tbody>
<tr>
<td>Journalism 4</td>
<td>4</td>
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<tr>
<td>Journalism 5</td>
<td>4</td>
</tr>
<tr>
<td>Reporting Lab 2</td>
<td>3</td>
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<tr>
<td>Press Photography</td>
<td>4</td>
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<tr>
<td>Desktop Publishing</td>
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<td>Media Studies</td>
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<tr>
<td>Freelance Workshop</td>
<td>3</td>
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<tr>
<td>Newspaper Production 1A</td>
<td>3</td>
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<td><strong>Total</strong></td>
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<th>Hours/Week</th>
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<td>Newspaper Production 2B</td>
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<tr>
<td>Newspaper Lab 2B</td>
<td>10</td>
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<tr>
<td>Magazine Production</td>
<td>5</td>
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<tr>
<td>Newspaper Production 2C</td>
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<tr>
<td>Newspaper Lab 2C</td>
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<tr>
<td>Special Projects</td>
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<td>Public Relations</td>
<td>2</td>
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<tr>
<td>Advertising</td>
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<th>Semester 4**</th>
<th>Hours/Week</th>
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<tbody>
<tr>
<td>Work Term</td>
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</table>

Courses may be offered in a slightly different sequence from that presented above.

* Students must take this course if a similar one has not been taken as part of their UW studies.
** This semester is only four weeks in length.

Further Information

Please contact the Director of the Print Journalism Option, D.E. Irish, University of Waterloo, Waterloo, ON N2L 3G1, Tel. 888-4567, ext. 2500; ESC-139.

Russian and East European Studies

Since its establishment in early 1989 the Waterloo-Laurier-Guelph Centre for East European and Russian Studies has provided a forum for the activities of scholars at the University of Waterloo, Wilfrid Laurier University and the University of Guelph who specialize in the field of Russian and East European Studies. A significant dimension of the Centre's academic objectives is its link with the Interdisciplinary Option in Russian and East European Studies. Through a wide selection of courses whose primary focus includes Russia, Ukraine, the former Soviet Union, and the countries of Eastern Europe, this Option integrates the study of history, politics, geography, economics, and culture, together with language and literature, in a coherent area studies program designed for the undergraduate student. In addition to the formal coursework, students in the Russian and East European Studies Option benefit from a variety of conferences, symposia, workshops and special lectures sponsored annually by the Waterloo-Laurier-Guelph Centre for East European and Russian Studies. There are also travel possibilities and fully accredited study abroad opportunities offered by several participating departments.

A university background in Russian and East European Studies can provide the student with a useful basis for a career in government service in Canada and abroad. In addition, the continuing expansion of East-West economic and trade relations has increased the demand for specialists in the business and financial sectors. At the secondary school level, a new emphasis on regional studies and international relations has made a knowledge of Russia, Ukraine, and Eastern Europe an asset for university graduates who choose to enter the teaching profession. Finally, a familiarization with an important and rapidly changing part of our world acquired at the undergraduate level will not only provide for a better understanding of future developments but will also constitute a basis for more specialized professional and academic training.

Requirements

1. This Option may be taken in combination with any General or Honours program.
2. Students must complete a minimum of ten term courses selected from at least three of the following subject areas: (i) History, (ii) Political Science, (iii) Economics and Geography, (iv) Culture, and (v) Language and Literature Studies. Furthermore,
no more than five courses counting toward the Option may be from one subject area or have the same course designator, e.g. RUSS, HIST;
o at least eight of these term courses must be above the First Year level;
the course selection should reflect a reasonable balance between the Study of Russia and Eastern Europe.

3. No more than three term courses which are used to fulfill a student’s major program may count toward the Option requirement.

4. To meet graduation requirements a student must maintain a minimum overall average of 65% in the courses selected to fulfill the Option.

5. Although students normally enrol in this Option in Year Two, it is highly recommended that a language course in Russian, Ukrainian, Polish, or Croatian be taken in Year One.

Approved Courses

History (HIST)
130 The Modern World in Historical Perspective
208 American-Russian Relations Since November, 1917
355 Russian History to 1900
356 20th-Century Russia
402A Senior Reading Seminar in Russian and Soviet History
402B Senior Research Seminar in Russian and Soviet History

Political Science (PSCI)
365A Politics in the Soviet Successor States 1
365B Politics in the Soviet Successor States 2
451 Comparative Political Systems: Eastern Europe

Economics and Geography
ECON 461A Comparative Economic Systems
ECON 463B The Soviet Economy
GEOG 204 Geography of Post Soviet Union
GEOG 206 The World Regions and World Issues
GEOG 423 Central and Eastern Europe

Culture
CROAT 371 Croatian Culture and Literature
FINE 351 Central and East European Film
RS 321 The History and Culture of the Orthodox Church
RUSS 271 Russian Thought and Culture (to 1905)
RUSS 272 Russian Thought and Culture (1905 to the Present)
RUSS 371 Masterpieces of Russian Literature and Opera
RUSS 381 Peoples of the Soviet Union 1
RUSS 382 Peoples of the Soviet Union 2
UKRAN 271 Ukrainian Civilization (to 1800)
UKRAN 272 Ukrainian Civilization (1800 to the Present)

Language and Literature Studies

a) Language Courses
RUSS 101/102 First Year Russian
RUSS 251/252 Russian Composition and Conversation
RUSS 351/352 Intermediate Russian
RUSS 451/452 Advanced Russian
UKRAN 101/102 Beginners’ Ukrainian
UKRAN 201/202 Intermediate Ukrainian
POLISH 101/102 First Year Polish
POLISH 201/202 Intermediate Polish
CROAT 101/102 Introductory Croatian
CROAT 201/202 Intermediate Croatian
CROAT 301/302 Advanced Croatian

b) Literature Courses:
RUSS 261/261 Introduction to Russian Literary Movements
RUSS 341/342 Russian Drama
RUSS 361/362 Russian Short Story
RUSS 391/392 Great Russian Novels
UKRAN 301 Introduction to Ukrainian Literature
UKRAN 302 20th Century Ukrainian Literature

For further information contact:
Professor Robert Karpiak
Director, Russian and East European Studies
Department of Germanic and Slavic Languages and Literatures
Modern Languages Bldg., Room 222
Ext. 3118

Society, Technology and Values

No matter where one looks, there is growing interest in the human context of science and technology. Courses in Society, Technology and Values are designed to help students come to grips with many of the major questions we face in a sophisticated technological society.

STV courses have traditionally attracted students from all faculties. They do not require a scientific or technical background. Engineering students should note that the Canadian Engineering Accreditation Board (CEAB) now requires that all Engineering undergraduates receive some instruction in the Impact of Technology on Society. Courses offered by the Centre for Society, Technology and Values (CSTV) are specifically designed to meet this requirement.

The Option and courses, which are administered by the UW Centre for Society, Technology and Values, are open to students in all UW faculties. Students whose schedules do not permit taking the entire Option are invited to take individual courses. STV lecture courses are scheduled in the evening.
Requirements
The STV Option consists of six courses in three categories:

**Category 1:** Students must begin with one of:
- STV 100 Society, Technology and Values: Introduction
- STV 202 Design and Society
- STV 204 Society, Technology and Risk

All three are introductory level courses, offered in the evening, with no prerequisites.

**Category 2:** Four courses are chosen by the student in consultation with the Centre for Society, Technology and Values to form a "Theme Package." These courses may be drawn from any UW offerings including other STV courses.

**Category 3:** The Option culminates with STV 400 Society, Technology and Values: Senior Project, an approved independent supervised research project of the student's choice.

Students must maintain a minimum overall average of 65% in the six courses to receive the "Society, Technology and Values Option" designation on the graduation diploma.

Further Information
Please contact the Centre for Society, Technology and Values, DC 2722, ext. 6215.

Option Co-ordinator: Prof. S.C. Lerner

Speech Communication
For program description, see "Arts".

Studies in Personality and Religion (SIPAR)
Studies in Personality and Religion (SIPAR) is an Interdisciplinary Program which may be chosen by students in conjunction with a major in any department. It provides a course of study for those who have a special interest in the relationship between religious growth and human development. The SIPAR Option is also appropriate for those considering careers in the ministry or other social service oriented vocations. The program is administered by St. Paul's College in co-operation with an advisory committee representing four UW departments—Philosophy, Psychology, Religious Studies and Sociology.

**CORE COURSES**
The core courses provide an introduction to the field and give students a base of knowledge, a familiarity with the subject and an understanding of the concepts involved.

There are six term courses in the core program; Psychology of Religion (SIPAR 270) examines the variety of religious experience from a psychological point of view; Personality and Religion (SIPAR 271) examines personality theory and its relationship to religious development and growth; Seminar on Selected Topics in Personality and Religion (SIPAR 302) involves the study of how the disciplines of philosophy, sociology, and religious studies have come to know and understand human behaviour; Psychology of Religion in Historical Perspective (SIPAR 372) provides an historical survey of theories on the relationship between personality and religion; Aging as Spiritual Journey (SIPAR 378) studies issues related to the aging process from a spiritual perspective; and Carl Jung's Theory of Religion (SIPAR 380) examines the role of religion in Jung's personality Theory.

**CHOICES**
There are two choices available: the first is open to students in a General program; the second, to students in an Honours program only.

**General Program**
A SIPAR Option may be earned by students in a General program majoring in one of the sponsoring disciplines.
- Three core courses: SIPAR 270, 271, and one of SIPAR 302, 372, 378, 380 or RS 370
- Two approved core courses, of following:
  - SOC 264 Sociology of Religion
  - PHIL 201 Love
  - PSYCH 211 Developmental Psychology
  - RS 200 Study of Religion
- One approved course offered by participating departments.

**Honours Minor**
A Minor in SIPAR is available to students pursuing an Honours degree in any Faculty and to students taking the four year General degree in Arts.
- Three core courses: SIPAR 270, 271, and one of SIPAR 302, 372, 378, 380 or RS 370
- Three approved core courses, of following:
  - SOC 264 Sociology of Religion
  - PHIL 201 Love
  - PSYCH 211 Developmental Psychology
  - RS 200 Study of Religion
- One more core course, of the following:
  - SI 378 Aging as a Spiritual Journey
  - SI 380 Carl Jung's Theory of Religion
  - SI 302 Selected Topics in Psychology and Religion
- Three approved courses offered by participating departments.

**Note**
Each of the participating departments has designated certain course offerings as SIPAR content courses. Many 300- and 400-level courses have specific prerequisites. Students planning to take these upper-level courses should use their elective courses wisely to ensure that the prerequisites are met.
CORE COURSES
(Consult the complete “SIPAR Course Descriptions”)
SIPAR 270 0.5
Psychology of Religion
SIPAR 271 0.5
Personality and Religion
SIPAR 302 0.5
Seminar on Selected Topics in Personality and Religion
SIPAR 372 0.5
Psychology of Religion in Historical Perspective
SIPAR 378 0.5
Aging as Spiritual Journey
SIPAR 380 0.5
Carl Jung’s Theory of Religion

COURSES OFFERED BY PARTICIPATING DEPARTMENTS
The study of selected courses offered by participating departments will either broaden the student’s comprehension of the field or permit a deeper understanding of some particular aspect of it.

The actual combination of courses selected is subject to approval by the SIPAR advisor.

Gerontology (GERON)
352 Sociology of Aging

Peace and Conflict Studies (PACS)
201 Roots of Conflict and Violence
202 Conflict Resolution

Philosophy (PHIL)
102C Philosophy of Life
201 Love
202 Gender Issues
210J Philosophy of Human Nature
236 Religious and Paranormal Experience
237 Introduction to Philosophy of Religion
318J Philosophy and the Family

Psychology (PSYCH)
211 Developmental Psychology
334 Theories in Counselling Psychology
354 Interpersonal Relations
355 Personality Theory

Religious Studies (RS)
100C Religious Quests
200 Study of Religion
221 Cults and Religious Movements
236 Human Sexuality and Christian Morality
292 Women and the Church
370 Dreams in Religious Experience
375 Religion and Psychotherapy

Interdisciplinary Programs
Studies in Personality and Religion (SIPAR)
Studies in Sexuality, Marriage and the Family (SMF)

Sexuality, Marriage and the Family (SMF)
206 Introduction to Marriage and the Family 1
207 Introduction to Marriage and the Family 2
308 Introduction to Marriage and Family Therapy 1
309 Introduction to Marriage and Family Therapy 2

Social Development Studies
Interdisciplinary Social Science (ISS)
220R Changing Concepts of Childhood
320R Critical Encounter with Human Nature
350D Adult Life Crises and Events
350H Values and the Contemporary Family

Sociology (SOC)
102 Social Problems
206 Gender Relations
209 Ancestry, History and Personal Identity
234 Social Psychology and Everyday Life
260 Religion in Sociological Perspective

Further Information
Please contact Dr. James Gollnick, Director, St. Paul’s College, 885-1460.

Studies in Sexuality, Marriage and the Family (SMF)
Studies in Sexuality, Marriage and the Family is an Interdisciplinary Program students may choose along with a Major in an undergraduate discipline or with a General Non-major Program.
The SMF program might be of interest to anyone with questions about sexuality, marriage and the family and be particularly relevant to those who intend to pursue, or are currently involved in, a career in health care, social services, counselling, or teaching.

The program is offered within the Faculty of Arts at the University of Waterloo but is administered by the University of St. Jerome’s College which is federated with the University of Waterloo. Students may choose the program as an Honours Option, as a Minor or as a General Option.

A Diploma program in Sexuality, Marriage and the Family is available for those who wish to do some focused study in this field, but who are either not seeking a university degree or already holding such a degree.

The Honours Option in Sexuality, Marriage and the Family
This option is intended for students, pursuing any type of Honours degree at UW, who would like to gain specialization in the area of sexuality, marriage and the family.

In addition to fulfilling the requirements for the Honours degree in the home discipline, the Honours Option in SMF requires the successful completion of at least 14 term courses chosen from the Approved List of Sexuality, Marriage and the Family courses. These 14 term courses must include:
SMF 204 Introduction to Sexuality and Sex Education 1
and
SMF 206 Introduction to Marriage and the Family 1

2. SMF 205 Introduction to Sexuality and Sex Education 2
or
SMF 207 Introduction to Marriage and the Family 2

3. Three of
SMF 304 Advanced Study of Sexuality and Sex Education 1
SMF 305 Advanced Study of Sexuality and Sex Education 2
SMF 306 Advanced Study of Marriage and the Family 1
SMF 307 Advanced Study of Marriage and the Family 2
SMF 308 Introduction to Marriage and Family Therapy 1
SMF 309 Introduction to Marriage and Family Therapy 2

A cumulative average of at least 75% must be maintained in these seven SMF courses.

Upon completion of the requirements of the Honours degree in their home discipline, and of those of the Honours Option in SMF, students are granted a Bachelor's degree in their subject area with the subtitle: Studies in Sexuality, Marriage and the Family.

The Minor in Sexuality, Marriage and the Family
A Minor in Sexuality, Marriage and the Family is available to students pursuing any type of Honours degree at UW (including a four-year Major program in Arts) who would like some specialization in this field of study. The requirements for the Minor consist of the successful completion of at least ten term courses chosen from the Approved List of Sexuality, Marriage and the Family Courses. The ten term courses must include:

1. SMF 204 Introduction to Sexuality and Sex Education 1
and
SMF 206 Introduction to Marriage and the Family 1

2. SMF 205 Introduction to Sexuality and Sex Education 2
or
SMF 207 Introduction to Marriage and the Family 2

3. Two of
SMF 304 Advanced Study of Sexuality and Sex Education 1

SMF 306 Advanced Study of Sexuality and Sex Education 2
SMF 306 Advanced Study of Marriage and the Family 1
SMF 307 Advanced Study of Marriage and the Family 2
SMF 308 Introduction to Marriage and Family Therapy 1
SMF 309 Introduction to Marriage and Family Therapy 2

A cumulative average of at least 70% must be obtained in these five SMF courses.

Upon completion of the requirements of the Honours degree in their home discipline, or of the General degree in a four-year program in Arts, and of those of the Minor in SMF, students are granted a Bachelor's degree in their subject area with the subtitle: Studies in Sexuality, Marriage and the Family.

The General Option
The General Option in SMF is available to students pursuing a General degree in any undergraduate discipline or a Non-major Arts degree at UW. The requirements for the General Option are the same as those for the Minor program in Sexuality, Marriage and the Family, except that the cumulative average in the five SMF courses must be at least 65%.

Upon completion of the requirements of the General degree in their home discipline (or of a Non-major Arts degree), and of those of the General Option in SMF, students are granted a Bachelor's degree in their subject area with the subtitle: Studies in Sexuality, Marriage and the Family.

The UW Diploma in Sexuality, Marriage and the Family
The program is intended for part-time students who seek education in this field but who do not wish to obtain an undergraduate degree or already hold such a degree. Requirements are the same as those for the General Option in SMF; that is, successful completion of ten courses from the Approved List of Sexuality, Marriage and the Family courses. Five of these ten courses must be the SMF courses specified for the Minor in SMF, and the cumulative average in these courses must be at least 65%.

Approved List of Sexuality, Marriage and the Family Courses
ANTH 350 Culture and Sexuality
ENGL 108E Women in Literature
ENGL 208E Women Writers of the 20th Century
HIST 202 The Individual and the Family in History
HIST 241 Society and the Sexes in Early Modern Europe
HLTH 220 Health and the Family
ISS 350H Values and the Contemporary Family
PHIL 201 Love
PHIL 202 Philosophy of Women and Men
PHIL 318J Philosophy of the Family
PSYCH 235 Psychological Perspectives on Gender and Sex
Women’s Studies

Women’s Studies at the University of Waterloo reflects a new understanding of the study of “humankind,” the study of women and men with a special focus on gender-based experiences.

Women’s history and lives, as well as feminist approaches to them, provide a rich field for scholarship and teaching in the humanities, social sciences and natural sciences. This scholarship and teaching is the foundation of the Women’s Studies Programs.

Our Programs offer opportunities for study at the undergraduate and graduate levels, a three-year General Major, an Option and a Diploma at the undergraduate level, and advanced, theoretical courses at the graduate level. At both levels, we explore such topics as the construction of femininity; social expectations for women; feminism as a social and political movement; medical, philosophical and religious assumptions about female capabilities; women’s self-perception; biological functions; sexuality; questions of gender identity; and women’s achievements in the arts, literature and science. As well we sponsor activities and speakers relevant to women’s lives and studies.

Close co-operation between the Women’s Studies programs at the University of Waterloo and Wilfrid Laurier University increases the variety of courses and other experiences available to students.

W S course offerings can help to prepare students, in a very practical way, for careers in such areas as law, medicine, personnel work, business, teaching and research, politics, community action, social policy and planning, child care, and fine arts.

We invite both women and men to join us in a quest to discover the bountiful history, culture and accomplishments of women.

Women's Studies Three-Year General Major

Students interested in the Women's Studies Three-Year General Program will ordinarily be admitted at the beginning of Year Two. Admission will be based on academic performance in at least ten term courses in Year One including at least one course listed as a Women's Studies approved course.

Application for admission to the program is usually made at the time of preregistration for Year Two or after completion of ten term courses. Criteria for admission will normally include an overall Year One average of at least 65% and an average of at least 70% in Women's Studies approved courses.

Because of the limitations on resources, however, the student’s fulfillment of minimum entrance requirements may not guarantee admission to the Women's Studies Three-Year Major. Decisions on admission will be based upon a consideration of academic record and/or other relevant experience.

A total of 30 courses, which must include:

14 required courses including:

- W S 200, 300, 365 or 475, SOC 101 and 206

Nine other courses from the Women’s Studies Approved List below which must include:

- at least two of the following Humanities Courses: CLAS 292; ENGL 108E, 208E, 492E; FR 486; HIST 202, 215, 241; MUSIC 334; PHIL 201, 202, 220, 402; RS 236, 292A, 292B, 329 or SPAN 387
- at least one of the following Social Science Courses: PSYCH 236; SMF 204, 205, 206, 207, 304, 305, 306, 307; SOC 378 or 401
- at least one of the following courses with significant Cross-Cultural Content Courses: ANTH 210/310, 350, 404 or GEOG 326 or SPAN 387

16 elective courses to be chosen in consultation with advisors. Arts Faculty Group A and B and all other Arts Faculty requirements must be met. Students' programs must be approved by both the Director of Women's Studies and the academic advisor from the Faculty of Arts.
Notes
1. It is strongly recommended that students take both ENGL 108E and HIST 215.
2. W S 365 or W S 475 may count as social science, humanities or cross-cultural content courses, according to the subject matter, with the approval of the Director.
3. If Spanish 387 is counted as both a "Humanities" and a "Cross-Cultural Content" course, one additional Women's Studies Approved Course must be taken.
4. Students may substitute courses from Wilfrid Laurier University which are listed in the calendar as equivalent courses to UW courses. They may also use Wilfrid Laurier courses from the Approved List of Women's Studies courses as "humanities," "social sciences," and "cross-cultural content" courses as follows:

WLU Humanities Courses: CL 218; EN 225, 226, 325; FI 310, 311; HI 325, 326; PY 233; RE 103, 224, 346, 348, 372 and W S 201.
WLU Social Sciences Courses: SL 201, 202, 302; SY 201, 204, 233, 234, 403, 452.
WLU Cross-Cultural Content Courses: SY 338, AN 221 and EN 325

OPTION
The Women's Studies Option may be taken in combination with any General or Honours program.
Approved courses at either UW or WLU can be used to fulfill requirements. If a course at one university is substantially the same as a course at the other university, credit is given for only one course. Such courses are identified in the lists below.

Students normally enter the Option program in second year. Appropriate courses taken in first year can be counted toward the Option.

Requirements
A minimum average of 65% in the following courses.

Required Courses
WS 200 Introduction to Women's Studies
WS 300 Seminar in Women's Studies

Approved Courses
Select six from the "Approved Courses List" below.

General or Honours Program
The Women's Studies Option can be taken in combination with any General or Honours program. Students in the Arts Faculty can double count courses on the WS "Approved" list. For example, English 108E can be counted as a course to fulfill the WS Option and as a course that meets the Group A(i) requirement in the Faculty of Arts.

Note
At this time Women's Studies does not offer any courses that meet the Group a (ii) requirement.

General or Non-Major Degree
Students in a General Non-major Degree program can either sign up for the Option or assemble a package of courses emphasizing Women's Studies.

DIPLOMA
This program is designed for students who wish to explore women's issues but are not seeking a degree, and for those already with a degree who want to upgrade their understanding of the dynamics of gender in social institutions, the workplace, government policy, and cultural and normative values. Especially relevant for students interested in the health care, teaching or counselling professions, in social work, or in personnel and management fields.

Requirements
Same as for Option (see above).

Students without a university degree must achieve a 65% average in W S 200 and 300 to continue.
Students with a university degree will be admitted and registered as post-degree students.

REGISTRATION Option/Diploma
Indicate "Women's Studies Option," or "Women's Studies Diploma" on your UW registration form and fill out a "Women's Studies Registration Form" available from the Women's Studies Office.
Check with the W S Director/Admin. Assistant about which courses are offered in a particular term and make your selection.
Declare the W S Option (or Diploma) as early as possible to ensure that you will have enough academic terms in which to fulfill requirements and that you will receive the appropriate W S designation on your graduation documents.

APPROVED COURSE LIST
University of Waterloo
ANTH 210/310 Anthropology Through Science Fiction/ The Anthropological Imagination
ANTH 261 Primate Behaviour
ANTH 350 Culture and Sexuality
ANTH 404 Human Development in a Cross-Cultural Perspective
CDN ST 311 Canadian Women and Religion
CDN ST 365I Native Women in Historical Perspective
CLAS 292 Women in Classical Antiquity (=WLU Classics 218)
ENGL 108E Women in Literature (=WLU English 225)
ENGL 208E Women Writers of the 20th Century
ENGL 492 Theory and Practice of Feminist Criticism
EHS 406 Seminar in Women and Environments
FR 485 French Women Writers
GEOG 328 Gender Roles and Development Alternatives in the Third World (=WLU Sociology/Anthropology 338)
HLTH 220 Health and the Family
HIST 202 The Individual and the Family in History
Interdisciplinary Program
Women’s Studies

HIST 215 The Proper Sphere: Canadian Women in Historical Perspective
HIST 241 Society and the Sexes in Early Modern Europe
MUSIC 334 Women and Music
PHIL 201 Love (=WLU Philosophy 233)
PHIL 202 Gender Issues
PHIL 220 Moral Issues
PHIL 402/670m Modern Feminism
PSCI 421 Justice and Gender
PSCI 472 Women and Public Policy
PSYCH 236 A Psychological Analysis of Human Sexuality
RS 236 Human Sexuality and Christian Morality
RS 202 Women and the Church
RS 328 Christian Feminist Thought
RS 329 Mothers of the Church
SMF 204 Introduction to Sexuality and Sex Education 1
SMF 205 Introduction to Sexuality and Sex Education 2
SMF 206 Introduction to Marriage and the Family 1
SMF 207 Introduction to Marriage and the Family 2
SMF 304 Advanced Study of Sexuality and Sex Education 1
SMF 305 Advanced Study of Sexuality and Sex Education 2
SMF 306 Advanced Study of Marriage and the Family 1
SMF 307 Advanced Study of Marriage and the Family 2
SOC 206 Gender Relations (=WLU Sociology 234)
SOC 378 Sociology of Women (=WLU Sociology 233)
SOC 401 Theoretical Perspectives on Gender
SOC WK 357R Family Violence
SPAN 387 Latin American Women Writers
WS 365 A-D Special Topics in Women’s Studies
WS 475 A-D Directed Readings in Women’s Studies

Wilfrid Laurier University
Anthropology 221 Kinship, Marriage and Gender
Classics 218 Women in Greece and Rome
(= UW CLAS 292)
English 225 The Woman Writer: Theory and Practice
(= UW ENGL 108E)
English 226 Women in Fiction
English 325 Feminist Theory and Cultural Practice: Fiction by Minority Women
Fine Arts 310 Images of Women in Art
Fine Art 311 Women as Artists
History 325 History of Gender Roles up to the Industrial Revolution
History 326 History of Gender Roles from the Industrial Revolution to the Present
Philosophy 233 (= UW Philosophy 201) Philosophy of Sex, Love and Friendship
Religion and Culture 103 Love and Its Myths
Religion and Culture 224 God as Goddess
Religion and Culture 346 Religion and the Crises of Daily Life: Wisdom Literature in the Old Testament
Religion and Culture 348 Psychology and Religion
Religion and Culture 372 Women’s Lives and Religious Values
Social Welfare 201 Income Security in Canada
Social Welfare 202 Social Services in Canada
Social Welfare 302 Selected Issues in Social Welfare
Sociology 201 Sociology of the Family
Sociology 204 Social Inequality
Sociology 233 Sociology of Women (=UW SOC 378)
Sociology 234 Sociology of Gender (=UW SOC 206)
Sociology/Anthropology 338 (= UW Geography 326)
Women and Development
Sociology 403 Feminist Theory
Sociology 452t Feminism and Education
Women’s Studies 201 Women and Identity
Women’s Studies 390 Directed Studies

Further Information
Please contact H. Lyons, Director, PAS 3010, ext. 2880 or M. Clare, Administrative Assistant, PAS 3011, ext. 6886.
Effective teaching inspires learning.
Course Description Information

Each course description begins with a line of coding as shown in the sample below. The course numbers are prefixed by a course or subject abbreviation. The terms offered, number of hours per week, type of instruction and "credit weight" are displayed. For some courses, information concerning terms offered and type of instruction was not available at the time of publication.

Course description information in the Undergraduate Calendar is accurate as to intention at the time of publication. However, actual course content, the hours/type of instruction and terms offered may vary somewhat from the listings in the Calendar.

The course listings and academic programs described in the Calendar represent Senate-approved requirements and electives for completion of degree requirements. Circumstances beyond the control of the University, such as severe budget shortfalls, may result in restrictions in the number and range of course and program choices available to students as compared with those listed herein or in other University publications. The University reserves the right to limit access to courses or programs, and, at its discretion, to withdraw particular programs, options, or courses altogether. In such circumstances the University undertakes to the best of its ability to enable students registered in affected programs to complete their degree requirements in a satisfactory manner. Prospective students or new registrants are advised to consult the University Course Offerings List and the most current information available from the University and its various Faculties in printed or electronic form, as well as the academic advisor(s) for the programs concerned, before making registration decisions or course/program choices.

The University reserves the right to require a student to withdraw from a course or courses for academic or other reasons.

The Senate and Board of Governors of the University of Waterloo reserve the right to invoke changes in this Calendar, in either its printed or electronic forms, at any time without prior notice.

Sample Course Description

<table>
<thead>
<tr>
<th>Course</th>
<th>Term(s) Offered</th>
<th>Type of Instruction and number of hours/wk</th>
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Course Name — Applied Probability

Course Description


Additional information — Prereg: STAT 230, and third-year standing

Terminology

Terms Offered

F Fall term
S Spring term
W Winter term
J Summer, first half, July
A Summer, second half, August
M Summer, both terms, July, August

Type of Instruction

C lecture
L laboratory
T tutorial
S seminar
D discussion
R reading course
wkshp workshop
std studio
fldlab field lab
P project

Corequisite

A course required to be taken concurrently with, or passed prior to registration in, another course which lists it as a corequisite.

Prerequisite

A course required to be passed prior to registration in another course which lists it as a prerequisite. ("Consent of instructor" is sometimes listed as an alternative to or in addition to a prerequisite.)

Cross-Listed Courses

Courses which are listed under two departments and which can be taken for credit from either department, but not both.

Additional Information — Definitions

Antirequisites

Courses with significant overlap. Degree credit cannot be obtained for both the antirequisite and the course(s) naming it as such.

Note 1

For term courses with credit weights other than 0.5, students should consult their Faculty Advisor regarding how such courses are counted for degree credits in their particular program.

Note 2

For purposes of course selection, courses designated "S" (Spring) in the Course Description listings are normally those offered in the Spring term of the year following the Fall and Winter terms of the particular academic year.
<table>
<thead>
<tr>
<th>Course Name</th>
<th>Course Abbreviation</th>
<th>Course Name</th>
<th>Course Abbreviation</th>
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Accounting

Undergraduate Officer
D.T. Carter, HH 290, ext. 2747

Courses not offered in the current academic year are listed at the end of this section.

Notes
1. All accounting courses except ACC 121, 122, 123, 131, and 231 are restricted to students in Honours Accounting Studies or to those who require them as part of their undergraduate program. If space permits, students in good standing in other Honours programs may be admitted, subject to prerequisite requirements.
2. Students who fail to preregister during normal preregistration periods may be unable to take a particular course in their term of preference.
3. Students may only repeat courses labelled ACC in which they have a grade of D+ or less. A passed course may be repeated once with the approval of the School of Accountancy.
4. Registration in ACC 121, 122, 131, and 231 is unrestricted. Preference will be given to students who require these courses as part of their program.

ACC 101 F 3C,1T 0.5
Introductory Accounting
An introduction to the principles and practices underlying the historical-cost income determination model.
Antireq: ACC 121, 123

ACC 121 F S 3C,1T 0.5
Understanding and Using Financial Accounting Information
This course is designed for non-accounting majors. The use of accounting information to assist in planning, control and managerial decision-making will be examined.
Prereq: ACC 121 or Accounting OAC
Antireq: ACC 123

ACC 123 W 3C 0.5
Accounting Information for Managers
This course is designed for non-accountants who will use accounting information for planning, control and decision making.
Antireq: ACC 101, 121/122

ACC 126 W 6C 1.0
Core Concepts of Accounting Information 1
This course covers the users and uses of accounting information and accounting issues involving income, cash-flows, economic resources and capital.
Prereq: Accounting OAC or ACC 101

ACC 131 F 3C 0.5
Management
The functional areas of business: finance, personnel administration, production, marketing and accounting are examined within differing organizational structures. Coverage also includes study of the principles of effective management and the financial system in Canada as a source of corporate capital.
May be subject to priority enrolment
Antireq: BUS 111W

ACC 226 F 6C 1.0
Core Concepts of Accounting Information 2
This course covers the planning, start-up, operating, auditing and tax compliance phases of a business with a focus on the accounting information that is used during these phases of business operation, and the information technologies that can support the development of such accounting information. Managerial accounting, financial accounting, auditing, taxation, and information technology concepts and applications are an integral part of this course.
Prereq: ACC 128

ACC 231 S 3C 0.5
Business Law
Particular attention is given to the law relating to contracts and business organizations. Other areas of study include sources of law, the judicial process, real and personal property, torts, agency, credit, and negotiable instruments.
Antireq: MTHEL 100

ACC 232 F 3C 0.5
Communicating Information for Decision Making
Theory and practice of public speaking. A workshop course involving design and delivery of various kinds of speeches, and the development of organizational, vocal, listening and critical skills. Students will be videotaped. This course addresses oral communication skills that are necessary for the professional accountant.
Antireq: DRAMA 225

ACC 371 F 3C 0.5
Managerial Finance 1
Analytic techniques for financial decision-making will be considered within a conceptual framework. Emphasis is placed upon the long-term investment, capital structure and distribution decisions. Developments in capital asset pricing and efficient markets will be examined.
Antireq: One course in Statistics and either ACC 121 or 228 or permission of School of Accountancy
Antireq: ECON 371

ACC 372 S 3C 0.5
Managerial Finance 2
The theoretical concepts examined in Accounting 371 will be applied within the context of the Canadian economy. Topics examined will include interest rate determination, capital markets, and risk/return characteristics of financing alternatives.
Prereq: ACC 371
Antireq: ECON 372

ACC 382 F 3C 0.5
Cost Management Systems
Consideration of more complex topics in management planning and control. Emphasis is on cost accumulation systems, performance evaluation, control models and case analysis of situations involving complex management accounting systems.
Prereq: ACC 228

ACC 392 F 3C 0.5
Intermediate Financial Accounting
This course completes the coverage of intermediate financial accounting. It deals with problems related to the measurement of liabilities, measurement of income, and the reporting and measuring of corporate equities.
Prereq: ACC 228

ACC 401 F 3C 0.5
Accounting Theory
A review of accounting theory as a background for applying underlying concepts to current accounting problems. Emphasis is on current literature, with a major term paper required.
Prereq: ACC 392 and 371
ACC 415-419 0.5
Special Topics
Admission by consent of instructor.

ACC 431 F 3C 0.5
Advanced Studies in Legal and Ethical Issues in Accounting
This course will examine issues such as economic torts, fiduciary responsibilities, administrative law and the interaction of law and accounting in practice. Critical ethical issues including an introduction to comparative professional ethics will also be examined.
Prereq: ACC 231 or MTHEL 100

ACC 442 S 3C 0.5
Accounting Information Systems
Examines the accountant's role in the design and evaluation of financial information systems. Discusses the implementation of small- and large-scale financial systems, and investigates the strategic use of information systems to achieve organizational objectives.
Prereq: ACC 228
Antireq: CS 330, 480

ACC 451 F 3C 0.5
Audit Strategy
An examination of elements of audit strategy and their interrelationships, including financial assertions, types and sources of audit assurance, and evidence gathering procedures, including statistical auditing methods, such as sampling and regression analysis.
Prereq: ACC 228

ACC 454 F 3C 0.5
Comprehensive/Operational Auditing
Examination of the value for money audit concept in the private and public sectors. This approach goes beyond the scope of the traditional financial audit and looks at all facets of the organization, including human resource management.
Prereq: ACC 228

ACC 461 F 3C 0.5
Taxation 1
A course in the interpretation in application of the major provisions of the Income Tax Act through an analysis of court decisions, Revenue Canada's publications, and practical problem situations.
Prereq: ACC 228

ACC 462 S 3C 0.5
Taxation 2
A continuation of ACC 461.
Prereq: ACC 461

ACC 463 F 3C 0.5
Taxation 3
A course which integrates the topics covered in ACC 461 and 462 for individual and corporate tax planning through a study of trusts, partnerships, corporate reorganizations and estate planning.
Prereq: ACC 462

ACC 464 F 3C 0.5
Tax Policy
An examination of the economic, political, legal and administrative aspects of selected contemporary issues in Canadian tax policy. The topics may include corporate losses transfers, minimum tax, auto expense rules, deductions for farm losses, tax simplification for small businesses, or other topics of current interest.
Prereq: ACC 461

ACC 471 F 3C 0.5
Investments
The objective of this course is to introduce the student to concepts of investment selection, purchase and management. The student should obtain a knowledge of security markets and the risk-return characteristics of forms of investment.
Prereq: ACC 371

ACC 491 F 3C 0.5
Advanced Financial Accounting
An advanced accounting course considering specific problems of accounting for the corporate entity, such as business combinations, intercorporate investments, consolidated financial statements, accounting for foreign operations and foreign currency transactions, segment reporting.
Prereq: ACC 392

COURSES NOT OFFERED 1996-97
ACC 143 Creative Thinking and Problem Solving for Accountants
ACC 232 Communicating Information for Decision Making
ACC 453 Control and Audit of Computer-Based Systems
ACC 465 Taxation for Decision Making
ACC 480 Selected Problems and Cases in Managerial Accounting
ACC 481 Selected Topics in Managerial Accounting
ACC 487 Management Accounting Policy and Integration
ACC 488 Project

Actuarial Science

Undergraduate Officers
M. Bennett, MC 6016A, ext. 5502
K. Sharp, MC 6016, ext. 4492

Courses not offered in the current academic year are listed at the end of this section.

Note
More detailed course descriptions and course outlines are available in the Actuarial Science Undergraduate Handbook.

ACTSC 221 F,W,S 3C 0.5
Mathematics of Investment
The theory of rates of interest and discount; annuities and sinking funds with practical applications to mortgage and bond questions. Yield rates.
Prereq: At least second year standing
Antireq: ACTSC 231
ACTSC 221 cannot be counted for credit toward a BMath Honours Actuarial Science degree.

ACTSC 231 F,W,S 3C,1T 0.5
Mathematics of Finance
The theory of rates of interest and discount including the theoretical continuous case of forces of interest and discount. Annuities and sinking funds, including the continuous case. Practical and theoretical applications primarily to mortgages and bonds. Yield rates.
Prereq: MATH 137 and second-year standing
Antireq: ACTSC 221

ACTSC 232 F,W,S 3C 0.5
Introduction to Actuarial Mathematics
The economics of insurance, utility theory. Application of probability to problems of life and death. The determination of single premiums for insurance and annuities in both the discrete and continuous case.
Prereq: ACTSC 231, MTHEL 3054, STAT 230
Antireq: ACTSC 222

ACTSC 331 W,S 3C 0.5
Life Contingencies 1
Net annual premiums and net premium reserves. Multiple life functions and multiple decrement models.
Prereq: ACTSC 232
Techniques for expressing the increased of additional morbidity and mortality. To determine the amount and incidence risk in premiums are investigated. The effects of medical and non-medical risk factors on bodily systems are explored. Population projections, mortality theories, and construction of life tables. Selection of Risks 1. The effects of medical and non-medical risk factors on bodily systems are explored to determine the amount and incidence of additional morbidity and mortality. Techniques for expressing the increased risk in premiums are investigated.

**Course Descriptions**

**Actuarial Science**

**Anthropology**

**Undergraduate Officer**

H.D. Lyons, PAS 2019, ext.2991

Course not offered in the current academic year are listed at the end of this section.

**ANTH 101 F,W,S 3C 0.5**

Human and Cultural Evolution

A survey of the discoveries of Physical Anthropology and Anthropological Archaeology. Lectures on living and fossil primates, the fossil evidence for the origins and development of humans, and archaeo-logical evidence concerning the origins and development of culture from the earliest tool making through the beginnings of civilization.

**ANTH 102 F 3C 0.5**

Introduction to Social and Cultural Anthropology

The dynamic nature of socio-cultural systems is examined. Topics include language, technology, social organization, economics, politics, and religion. Data are drawn from a broad ethnographic base, including both "primitive" cultures and modern, developed societies.

**ANTH 201 F,W,S 3C 0.5**

Principles of Archaeology

An introduction to the working assumptions, analytic approaches, and integrative and descriptive methods of archaeological anthropology.

**ANTH 202 W 3C 0.5**

Principles of Social and Cultural Anthropology

An introduction to basic concepts used by social and cultural anthropologists for the analysis of social, economic, political and ideological systems. 

Prereq: ANTH 102 or permission of instructor

**ANTH 203 F 3C 0.5**

North American Prehistory

This is a general introduction to North American Archaeology. The traditional cultural ecological approach is used.
ANTH 223 W 3C 0.5
Archaeology and Cultural Adaptation: Gatherers and Hunters
The technology, social organization and ideology of prehistoric and historic peoples who subsist without domesticated plants or animals. Archaeology and ethnographic evidence concerning human adaptations over the past three million years are considered.
Prereq: ANTH 101

ANTH 310 W 3C 0.5
The Anthropological Imagination
Anthropological theories and concepts are examined as they are explored in fiction and fantasy. Among the issues discussed will be the relationship between nature and culture, the course of human physical and cultural evolution, the relationship between humans and non-human primates, the role of the symbol in human thought, and the nature of human society. The works of Geertz, Turner, Levi-Strauss, LeGuin, Godel and Card are among those studied.
Prereq: ANTH 210

ANTH 311 F 3C 0.5
Magic, Witchcraft and Religion
An introduction to the way in which anthropologists study the system of behaviour and belief known as religion.

ANTH 320 W 3C 0.5
Studies in Hunter-Gatherer Archaeology
Detailed consideration of prehistoric cultural developments from earliest toolmaking to the transition to agriculture. An examination of the human mode of adaptation and the increasing complexity of cultural systems among prehistoric hunters and gatherers. Areas and periods of emphasis will vary from year to year.
Prereq: ANTH 201 or permission of instructor

ANTH 321 F 3C 0.5
Cultural Ecology
An examination of the relationships among environment, technology, society, and culture. The increasing levels of complexity will be considered in the context of hunting and foraging bands, horticultural tribes and chiefdoms, pastoral tribes and agricultural peasantry.
Prereq: Two term courses in Anthropology or consent of instructor

ANTH 330 W 3C 0.5
Special Topics in Anthropology
Directed independent research.
Prereq: Permission of instructor

ANTH 335 S 3C 0.5
Comparative Policies on Native Minorities
An examination of the legal, social and cultural position of native minorities within the larger nation-state. The course will compare and contrast Canada's relation with its indigenous populations to those of the United States and other countries such as New Zealand and/or Australia.
Prereq: One of ANTH 102 or 230 or 370

ANTH 352 F 3C 0.5
History of Anthropological Thought
An examination of the historical origins and development of culture theory. The major emphasis is on the period from the appearance of anthropology as a distinct discipline in the nineteenth century until the emergence of modern perspectives in the 1950s.
Prereq: ANTH 102 or permission of instructor

ANTH 370 0.5
Issues in Contemporary Native Communities in Canada
Selected aspects of the contemporary native experience as defined by the local native community. The topics examined will be placed in historical perspective. Specially selected course lectures will be representative of the wider native community.
Cross-listed as NAT ST 370 and CDN ST 370
(Formerly ANTH 241)

ANTH 390/393 F.W 0.5/0.5
Reading in Anthropology
Guided reading in a selected portion of the anthropological literature.
Prereq: Anthropology Major or Honours student and permission of instructor

ANTH 391/393 F.W.S 0.5/0.5
Reading in Anthropology
Guided reading in a selected portion of the anthropological literature.
Prereq: Anthropology Major or Honours student and permission of instructor

ANTH 400 W 3C 0.5
Special Topics in Anthropological Theory
Seminar on current topics in method and theory in Anthropology. Focus will vary from year to year.
Prereq: Any course in Social/Cultural ANTH or WS 200 or any course in Sexuality, Marriage and Family or permission of instructor

ANTH 404 F 3C 0.5
Human Development in a Cross-Cultural Perspective
Seminar in current issues in the anthropology of the life cycle. This course will deal with child rearing, young adulthood, aging and the female and male life cycles, among other topics, from the perspectives of various cultures.
ANTH 485 F 3C 0.5
Selected Topics in Primate Behaviour
This course focuses on methodological
and ideational aspects of studying primate
behaviour. Topics include fieldwork meth-
ods, comparative theoretical approaches,
mother-infant interaction, infanticide,
socialization and communications patterns.
Prereq: ANTH 261

ANTH 492A/B F,W 0.5/0.5
Reading in Anthropology
Guided reading in a selected portion of the
anthropological literature.
Prereq: Anthropology Major or Honours
student and permission of instructor

ANTH 495/497 F,W 0.5/0.5
Reading in Anthropology
Guided reading in a selected portion of the
anthropological literature.
Prereq: Anthropology Major or Honours
student and permission of instructor

ANTH 499A/B F,W,S 0.5/0.5
Honours Essay
Directed reading and research in a
selected area of anthropology inquiry.

NATIVE STUDIES

NAT ST 370 0.5
Issues in Contemporary Native
Communities in Canada
Selected aspects of the contemporary
native experience as defined by the local
native community. The topics examined
will be placed in historical perspective.
Specially selected course lecturers will
be representative of the wider native
community.
Cross-listed as CDN ST 370 and
ANTH 370

COURSES NOT OFFERED 1996-97
ANTH 103 The Nature of Language
ANTH 210 Anthropology Through
Science Fiction
ANTH 222 Prehistoric Cultures of the
Great Lakes Area - A Survey
ANTH 224 Archaeology and Growth of
Cultural Complexity
ANTH 228 Peoples of the Pacific
ANTH 260 Human Evolution
ANTH 261 Primate Behaviour
ANTH 270 Archaeological Method and
Technique
ANTH 271 Archaeological Field Methods
ANTH 321 Studies in Archaeology of
Complex Cultures
ANTH 322 Prehistoric Cultures of the
Great Lakes Area

Course Descriptions
Anthropology
Applied Mathematics

ANTH 333 Applied Anthropology
ANTH 350 Culture and Sexuality
ANTH 365 Fossil Hominids
ANTH 377 Early Cultures in the New
World
ANTH 420 Social and Cultural Change
ANTH 480 Human Adaptation and
Evolution

ANTH 370 S 0.5
Early Cultures in the New
World - Great Lakes Area-A Survey

ANTH 377 Early Cultures in the New
World - Great Lakes Area

ANTH 333 Applied Anthropology
ANTH 350 Culture and Sexuality
ANTH 365 Fossil Hominids
ANTH 377 Early Cultures in the New
World
ANTH 420 Social and Cultural Change
ANTH 480 Human Adaptation and
Evolution

AM 251 F,W 3C 0.5
Elementary Differential Equations and
Applications
Properties of solutions of first-order and
second-order scalar differential equations;
solution techniques. Physical dimensions;
scaling; dimensional homogeneity; dimen-
sionless ratios; the Buckingham Pi theo-
rem. Systems of first-order differential
equations in R²; the matrix exponential
and linear flow; stability of equilibrium;
qualitative analysis; linearization about
equilibrium. Applications are drawn from
population dynamics and classical
mechanics.
Prereq: MATH 138
Coreq: MATH 235
No student is allowed to take all three of
AM 250, 251, and 261 for credit.

AM 261 F 3C,1T 0.5
Newtonian Mechanics
Modeling physical reality: Mathematics vs.
Dynamics: Newton's laws of motion. Critique
of Newton's formulation. The prin-
ciple of galilean invariance. Applications:
standard problems of particle motion.
The conservation principles: energy, linear
momentum, and angular momentum.
Collision processes. The two-
body problem with a central field. Introduction to the
linear theory of small oscillations: normal
co-ordinates. weak-coupling limit. forced
vibrations of two coupled degrees of
freedom.
Prereq: MATH 237
No student is allowed to take all three of
AM 250, 251, and 261 for credit.

AM 331 F,W 3C 0.5
Real Analysis
Topology of R^n, continuity, norms, metrics,
completeness. Fourier series and applica-
tions, for example, to ordinary differential
equations, the heat problem, optimal
approximation, the isoperimetric inequality.
Prereq: MATH 237
Antireq: PMATH 351
Cross-listed as PMATH 331
Not available for credit to students in
Honours Pure Mathematics programs.
AM 332 W, S 3C 0.5
Complex Analysis
Complex numbers; continuity, differentiability, analyticity of functions; the Cauchy-Riemann equations; solution of Laplace's equation; conformal mapping by elementary functions, and applications; contour integration, the Cauchy and allied theorems; Taylor and Laurent expansions, uniform convergence and power series; the residue calculus and applications.
Prereq: MATH 237
Antireq: PMATH 352
Cross-listed as PMATH 332
Not available for credit to students in Honours Pure Mathematics programs.

AM 333 F, S 3C 0.5
Elementary Differential Geometry and Tensor Analysis
Curves in Euclidean 3-Space (E^3) and the Serret-Frenet formulae; surfaces in E^3 and their intrinsic geometry, Gaussian curvature and the Gauss-Bonnet theorem. Coordinate transformations and tensors in n dimensions; n-dimensional riemannian spaces; covariant differentiation; geodesics; the curvature, Ricci and Einstein tensors. Applications of tensors in relativity and continuum mechanics.
Prereq: AM 231 or consent of instructor
Cross-listed as PMATH 389

AM 343 W 3C 0.5
Discrete Models in Applied Mathematics
Difference equations, Laplace and z transforms applied to discrete (and continuous) mathematical models taken from ecology, biology, economics and other fields.
Prereq: MATH 108, or consent of instructor

AM 351 F, S 3C 0.5
Ordinary Differential Equations
Existence and uniqueness theorems; first-order and second-order equations; series solutions and special functions. Laplace transforms. Eigenvalues and eigenfunction expansions; applications to mathematical physics. Sturm's comparison, separation and oscillation theorems.
Prereq: MATH 237, AM 250 is recommended for non-AM majors

AM 353 W, S 3C 0.5
Partial Differential Equations I
First-order partial differential equations and characteristic curve. Second order linear partial differential equations, primarily in two variables: physical origins; classification into hyperbolic, parabolic and elliptic equations; the Cauchy initial-value problem and characteristic curves. Derivation and analysis of solutions of the wave equation, heat equation and Laplace's equation, separation of variables and eigenfunction expansions; Fourier integrals; d'Alambert's solution and the propagation of waves; maximum principle for harmonic functions. Introduction to systems of partial differential equations, hyperbolic systems, reduction to canonical form.
Prereq: AM 231, or consent of instructor
Coreq: AM 351

AM 361 W 3C 0.5
Continuum Mechanics
Prereq: AM 231 and AM 281, or consent of instructor
Coreq: AM 353 and AM/PMA 332 (or PMATH 362)

AM 373 W 3C 0.5
Quantum Mechanics I
Critical experiments and old quantum theory. Basic concepts of quantum mechanics: observables, wavefunctions, hamiltonians and the Schrödinger equation. Uncertainty, correspondence and superposition principles. Simple applications to finite and extended one-dimensional systems, harmonic oscillator, rigid rotor and hydrogen atom.
Prereq: AM 231 and AM 281, or consent of instructor

AM 375 W 3C 0.5
Special Relativity and Electromagnetic Field Theory
Prereq: AM 333 and AM 261, or consent of instructor

AM 431 F 3C 0.5
Measure and Integration
Lebesgue measure and integral for the real line, general measure and integration theory, convergence theorems, Fubini's theorem, absolute continuity, Radon-Nikodym theorem, LP-spaces.
Prereq: PMATH 351 or 353
Cross-listed as PMATH 451

AM 432 W 3C 0.5
Functional Analysis
Banach spaces, linear operators, geometry of Hilbert spaces, Hahn-Banach theorem, open mapping theorem, compact operators, applications.
Prereq: AM 431/PMATH 451 or PMATH 353
Cross-listed as PMATH 453

AM 433 F or W 3C 0.5
Differential Geometry
Some global aspects of surface theory, the Euler-Poincaré characteristic, the global interpretation of Gaussian curvature via the Gauss-Bonnet formula. Submanifolds of E^n, induced riemannian metrics, extrinsic and intrinsic curvatures, Gaussian-Codazzi equations. Local Lie groups of transformations on P^2, infinitesimal generators, the Lie derivative. An introduction to differentiable manifolds, the tangent and cotangent bundles, affine connections and the riemann curvature tensor. The above topics will be illustrated by applications to continuum mechanics and mathematical physics.
Prereq: AM 333/PMATH 365 or consent of instructor
Cross-listed as PMATH 465

AM 441 F 3C 0.5
Numerical Computation for Dynamic Simulation
Prereq: CS 370 or (374, or 357 and consent of instructor, or CS 372 and consent of instructor)
Cross-listed as CS 476
AM 451 W 3C 0.5
Introduction to Dynamical Systems
Prereq: AM 251 and 351, or consent of instructor

AM 453 F 3C 0.5
Partial Differential Equations 2
A thorough discussion of the class of 2nd-order linear partial differential equations with constant coefficients, in two independent variables. Laplace's equation, the wave equation and the heat equation in higher dimensions. Theoretical/qualitative aspects: well-posed problems, maximum principles for elliptic and parabolic equations, continuous dependence results, uniqueness results (including consideration of unbounded domains), domain of dependence for hyperbolic equations. Solution procedures: elliptic equations - Green's functions, conformal mapping; hyperbolic equations - generalized d'Alembert solution, spherical means, method of descent; transform methods - Fourier, multiple Fourier, Laplace, Hankel (for all three types of partial differential equations); Duhamel's method for inhomogeneous hyperbolic and parabolic equations.
Prereq: AM 351 and 353, or consent of instructor

AM 455 W 3C 0.5
Control Theory
Prereq: Consent of Instructor

AM 456 F 3C 0.5
Calculus of Variations
Prereq: AM 231, or consent of instructor

AM 463 F 3C 0.5
Fluid Mechanics
Prereq: AM 361, or consent of instructor

AM 465 W 3C 0.5
Elasticity
Basic equations of elasticity for homogeneous isotropic bodies; bending of beams; plane elastic waves; Rayleigh surface waves, Love waves. Solution of problems by potentials, variational methods and Saint Venant's principle.
Prereq: AM 351, or consent of instructor

AM 473 F 3C 0.5
Quantum Mechanics 2
Prereq: AM 373, or consent of instructor

AM 475 W 3C 0.5
Introduction to General Relativity
Prereq: AM 375, or consent of instructor

AM 477 W 3C 0.5
Statistical Mechanics
Equilibrium statistical mechanics is developed from first principles, based on elementary probability theory and quantum theory (classical statistical mechanics is developed later as an appropriate limiting case). Emphasis is placed on the intimate connections between statistical mechanics and thermodynamics. Although it would be useful, prior knowledge of quantum theory is not necessary.
Prereq: Consent of instructor

AM 495 F 3C 0.5
Reading Course

AM 496 W 3C 0.5
Reading Course
ARCH 124 F 3C 0.5
Introduction to Landscape Design
An introduction to analysis of the form that landscapes take and the processes and ideals leading to those forms. Topics of discussion include the vernacular landscape, the garden, the park, the town and suburban landscape. Emphasis will be on site planning within the above situations and on the introduction of ideas of sustainable development and an ecosystems approach.
Prereq: Consent of instructor

ARCH 142 F 4C,2L 1.0
Cultural History 1: Iconography
Selected schemes of order, such as fate, providence, natural law, the human will, as expressed in plays, poems and fiction from various ages; selected conventions in literature, cinema, and the visual arts; the development of one or two archetypal symbols in literature and the visual arts; directed to lead into more detailed studies of symbolic patterns in Iconography 2.
Prereq: Consent of instructor

ARCH 143 W 4C,2L 1.0
Cultural History 2: The Ancient World
A study centred on ancient life to initiate the student into the stream of cultural history and the complex problems of what the artist is, the quality of the human existence, culture, environment, as well as the working of the icon from raw state of perceived image to its function as an expressive symbol in poetry, music, dance, architecture and other works of art; a study of modern work in comparison to an ancient achievement.
Prereq: ARCH 142

ARCH 163 W 1C,2L 0.5
Statics and Structural Analysis
Fundamental concepts of mechanics and structures, as related to architectural design, study of loading conditions, forces, moments, systems of forces, conditions of equilibrium for two and three dimensional structures, centre of gravity of loads and areas, bar forces in trusses, simple frame analysis, friction, moment of inertia.

ARCH 172 W 3C 0.5
Building Construction 1
This course on the construction of small scale buildings introduces the fundamentals of building construction, demonstrating relationships between design development and building technique: materials, building science and construction practices, factors of climate and geology. Faculty and students will use case studies and projects for small-scale buildings to investigate: soils and foundations, wood frame and masonry construction.

ARCH 174/175 0.5 each
Experimental Courses
These courses offer a vehicle for introducing additional electives to the program on a short-term basis, and for developing future permanent courses.
Prereq: Consent of instructor

ARCH 182 F 2C,14std 1.5
Design Studio
Development of the means to appreciate the art and science of building; introduction to the study of theories of architecture; development of skills in graphic communication; introduction to a study of building elements; promotion of the application of theory in the practice of design. Field trip (one week).
Prereq: Architecture students only
Field trip cost: $250-$300

ARCH 183 W 2C,14std 1.5
Design Studio
Further development of basic skills, and the application of theory and design in small scale architectural design projects. Introduction to issues of habitation, program and context.
Prereq: ARCH 182

ARCH 213 F 3C,3std 0.5
Introduction to Architectural Computer Graphics
By focusing on three-dimensional modelling, the course introduces a number of related topics in computer graphics such as rendering, raster graphics, light, colour and image compositing. There are studio projects involving the design, modelling and rendering of sculptures and a project dealing with interpretations through modelling of distinctive buildings from the recent or distant past. Lectures support the hands-on work with a general theoretical background.
Prereq: ARCH 113 or CS 100 and ARCH 193 or consent of instructor

ARCH 225 S 3C 0.5
The Architecture of the Urban Environment
An introduction to the structure and form of urban environments as understood through the urban architecture. The forces that determine the creation and development of urban places will be examined. Topics include: the plan as a generative form, urban building types, urban morphology and the shape of the public realm, infrastructure as a system and an architectural object, nature and the park, and real estate and development controls. Of special interest will be analyses of the suburb and urban master plans.
Prereq: For Architecture 2B students or consent of instructor

ARCH 245 W, S 1C,2L 0.5
Survey of Contemporary Architecture
Beginning with the formative years of modern architecture, the course will analyse buildings and theories of representative architects and designers, document the development of architectural ideas in Europe and elsewhere.
Prereq: Consent of instructor

ARCH 246 F 4C,2L 1.0
Cultural History 3: Foundations of Europe
Recognition of patterns of life and concepts of order and conduct, models of the universe and other, moving metaphors and myths by means of study of the thoughts, acts, art, architecture, technology, literature, music and town design of the West from the break-up of the Roman Empire until the Renaissance.
Prereq: ARCH 143 or consent of instructor

ARCH 247 S 4C,2L 1.0
Cultural History 4: Renaissance to Revolution
Analysis of the various styles emerging out of provincial and international Gothic, especially Italian use of classical models, the spread of this "renaissance" mode, leading to consideration of the Mannerist, the Baroque, the Rococo, the Neoclassical; investigation of the course of man's attitudes from humanism, nationalism, and Reformation through the Enlightenment until the French Revolution and Hume's dethronement of Reason.
Prereq: ARCH 248 or consent of instructor

ARCH 249 F 3C 0.5
The Art and Architecture of the East
This course addresses the fundamentals of the Eastern Art and Architecture, discussing major landmarks of India, China and Japan.
Field trip cost: $15

ARCH 252 S 0.5
Creative Problem Solving
Development of creative skills through group behaviour in problem solving sessions by: developing a clear understanding of each participant's own creative thought processes; increasing her/his ability to consciously and deliberately make use of her/his own creative potential; engendering an awareness of the capacity to use herself/himself and the people he/she works with to produce better solutions to the problems identified by the group.
Prereq: Consent of instructor
ARCH 262 F 2C,2L 0.5
Strength of Materials
Concept of simple stress and strain; statically indeterminate axially loaded members; thermal stresses, torsion, shear and bending moments in simple beam; shear and moment diagrams, qualitative deflected shapes, flexural and shear stresses, deflection calculations; combined stresses, beams of different materials, compression members, Euler's formula.
Prereq: ARCH 183

ARCH 266 F 3C 0.5
Building Construction 2
This course on the construction of medium to large-scale buildings examines relationships between design development and the building science and construction practices of structural systems and enclosures. Faculty and students will use case studies and projects to investigate: reinforced, precast and pre-stressed concrete construction; steel framing systems; building envelopes (curtain walls, window walls, glazing and roofing systems); fire protection; interior finish selection; and the relationship of all these to mechanical and electrical systems.
Prereq: ARCH 172 or consent of instructor

ARCH 274/275 0.5 each
Experimental Courses
These courses offer a vehicle for introducing additional electives to the program on a short-term basis, and for developing future permanent courses.
Prereq: Consent of Instructor

ARCH 276 S 2C,2L 0.5
Timber: Design, Structure and Construction
Architectural case studies are used to examine conceptual development, structural design, building process and the selection of structural timber systems. Topics such as flexural, compression and truss members; connections; and plywood construction are studied using calculations, design aids, rules of thumb and the latest CSA design standards.
Prereq: ARCH 262

ARCH 284/285 F,W 3C 0.5 each
Architectural Research
This offers a student an opportunity for independent research into architectural problems not offered in the regular curriculum, guided exploration of specific architectural problem areas, of appropriate complexity to the particular term.
Prereq: Approval of (in house) UGAC

ARCH 285 F 2C,1L 0.5
Design Studio
The exploration of design as a thinking process through the medium of small scale design projects. The development and analysis of architectural propositions concerning personal space within the context of a larger community.

ARCH 293 S 2C,1L 0.5
Design Studio
Design involving problems of human perception and dimension in more complex environments, and dealing with issues of public and private space. Development of skills in analysis and programming, and further exploration of questions of siting and context. Field trip (one week).
Prereq: ARCH 292
Estimated field trip cost: $125

ARCH 313 W 2C,2L 0.5
Computer Aided Design
A study of Computer Aided Design (CAD) seen as the creation of a data base of two-dimensional graphics and three-dimensional models from which drawings and images can be extracted. An important component of the course is therefore the structuring of this two- and three-dimensional information. For architectural subject matter the course will use the works of a classical architect, such as Palladio or Schinkel, by requiring the design and modelling of a building incorporating the design rules perceived to have been used by the architect. By using CAD as a means of criticism, CAD is also used to teach architectural history by allowing visual testing of the validity of the design rules and by allowing one to project oneself into a virtual reality of the past.
Prereq: ARCH 213 or consent of instructor

ARCH 345 W 2C,1S 0.5
Architectural Theory 1850-1890
Beginning with the introduction of important theories of architecture in vogue prior to 1850, the course will examine texts, movements, buildings, projects, and urban proposals of the period in order to understand the structure of contemporary architectural theory.
Prereq: Consent of Instructor

ARCH 346 W 2C,2L 0.5
Historicism and Romanticism: Sense of Periods and Styles
Depiction of "modern" culture as one in which the notion of environmental order as the fulfilling of natural law is replaced by a notion of order as the historical creation of autonomous wills. Selected works in philosophy, literature, art and architecture will be studied.
Prereq: ARCH 247 or consent of instructor

ARCH 352 W 2C,2L 0.5
Steel: Design, Structure and Construction
Architectural case studies are used to examine conceptual development, structural design, building process and the selection of structural steel systems. Topics such as tension, flexural and compression members; and connections are studied using calculations, design aids, rules of thumb and the latest CSA design standards.
Prereq: ARCH 262

ARCH 353 F 2C,2L 0.5
Concrete: Design, Structure and Construction
Architectural case studies are used to examine conceptual development, structural design, building process and the selection of structural concrete systems. Topics such as flexural (rectangular, T-Beams, and one-way slabs) and compression members; footing and retaining walls; non-reinforced and reinforced masonry walls are studied using calculations, design aids, rules of thumb and the latest CSA design standards.
Prereq: ARCH 262

ARCH 372 W 2C,2L 0.5
Building Services 1
The course focuses on the air and water systems of buildings and is aimed at developing knowledge and skills appropriate to architectural practice. Subjects covered include environmental parameters, heating and cooling loads, energy conservation design, the selection of heating, ventilating and air conditioning systems, plumbing systems, and the protection of architectural and structural elements.
Coreq: ARCH 392 or consent of instructor

ARCH 373 F 2C,2L 0.5
Building Services 2
A study of services in buildings, covering electrical distribution, vertical transportation, lighting and acoustics. The course also addresses exterior applications, site planning and district services, and a survey of urban infrastructures.
Coreq: ARCH 393 or consent of instructor

ARCH 374/375 0.5 each
Experimental Courses
These courses allow for additional electives to the program on a short term basis, and for developing future permanent courses.
Prereq: Consent of Instructor
ARCH 446 F 2C,2S 0.5
Italian Urban History (Rome)
The course provides a survey of the history of settlement and urban form on the Italian peninsula from antiquity to the present day. In it the influences upon the structure of public and private space are outlined for each historical period. These include the constants such as geography and climate, but more especially the factors that induce and manifest change: politics, warfare, economics, social structure, the arts and theory.
Prereq: Registration in ARCH 492 or consent of instructor

ARCH 447 S 2C,1S 0.5
Japan: Signatures on the Landscape
The course examines connections between pre-war and post-war ideologies as a context for looking more closely at the work of contemporary architects and planners in Japan.
Architecture students only OR consent of instructor

ARCH 448 F 2C,2S 0.5
Rome and the Campagna (Rome)
History of settlement and building in Rome and the surrounding area from antiquity to the present. Acts of design in architecture, urban form and landscape related to political, cultural and spiritual authority of Rome. Comparison drawn between the image of the city, represented in literature and art, and the material facts of the place. Field trips, lecture.
Prereq: Registration in ARCH 492 or consent of instructor

ARCH 449 F 2C,2S 0.5
The Development of Modern Italian Architecture (Rome)
The course addresses the issues of architecture and urbanism in Rome and Italy from 1750 to the present. It explores the relationship between cultural, political and artistic phenomena such as Futurism, Novecento and Rationalism, that anticipate and create modernism in Italy.
Coreq: ARCH 492 or consent of instructor

ARCH 451 W 2C,1S 0.25
The Financial Aspects of Architecture
The course is an introduction to the financial aspects of the development and construction industries. The economics of property development and the process of cost estimation and control will be treated from a practical perspective.
Prereq: BArch Students or consent of instructor

ARCH 452 W 2C,1S 0.25
Specifications
Architectural working drawings and specifications; bidding requirements; general conditions; general requirements trade divisions; reference and source material; assembly and reproduction; structural, mechanical and electrical consultants.
Prereq: BArch Students or consent of instructor

ARCH 453 S 2C,1S 0.25
Professional Practice
Discussion of the legal and ethical aspects of architectural practice in Canada and in Ontario; in particular, contracts, bonds and insurance, construction lien, by-laws and regulations, architectural partnerships. The legal background, client-architect relations, partial services, professional problems.
Prereq: BArch Students or consent of instructor

ARCH 454 S 2C,1S 0.25
Acts and Codes
The course introduces students to the legislative context within which architects operate; specifically, The Architects’ Act, The Planning Act and The Building Codes.
Prereq: BArch Students or consent of instructor

ARCH 455 S 3C 0.5
Creative Problem Solving 2: Conflict Resolution and Innovation in Design
This course will carry the skills learned in ARCH 252 to the world at large, giving the participants the opportunity of dealing with larger client groups.
Prereq: ARCH 252 and consent of instructor

ARCH 474/475 0.5 each
Experimental Courses
These courses allow for additional electives to the program on a short-term basis, and for developing future permanent courses.
Prereq: Consent of instructor

ARCH 484/485 F,W 3R 0.5 each
Architectural Research
This offers a student an opportunity for independent research into architectural problems not offered in the regular curriculum. It allows guided exploration of a specific architectural problem area, of appropriate complexity to the particular term.
Prereq: Approval of (in house) UGAC
ARCH 492 E F 3C,18st 2.0
Design Studio (Rome)
The studio course is mounted in Rome, Italy, with the school's own faculty and premises, and offers a unique opportunity to undertake design studies in a truly rich architectural heritage. The main focus is the nature of the institution and its relationship to the city and its culture. Two field trips, one week each.
Pre-req: BES (pre-professional architecture) degree with minimum C- average in design courses
Field trip cost: $900

ARCH 492 E F 3C,18st 2.0
Design Studio (Waterloo)
For students unable to study in Rome, an alternative studio is offered in Waterloo. It presents similar design projects and theoretical questions in a North American context.
Pre-req: BES (pre-professional architecture) degree with minimum C- average in design courses

ARCH 493 W,S 3C,18st 2.0
Design Studio Options
A series of studio courses is offered which enables students to select their subject of study and instructor. The studios are presented either by visiting architects or professors or by school faculty, and reflect the instructor's particular interests and expertise. Enrolment is normally limited to a maximum of fifteen in any one studio.
Pre-req: ARCH 492

ARCH 499 W,S 0.0
Fifth Year Thesis Proposal
Architecture students are responsible for developing a satisfactory thesis proposal prior to and as a pre-requisite of the 5A Design Studio. The completion of this requirement will be indicated as a mark of TCRU for the course on the student's academic record. The thesis proposal will be developed independently by the student between the 4B and 5A terms and will be reviewed and assessed by the 5A studio instructor.
Pre-req: ARCH 493

ARCH 574/575 W,S 0.5 each
Experimental Courses
These courses allow for additional electives to the program on a short-term basis, and for developing future permanent courses.
Pre-req: Consent of instructor

ARCH 584/585 W,S 3R 0.5 each
Architectural Research
This offers a student an opportunity for independent research into architectural problems not offered in the regular curriculum. It allows guided exploration of a specific architectural problem area, of appropriate complexity to the particular term.
Pre-req: Approval of (in house) UGAC

ARCH 592/593 W,S 4C,25th 3.0 each
Design Studio
These courses provide an opportunity for the student to select an area of concentration for study and design in depth. A thesis topic is to be submitted and approved during term eight (4B) and all research work completed by the end of the eight-month Co-op work term five. Terms nine and ten (5A and 5B) will be spent developing the thesis for presentation during term ten. The thesis is to be a vehicle for thinking and design at an innovative level. Thus considerable emphasis is placed on both theory and development of design solutions.
Pre-req: ARCH 499 and consent of instructor
A letter grade for ARCH 592 will be submitted only after the completion of ARCH 593.

COURSES NOT OFFERED 1996-97
ARCH 348 Italian Renaissance
Architecture

ARTS Courses not offered in the current academic year are listed at the end of this section.

Notes
1. Courses designated "Arts", those listed below, usually cover some topics and themes of general interest to several disciplines and their presentation is often made with this interdisciplinary perspective in view.

2. Arts courses are elective courses in General and Honours programs and, except for ARTS 301, do not satisfy either the Group A or Group B requirements.

ARTS 122 0.5 F
Quest for Meaning in the 20th Century
This course invites students to a quest for personal and corporate meaning in the context of a century in which traditional meanings and definitions have been challenged by world wars, nuclear threat and rapidly shifting sexual, social, economic, and religious values.

ARTS 301 0.5
Studies in the Humanities
A one-term multi-disciplinary study of the humanities, including art and music as well as literature, history and religious studies. In addition to the principal professor, visiting lecturers from the different disciplines enable the student to see each discipline through expert eyes. Also discussion of the nature of the humanities, and their role in life, business, etc.
Pre-req: Second-year standing
Counts toward the A(1) requirement (Formerly ARTS 100)

COURSES NOT OFFERED 1996-97
ARTS 215 A/B Man in Crisis (Literary Views)
ARTS 225 Mennonite Authors and Artists
Course Descriptions

Biology

BIOL 201 F 2C, 3L 0.5
Human Anatomy
Basic anatomical features of the skeletal, muscular, nervous, cardiovascular, endocrine and reproductive systems of the human.
Open to students other than those intending to major in Biology. Required for students enrolled in Honours Science Program Two (Pre-Health-Professions Option), but not open to students in other Biology major programs. Strongly recommended for students intending to enter the School of Optometry.
BIOL 201 cannot be counted for credit toward a BSc (Kinesiology) degree.

BIOL 202 W 2C, 3L 0.5
Embryology and Histology
Fundamental developmental processes in vertebrates, including humans; the development of the early embryo; morphogenesis of tissues and the major organ systems. Structure of human cells and tissues at the light-microscope level; epithelia, connective, muscular and nervous tissues and the major organ systems. Open to students other than those intending to major in Biology. Strongly recommended for students intending to enter the School of Optometry.
Antireq: BIOL 404

BIOL 210 F 2C, 3L 0.5
Introductory Invertebrate Zoology
A study of the functional morphology of selected invertebrate types with special emphasis on the various grades of organization and development in the different phyla.

BIOL 211 W, S 2C, 3L 0.5
Introductory Vertebrate Zoology
An introduction to the structure, evolution and development of vertebrate organ systems.
Offered during the Spring term in odd-numbered years.

BIOL 220 F 2C, 3L 0.5
Plant Biology 1 - The Living Plant
An introduction to the structure, function and physiology of plants with emphasis on flowering plants.

BIOL 221 W, S 2C, 3L 0.5
Plant Biology 2 - The Diversity of Plants
A Survey of Fungi, Algae and Plants
A comparative survey of the morphology and life histories of the different kinds of plants and fungi important to us and an introduction to their evolution.
Offered during the Spring term in odd-numbered years.

BIOL 222 F 0.5
Non-Vascular Plants
An introductory course which will survey the evolution, morphology, ecology and importance of the fungi, algae, and bryophytes.
Offered by Distance Education only for 1996-97.

BIOL 230 F 2C, 3L 0.5
Introductory Cell Biology
An introduction to the concepts of cell biology with emphasis on (1) the structural organization of the cell and its constituent organelles and (2) the function of critical molecular processes that are characteristic of living organisms.
Antireq: PHYS 381

BIOL 239 W, S 2C, 3L 0.5
Genetics
Offered during the Spring term in even-numbered years.

BIOL 240 F 2C, 3L 0.5
Fundamentals of Microbiology
Introduction to fundamental theories, principles and methods of microbiology. Structure, methods of cultivation, growth, effects of physical factors, and inhibition and killing of microorganisms will be studied.

BIOL 241 W, S 2C, 3L 0.5
Introduction to the Microbial World
Biological characterization of major bacterial groups, microorganisms as geochemical agents, utilization of microorganisms by humans, and mechanisms of microbial pathogenicity.
Offered during the Spring term in odd-numbered years.

BIOL 250 F 3C 0.5
Ecology
An introduction to the study of the relationships of plants and animals to their environment. The nature of ecosystems, ecological energetics, biogeochemical cycling, community ecology, introduction to population biology. BIOL 250 is recommended for students specializing in ecology.
Antireq: ENV S 200
BIOL 273 W/S 2C,3L 0.5
Introductory Human Physiology
The physiology of the major organ systems including the nervous, muscular, circulatory, respiratory, urinary, digestive, endocrine and reproductive systems.
Antireq: SCI 351 and 352
Offered during the Spring term in even-numbered years.

BIOL 288 F Fall lab 0.25
Field Course 1
A series of one-day field trips from campus held on Saturdays during the first half of term (omitting Thanksgiving weekend), designed to introduce students to the flora, fauna and major ecosystems of Southern Ontario. Written reports will be required for each trip.
Coreq: BIOL 250 or equivalent
Field trip fee of $75 is required towards the cost of transportation.
Minimum enrolment of 24 students is required.

BIOL 301A/B F/W 3C,3L 0.5/0.5
Human Physiology
The physiology of the major organ systems of the body. The topics discussed include circulation, respiration, digestion and nutrition, metabolism, muscle, nervous systems, special senses, and the endocrine system.
No credit or grade will be given for the first term course unless the two term sequence is completed.
For Optometry students only.

BIOL 402 F 2C,3L 0.5
Embryology
Fundamental processes and concepts in embryonic development including the acquisition of multicellularity, organization of the early embryo, morphogenesis of tissues, major organ systems, fetal membranes, growth, differentiation and analysis of common developmental defects.

BIOL 403 F 2C,3L 0.5
Developmental Biology
Analysis of embryonic development of selected organisms with emphasis on growth and the processes of subcellular, cellular and organ differentiation stressing recent experimental methodology.

BIOL 404 W 2C,3L 0.5
Histology and Cytology
The structure of mammalian cells, tissues and organs interpreted in functional terms. Cell reproduction and differentiation, with some discussion of the embryological origin of tissues and the regulation of tissue growth. Light and electron microscopy techniques.
Prereq: BIOL 211 or 230 or 273
Antireq: BIOL 202

BIOL 410 F 2C,3L 0.5
Invertebrate Zoology
The biology of invertebrate animals, excluding arthropods. Topics covered will include reproduction, development, life history, feeding, locomotion, and behaviour. Laboratories will introduce the major invertebrate phyla.
Prereq: BIOL 210

BIOL 411 W 2C,3L 0.5
Vertebrate Paleontology and Evolution
A history of vertebrate life on earth, a description of important fossils and a classification of the chordates.
Prereq: BIOL 211

BIOL 412 F,S 2C,3L 0.5
Arthropod Zoology
A survey of the phylum Arthropoda, including the insects, with emphasis on their classification, interrelationships and ways of life.
Prereq: BIOL 210
Offered during the Spring term in even-numbered years.

BIOL 416 F 2C,3L 0.5
Entomology
Introduction to morphology, systematic and biology of insects. Insect collection is required as part of the course.
Brief field trips will be made to collect insects from different local habitats.

BIOL 421 F 2C,3L 0.5
Plant Anatomy and Morphogenesis
Plant structure in relation to function and development with particular reference to the vascular plants. Cell, tissue and organ differentiation.
Prereq: Biol 220 and 230
Offered in even numbered years.

BIOL 423 W 2C,3L 0.5
Plant Physiology
A study of physiological principles that govern the water economy, mineral nutrition, transport processes and metabolism of plants with a strong emphasis on bio-physical and biochemical mechanisms.
Prereq: BIOL 220 or permission of instructor

BIOL 425 F 2C,3L 0.5
The Flowering Plants

BIOL 426 W 2C,3L 0.5
Applied Physiology
Algae in human affairs and the environment. Topics examined include algal ecology, algae and organic, thermal, metal and acid pollution; cultural eutrophication; toxic algae; uses of algae for food; algal products; mass culture of microalgae and macroalgae.
Prereq: BIOL 220 or 221 or permission of instructor

BIOL 427X W 2C,3L 0.5
Environmental Physiology
A study of the physiological processes used by plants and animals to respond to changes in the physical environment. The processes of adaptation and acclimation to temperature will be examined in detail from the molecular to the organismal level.
Prereq: BIOL 250 and one of the following: BIOL 423, 436 or 470

BIOL 428 F 2C,3L 0.5
Molecular Biology of Plant Development
An examination of plant development and physiology at a molecular level including topics such as genome analysis, mutant isolation and characterization of plant genes.
Prereq: BIOL 220 and 437

BIOL 432X W 3C 0.5
Molecular Biotechnology 2
How recombinant DNA technology is used to produce vaccines, plant growth promoting bacteria, pharmaceuticals, crop plants and other commercial products will be discussed.
Prereq: BIOL 437 and 440 or permission of instructor

BIOL 433X W 3C 0.5
Animal and Plant Cell Biotechnology
Techniques and applications of animal and plant cell cultures to biotechnology.
Prereq: BIOL 220 and 230 or permission of instructor

BIOL 434 F 3C/S 0.5
Human Molecular Genetics
Recent advances in human molecular genetics will be examined with emphasis on how human disease-causing genes are mapped, identified, isolated and characterized. Examples will draw from research on Duchenne muscular dystrophy, Huntington disease, cystic fibrosis, Alzheimer disease, cancer, vision defects and other disorders.
Prereq: BIOL 239, 437 and 440
Course Descriptions
Biology

BIOL 436 W 2C,3L 0.5
Cell Physiology
The functional organization of cells with particular reference to cell-cell interaction, the structure, function and development of organelles and the biological roles of cellular membranes.
Prereq: BIOL 230
It is recommended that students take either CHEM 233 or 237 prior to taking this course.

BIOL 437 F,S 2C,3L 0.5
Molecular Biology
Structure, expression and regulation of prokaryote and eukaryote genes, including DNA replication, transcription and protein synthesis. Introduction to recombinant DNA technology.
Prereq: BIOL 230 and 239 or permission of instructor

BIOL 438 W 3C 0.5
Molecular Biology of Animal Development
An examination of the current major issues in the regulation of gene expression during animal development with emphasis on technical and conceptual advances. Current research literature will be reviewed.
Prereq: BIOL 437 and 402 or 403 or permission of instructor, BIOL 440 is strongly recommended.

BIOL 439 W 3C 0.5
Biochemistry of Natural Products
The chemistry, functions and distribution of natural products including alkaloids, isoprenoids, amines, phenolics, cyanogenic glycosides and other important compounds in plants and other biological systems.
Prereq: At least one full-year course or equivalent in organic chemistry plus a one-term course in biochemistry that includes the essentials of carbohydrate and fat metabolism

BIOL 440 F,S 2C,3L 0.5
Molecular Biotechnology 1
Molecular biotechnology applies the principles of recombinant DNA technology (genetic engineering, gene cloning) to the development of commercial products. The methods of recombinant DNA technology, molecular diagnostic systems for detecting diseases and transgenic organisms will be discussed.
Prereq: BIOL 240 and 241 or permission of instructor. It is recommended that this course be taken after completion of second year.

BIOL 441 F 2C,3L 0.5
Immunology
An introduction to the vertebrate immune response; the cells and tissues of the lymphoid system; humoral and cell-mediated immunity; initiation and regulation of the immune response; the immune system and disease, techniques used in immunology.
Prereq: BIOL 239, 437 and 440

BIOL 442 W 2C,3L 0.5
Virology
A survey of viral structures, life cycles, and the interactions of viruses with microbial and animal hosts. Laboratory experiments involve procedures used for viral detection and titration.
Prereq: BIOL 240, 241 and 437 or permission of instructor

BIOL 443 F 2C,3L 0.5
Fermentation Biotechnology
Biology of industrial micro-organisms: fermentation systems; fermentation raw materials; downstream processing; biomass production; food fermentations; production of industrial chemicals, food additives, enzymes and other products by fermentation.
Prereq: BIOL 240 and 241

BIOL 444 W 2C,3L 0.5
Microorganisms and Disease
A study of the microorganisms involved in pathogenesis, their mode of infection, symptoms and prevention.
Prereq: BIOL 240 and 241
It is recommended that students take BIOL 441 prior to taking this course.

BIOL 445 W 2C,3L 0.5
Microorganisms In Foods
Food preservation, spoilage, poisoning and modern concepts in quality assurance programs are studied. The aim is to understand factors governing microbial changes in foods. Problem solving in the food industry is emphasized. Laboratory work will reflect current practices in quality control and testing.
Prereq: BIOL 240 and 241 or permission of instructor

BIOL 446 F 2C,3L 0.5
Microbial Ecology
A study of the ecological roles of microorganisms. Examples from freshwater, terrestrial, marine and other ecosystems will be used to illustrate the activities and importance of microorganisms in these habitats.
Prereq: BIOL 240 and 241 or permission of instructor

BIOL 447 W 2C,3L 0.5
Environmental Microbiology
A study of the environmental impact of microorganisms. Aspects of pollution, waste treatment, biodegradation of environmental contaminants, and nutrient cycling will be examined.
Prereq: BIOL 240 and 241 or permission of instructor

BIOL 448 W 2C,3L 0.5
Microbial Physiology
A study of the physiology of microorganisms including growth of cells and populations, nutrient transport systems, nutrient assimilation, biosynthesis and fueling, polymerization and assembly of cell components.
Prereq: BIOL 240 and 241 or permission of instructor

BIOL 450 F 3C 0.5
Marine Biology
An examination of coastal and offshore marine environments. Physical and chemical oceanography, plankton, benthos, fish and marine tetrapods are discussed.
Prereq: Any two of BIOL 210, 250 and a Biology field course or permission of instructor
Antireq: SCI 453

BIOL 451 W 3C 0.5
Limnology
A study of the Biology, Chemistry and Physics of lakes and streams, with emphasis on biological processes and their interactions with the environment. Familiarity with basic statistics and with the plant and animal kingdoms is assumed.
Prereq: BIOL 210, 220 or 221, and 250
Antireq: SCI 454

BIOL 452 F 3C 0.5
Fisheries Biology
The practices of fisheries science, including world fish supplies and potential harvests, capture methods, obtaining vital statistics of fish stocks, biological production, management and conservation, as well as the opportunities and limitations of aquaculture.
BIOL 453 F 3C 0.5
Wetlands
Basic concepts on the distribution, hydrology, geochemistry, formation and ecology of wetlands with an emphasis on temperate and subarctic systems. The uses and management of wetlands are considered with the view of wetlands as functional ecosystems.
Prereq: An introductory course in physical geomorphology, biology, ecology or hydrology.
Cross-listed as GEOG 405
Field Trip fee: $20.

BIOL 454 F,S 2C,3L 0.5
Environmental Toxicology 1
An introduction to the basic theories, principles and techniques of environmental toxicology. A comparative study of the effects of specific groups of toxicants on ecosystems; bio-degradation and cycling.

BIOL 455 F 2C,3L 0.5
Environmental Toxicology 2
Cellular, developmental and physiological effects of toxicants on multicellular organisms.
Prereq: BIOL 454

BIOL 456 W 2C,1T 0.5
Population Biology
The analysis of the structure and dynamics of plant and animal populations. Theoretical, mathematical and experimental approaches to the study of population ecology.
Prereq: BIOL 250 and STAT 202, or equivalents
Students are advised that this course involves substantial computer and numerical applications.

BIOL 457 F 2C,3L 0.5
Analysis of Communities
A study of the organization, structure and development of communities with emphasis on vegetation change. Topics include: sampling procedures; diversity; stability; succession; niche; multivariate analysis.
Prereq: BIOL 250 and STAT 202, or equivalents.

BIOL 458 F 2C,3L 0.5
Behavioural Ecology
This course will deal with the survival value of behaviour. It will concentrate on how ecological selection pressures associated with acquiring resources and reproducing influence how animals behave. A strong emphasis will be placed on the ultimate causation of behaviour i.e. the evolutionary basis for behaviour.
Prereq: BIOL 250 or permission of instructor

Course Descriptions
Biology

BIOL 459 W 3C/S 0.5
Evolution
A study of the processes of evolution; the differentiation of populations and the origin of new forms of life.
Prereq: BIOL 239

BIOL 461 W 3C 0.5
Statistics and Experimental Design
A review of elementary descriptive and inferential statistics; power analysis; an introduction to exploratory data analysis; the design and analysis of planned experiments: analysis of variance (1-way, factorial, hierarchical and blocking designs; fixed- and random-effects models); a-priori and a-posteriori comparisons; regression analysis (models 1 and 2); correlation; analysis of covariance.
Prereq: STAT 202 or equivalent

BIOL 463 W 3C 0.5
Ecological Research Methods
A study of the organization, structure and development of communities with emphasis on temperate and subarctic systems. Both population and community approaches are stressed. The course is normally held in Algonquin Park in September. Courses sponsored by Ontario Universities at other times of the year also qualify.
Prereq: BIOL 250 or equivalent
Field trip fee: $400-$1500

BIOL 464 W,F,S 3C,4T 0.5
Genetic Analysis
A study of the genetics of populations; the principles of population genetics; the effects of specific groups of toxicants on ecosystems; bio-degradation and cycling.

BIOL 481 W 2C,3L 0.5
Introductory Quaternary Ecology
An introduction to Quaternary ecology. The morphology, biostratigraphy, distribution and paleoecological significance of major plant and animal groups in the Quaternary sciences. Relationships of fossil assemblages to modern ecosystems. Students will be expected to arrange with the instructors a field trip in the preceding term.
Prereq: EARTH 440 or consent of instructors
Cross-listed as EARTH 441

BIOL 490A/B F,W,S fieldlab 0.5/0.5
Field Course In Marine Biology
A two-week study of marine environments and biota. Emphasis on the flora and fauna of rocky shores, mud flats, and the sub-tidal benthos. Grade based on a field notebook and a research project. This course will normally be held at Huntsman Marine Lab, New Brunswick each September. Courses sponsored by Ontario Universities at other times of the year also qualify.
Prereq: BIOL 210, 250 or equivalent
Field trip fee: $400-$1500

BIOL 491B/F,W,S fieldlab 0.5/0.5
Field Course In Terrestrial and Aquatic Biology
A two-week study of the flora and fauna of terrestrial environments, lakes and streams. Emphasis on biotaxies, distribution and dynamics of organisms. Both population and community approaches are stressed. The course is normally held in Algonquin Park, Ontario each September. Courses sponsored by Ontario Universities at other times of the year also qualify.
Prereq: BIOL 250 or equivalent
Field trip fee: $300-$700

BIOL 492 F,W,S fieldlab 0.5
Introduction to Marine Mammals
A two-week field course at the Huntsman Marine Laboratory, St. Andrews, NB. The course has a strong emphasis on field research and each student must complete a research project. Lectures will introduce the evolution, zoogeography, ecology and behaviour of whales, seals and sea lions. Additionally, marine-mammal fisheries will be dealt with in both lecture and laboratory work.
This course will normally be offered during the first two weeks of August in even-numbered years.
Course Descriptions
Biology
Canadian Studies

BIOL 493 F,W,S fieldlab 0.5
Myecology
Fungal taxonomy and ecology; medical mycology; plant pathology; industrial applications; food and food processing; toxins and hallucinogens; biological control; fungi as coprophiles, predators and symbionts with plants and animals.
Prereq: BIOL 221
Antireq: BIOL 422
This course will normally be an intensive field course held in Algonquin Park, Ontario each September.

BIOL 498A/B F,W,S fieldlab 0.25/0.25
Field Course 2
A general interest field course usually of one week duration. Courses sponsored by Ontario Universities at other times of the year also qualify.
Coreq: BIOL 250 or equivalent
Field trip fee: $100-$300

BIOL 499A/B F,W,S 6L 0.5/0.5
Senior Honours Project
A senior-year research project. Normally, only students attaining a 70% cumulative major average will be accepted into this course. Students are referred to the coordinator for BIOL 499 for further details.
A final grade for BIOL 499A will be submitted only after completion of 499B.

COURSES NOT OFFERED 1996-97
BIOL 111 Introductory Biology I
BIOL 420 The Flora of Canada
BIOL 424 Ferns, Gymnosperms and Fern Allies: An Evolutionary Survey
BIOL 448 Microbial Physiology 1
BIOL 472 Comparative Animal Physiology 3

Canadian Studies

Program Director
W.R. Needham, 885-1460

Note
These courses provide an interdisciplinary study of Canadian issues and are offered either in lecture/tutorial or seminar formats (depending on the size of the class). They involve the participation of both Faculty members from various UW departments and of other scholars who may be visiting the University for brief or extended periods during the year. Students should be aware that limited resources do not permit all of these courses to be offered each year and that they should consult the term course offerings list.

CDN ST 101 F 2C,1S 0.5
Landforms and Mindscapes
An introduction to the Canadian landscape and its early impact upon the creative imagination of Canadians. The course provides a basis for dealing with contemporary Canadian culture.

CDN ST 102 W 2C,1S 0.5
Canadian Cultural Narratives: Facts, Fiction and Truths
De historically-based Canadian books and films repeat accepted facts, or do they rewrite them to suit present needs? A comparison of documentary and fictionalized narratives as seen in historical writing, novels, journalism, poetry, and films.

CDN ST 201 F 3S 0.5
Social Regionalism
An interdisciplinary examination of aspects of the nature of "community" and the existence and sustainability of community in Canadian social settings. An emphasis is given to comparative value analysis, social change and the common good.

CDN ST 202 W 2C,1S 0.5
Cultural Regionalism
The study, critical evaluation of, and issues pertaining to, Canadian culture and identity and their development at regional and national levels through such modes of creative expression as literature, film, art and music.

CDN ST 301 F 3S 0.5
Regionalism: West
This course continues the exploration of Canadian regionalism by applying knowledge gained in CDN ST 201/202 to distinctive problems of the Canadian west and northwest. The focus of the seminar will vary according to the interests of the faculty and students.
Prereq: CDN ST 101, 201, 202 or permission of instructor

CDN ST 302 W 3S 0.5
Regionalism: East
This course continues the exploration of Canadian regionalism by applying knowledge gained in CDN ST 201/202 to distinctive problems of Atlantic Canada. The focus of the seminar will vary according to the interests of the faculty and students.
Prereq: CDN ST 101, 201, 202 or permission of instructor

CDN ST 311 F 3S 0.5
Canadian Women and Religion
This course investigates Canadian women's experience in religion from pioneer times to the present day. It analyses the role of women in mainstream Protestant, Roman Catholic and Jewish traditions, in the less structured sectarian and cultic groups, and in native religion.

CDN ST 313 W 3S 0.5
Canadian Traditional and Popular Culture
Studies traditional and popular bases for Canadian culture through interdisciplinary examination of verbal, musical, ritual, material, and belief heritage, reflected in a variety of social groupings: occupational, family, gender, age, community, ethnic, religious, linguistic and regional.

CDN ST 355 0.5
Special Topics
A course offered from time to time on a significant Canadian issue or theme using expertise available by special arrangement.

CDN ST 385D F,W,S 0.5/0.5
Reading Course
A student-initiated reading course on the approval of the Program Director.
Available on-campus and by special arrangements through Distance Education.
### Chemical Engineering Course Descriptions

#### Chemical Engineering Concepts 1
- An introduction to the basic methods and principles used by engineers in the analysis and design of physical processes: units, dimensions, and measurements; mass balances; behaviour of fluids. Laboratory on visual communication is included.
- **Prerequisite:** CHE 100
- **Credit Points:** 0.5
- **Offered in:** Fall, Winter

#### Chemical Engineering Concepts 2
- An extension of the topics covered in CHE 100. Energy balances. Laboratory experiments illustrate the physical principles discussed.
- **Prerequisite:** CHE 100
- **Credit Points:** 0.5
- **Offered in:** Spring, Fall

#### Thermodynamics: Work and Heat as Forms of Energy
- **Prerequisites:** CHE 101 or ENV E 101, CHE 102
- **Credit Points:** 0.5
- **Offered in:** Fall

#### Transport Processes 1 (Equilibrium Stage Operations)
- Equilibrium between phases; the equilibrium stage concept. Cascades of stages with and without reflux; group methods and stage-by-stage approaches; graphical solutions. Applications in the separation of components by distillation, absorption, stripping, extraction and leaching.
- **Prerequisites:** CHE 101, MATH 115
- **Credit Points:** 0.5
- **Offered in:** Fall, Winter

#### Transport Processes 2 (Fluid Mechanics)
- **Prerequisites:** CHE 101
- **Credit Points:** 0.5
- **Offered in:** Winter

#### Applied Mathematics 1 (Statistics)
- Introduction to statistical ideas, probability theory, distribution theory, sampling theory, confidence intervals and significance tests. Introduction to regression analysis. Introduction to design of experiments and statistical quality control.
- **Prerequisites:** MATH 115, 117, or consent of instructor
- **Credit Points:** 0.5
- **Offered in:** Winter, Spring

#### Chemical Engineering Concepts 3
- An introduction to the basic methods and principles used by engineers in the analysis and design of physical processes: units, dimensions, and measurements; mass balances; behaviour of fluids. Laboratory on visual communication is included.
- **Prerequisites:** CHE 100
- **Credit Points:** 0.5
- **Offered in:** Fall, Winter

#### Thermodynamics: Work and Heat as Forms of Energy
- **Prerequisites:** CHE 101 or ENV E 101, CHE 102
- **Credit Points:** 0.5
- **Offered in:** Fall

#### Transport Processes 1 (Equilibrium Stage Operations)
- Equilibrium between phases; the equilibrium stage concept. Cascades of stages with and without reflux; group methods and stage-by-stage approaches; graphical solutions. Applications in the separation of components by distillation, absorption, stripping, extraction and leaching.
- **Prerequisites:** CHE 101, MATH 115
- **Credit Points:** 0.5
- **Offered in:** Fall, Winter

#### Transport Processes 2 (Fluid Mechanics)
- **Prerequisites:** CHE 101
- **Credit Points:** 0.5
- **Offered in:** Winter

#### Applied Mathematics 1 (Statistics)
- Introduction to statistical ideas, probability theory, distribution theory, sampling theory, confidence intervals and significance tests. Introduction to regression analysis. Introduction to design of experiments and statistical quality control.
- **Prerequisites:** MATH 115, 117, or consent of instructor
- **Credit Points:** 0.5
- **Offered in:** Winter, Spring

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**Note:**

For all courses in the Department of Chemical Engineering, registration in the Department or in the Chemical Engineering branch of the Environmental Engineering program or permission of the Associate Chair (Undergraduate Studies) is a requirement.
CH E 024 W,S 3C,1T,3L 0.5
Inorganic Process Principles 1
Inorganic chemical processes of industrial importance: sulphuric acid; nitric acid; ammonia; chlorine; phosphoric; caustic; uranium. Principles and applications of atomic and molecular structure to inorganic processes; atomic theory; bonding; stereochemistry; catalysis; transition metal chemistry. Some thermodynamic aspects of inorganic chemistry: thermodynamics; stability of elements and compounds; graphical representation of thermodynamic data; aqueous solution thermodynamics. Inorganic materials: structure and properties of metals and alloys; ceramics; composites; semiconductors. Selected topics in biology, polymers, metallurgy.
Prereq: CH E 026, MATH 118
1 Alternate weeks

CH E 035 F,W 3C,1T 0.5
Transport Processes 4 (Mass Transfer)
Steady state and unsteady state mass transfer by molecular and turbulent motion. Heat-mass transfer analogies. Mass transfer models and applications: absorption; extraction; adsorption. Simultaneous heat and mass transfer in gas-liquid contacting and solids drying.
Prereq: CH E 021, 030, MATH 218

CH E 036 F,W 3C 0.5
Chemical Reaction Engineering
Prereq: CH E 025, MATH 218, GEN E 121
Cross-listed as ENV E 333

CH E 037 W,S 3C 0.5
Prereq: MATH 115, 217, 218
Cross-listed as ENV E 324. Also offered at 3B level for final term in Fall 1996

CH E 038 F,W 3C,3L 0.5
Chemical Engineering Laboratory
Experimental applications of physical and chemical principles using pilot scale equipment. Experiments illustrating major unit operations: distillation; absorption; reactors; extraction; humidification; heat exchange.
Prereq: CH E 030

CH E 041 S,F 3C,1T,2L 0.5
Introduction to Process Control
Prereq: CH E 037, 101, 102, GEN E 121

CH E 043 S,F 3L 0.25
Research-Design Project 1
Individual research or design on any chemical/environmental engineering subject chosen by the student in consultation with the supervising professor. A written interim preliminary report is required.

CH E 045 S,F 3C 0.5
Economics for Chemical Engineering
Cross-listed as ENV E 429

CH E 046 S,F 1C,3L 0.5
Chemical Engineering Unit Operations Laboratory
Experimental applications of physical and chemical principles using pilot scale equipment. Experiments illustrating major unit operations: distillation; absorption; reactors; extraction; humidification; heat exchange.
Course Descriptions

Chemical Engineering

Chemistry

CH E 047 W 12 L 1.0
Group Design Project
Student design teams of two to four members work on design projects of industrial scope and importance under the supervision of a faculty member.
Prereq: CH E students only
Antireq: CH E 048, ENV E 481
Cross-listed as ENV E 493

CH E 048 W 9 L 0.75
Research-Design Project 2
A continuation of CH E 043. The individual research or design project started and presented in proposal form in 4A is carried out. An oral presentation of results and a written report are required.
Prereq: CH E 043
Antireq: CH E 047, ENV E 483
Cross-listed as ENV E 481

CH E 512 W 3 C 0.5
Separation Processes
Computational approaches in the design of multiple component separation processes. Energy requirements. Capacity and efficiency of contacting devices: distillation; absorption; liquid-liquid extraction; filtration; molecular sieves; membranes; ion exchange.
Prereq: CH E 033, 035

CH E 514 W 3 C 0.5
Fundamentals of Petroleum Production
Background for understanding the physical principles involved, and the terminology used, in petroleum production. Fundamentals of surface chemistry; capillarity. Characterization of, and fluid flow through, porous media. Principles of oil production performance, water flooding and enhanced oil recovery techniques.

CH E 522 W 3 C 0.5
Advanced Process Dynamics and Control
Prereq: CH E 041

CH E 524 W 1 C, 3 L 0.5
Process Control Laboratory
Experiments on process dynamics, control and simulation of processes. Time constant step and frequency response; controller tuning; multivariable control strategies. Implementation using simulation systems, mainframe computer control, microcomputers.
Prereq: CH E 041
Coreq: CH E 522

CH E 542 W 6 C 1.0
Polymerization and Polymer Properties
Prereq: CH E 101, 102, MATH 118

CH E 554 W 3 C 0.5
Food Process Engineering
Applications of unsteady and steady state heat and/or mass transfer operations to processing natural and texturized foods. Design and analysis of sterilization, low temperature preservation, concentration, separation and purification processes. Effects of formulation, additives and processing on organoleptic and nutritional quality.
Prereq: CH E 032, 035 or consent of instructor

CH E 572 W 3 C 0.5
Air Pollution Control
Treatment of gaseous waste products from representative Canadian industries. Characterization and toxicity of filtration, scrubbing, cycloning, electrostatic precipitation and other chemical treatments. Legal, sociopolitical, economic and engineering aspects.
Prereq: CH E 025, 035 or consent of instructor

CH E 574 W 3 C 0.5
Treatment of Aqueous Inorganic Wastes
Introduction to separation/treatment of aqueous inorganic wastes from chemical and metallurgical processes. Separation/treatment methods discussed include ion exchange, reverse osmosis, adsorption, ion flotation, electromembrane solvent extraction, electro-oxidation and electrodegradation. Legal, economic and social implications.
Prereq: CH E 035, 038

Chemistry

Undergraduate Officers
L.J. Brubacher, ESC-338, ext. 3701
M.F. Toogood, ESC-382, ext. 3022
G.E. Toogood, ESC-140, ext. 3314

Notes
1. in all cases, it is the student's responsibility to determine eligibility to enter a course. It is advisable to obtain special consents in writing before registration period to avoid delays and complications.
2. most 300- and 400 level courses are listed as two lecture hours. An additional hour may be scheduled at the discretion of the lecturer, usually for a tutorial.
3. because of space and equipment limitations in laboratory courses, we must give priority to students whose programs require those courses.

CHEM 001 0.0
Pre-University Chemistry
Essential preparation for first year chemistry courses. Formulae, nomenclature, stoichiometry, an introduction to thermochemistry, solution chemistry, chemical equilibria, acids, bases, oxidation-reduction reactions, kinetics and bonding. Successful completion of this course fulfills the University admission requirements where high school chemistry is necessary. No University credit. Offered by Distance Education only.

CHEM 010 F, W 1 C 0.0
General Chemistry Seminar
Required for all Chemistry students beyond Year One, this seminar brings together students from all years to receive information concerning the activities of the Chemistry Department and The Chemical Institute of Canada, and to hear invited speakers.
### Course Descriptions
**Chemistry**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Type</th>
<th>Credits</th>
<th>Description</th>
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| CHEM 028 F,W | 3C | 0.5 | Introductory Organic Chemistry: Environmental Bonding, structure, nomenclature and physical properties of the important functional groups. Simple reactions of the functional groups. How physical properties affect the behaviour of organic compounds in the environment.  
Prereq: CH E 102  
Antireq: CHEM 264, 266  
For students in Year Two Engineering |
| CHEM 028L F,W | 3L | 0.25 | Environmental Organic Chemistry Laboratory  
Selected experiments for students taking CHEM 028. |
| CHEM 038 F,S | 3C | 0.5 | Introductory Organic Chemistry: Reactions Laboratory and industrial chemical transformations amongst functional groups, mechanisms of reactions, introduction to spectroscopic methods.  
Prereq: CHEM 028  
Antireq: CHEM 265, 267  
For students in Year Three Chemical Engineering  
First offering: Spring term, 1997 |
| CHEM 118 W | 3C | 0.5 | Chemical Concepts for the Applied Health Sciences  
This course gives the background in chemistry necessary for understanding physiological and biochemical topics in the applied health sciences. Relevant concepts and facts are presented and illustrated by examples from the life sciences. Topics include approaches to calculations and problem-solving, general chemistry focused towards applied health sciences, and the chemistry of specific organic functional groups.  
Prereq: OAC Chemistry or permission of instructor  
Antireq: CHEM 120/121, 123/125  
CHEM 118 cannot be counted for credit towards a BSc degree in the Faculty of Science. |
| CHEM 120 F | 3C,1T | 0.5 | Physical and Chemical Properties of Matter  
The stoichiometry of compounds and chemical reactions. Properties of gases. Periodicity and chemical bonding. Energy changes in chemical systems. Electronic structure of atoms and molecules; correlation with the chemical reactivity of common elements, inorganic and organic compounds. Ionic solids and other extended arrays. Materials and processes in the chemical industry.  
Prereq: OAC Chemistry, Mathematics (Calculus)  
Coreq: (for Science Students) CHEM 120L  
Antireq: CHEM 121 |
| CHEM 120L F | 3L | 0.25 | Chemical Reaction Laboratory 1  
Selected experiments for students taking CHEM 120 or 121. |
| CHEM 121 F | 3C,1T | 0.5 | Physical and Chemical Properties of Matter  
An enriched version of CHEM 120 for all students in or planning to enter, Chemistry or Biochemistry programs.  
Prereq: Same as for CHEM 120  
Coreq: Same as for CHEM 120  
Antireq: CHEM 121 |
| CHEM 121L | 3L | 0.25 | Chemical Reaction Laboratory 1  
Selected experiments for students taking CHEM 120 or 121. |
| CHEM 122 W,S | 3C,1T | 0.5 | Chemical Reactions, Equilibria and Kinetics  
Prereq: CHEM 120 or 121  
Coreq: (for Science Students) CHEM 123L  
Antireq: CHEM 125 |
| CHEM 123L W,S | 3L | 0.25 | Chemical Reaction Laboratory 2  
Selected experiments for students taking CHEM 123 or 125. |
| CHEM 124 W,S | 0.5 | Introductory Organic Chemistry  
Bonding in carbon compounds. Structures, properties and nomenclature of several important classes of organic compounds. Interconversions of functional groups. Mechanisms of organic reactions.  
Prereq: OAC Chemistry or equivalent CHEM 120 strongly recommended Offered by Distance Education only.  
Not for students intending to major in Chemistry or Biochemistry. |
| CHEM 125 W,S | 3C,1T | 0.5 | Chemical Reactions, Equilibria and Kinetics  
An enriched version of CHEM 123 for all students in, or planning to enter, Chemistry or Biochemistry programs.  
Prereq: Same as for CHEM 123  
Coreq: Same as for CHEM 123  
Antireq: CHEM 123 |
| CHEM 129 W,S | 3C,3L | 0.5 | Introductory Spectroscopy  
The electromagnetic spectrum and the production and detection of photons in various energy ranges. Elementary descriptions of atomic and molecular spectra and their use in the locations of energy levels. The use of spectra to elucidate energy states of atoms and molecules and to determine molecular structure. Aspects of ultraviolet, visible, infrared, Raman, microwave and nuclear magnetic resonance spectroscopies.  
Prereq: CHEM 120 or 121  
Lab alternate weeks  
For students in, or planning to enter, Chemistry or Biochemistry programs. |
| CHEM 212 F,W | 3C | 0.5 | Structure and Bonding  
Structure and symmetry of main group and transition metal compounds. Valence bond, molecular orbital and ligand field theories applied to polyatomic molecules. Descriptive chemistry of selected elements and compounds.  
Prereq: CHEM 120 or 121, 129  
Antireq: CHEM 218  
For Honours students only |
| CHEM 218 F | 2C,1T | 0.5 | Development of Chemical Bonding and Structure  
Prereq: CHEM 120 or 121  
Antireq: CHEM 212  
Not for students in Honours Chemistry or Biochemistry or Biology and Chemistry programs |
| CHEM 219 W | 0.5 | Chemistry of Non-Transition Elements  
Group trends in main group chemistry. Correlation of structure with physical properties in various groups of compounds is emphasized.  
Prereq: CHEM 212 or 218  
By Distance Education only |
Course Descriptions

Chemistry

CHEM 311 F 0.5 Radiochemistry
Historical development of nuclear chemistry; elementary particles; composition of atomic nuclei; nuclear properties and models; radioactive decay processes; nuclear reactions including fission and fusion; interaction of radiation with matter; radiation detection, measurement and dosimetry.
Prereq: Ontario OAC or Grade 13 Chemistry or equivalent. Some university-level Science and Mathematics background is necessary.
Antireq: CHEM 412
Offered by Distance Education only

CHEM 312 F 2C,1T 0.5 Transition Metal Chemistry
The transition elements and their compounds. Stereochemistry of complex ions; ligand field and molecular orbital theories of metal-ligand bonding; electronic spectra and magneto-chemistry of complexes; reaction mechanisms.
Prereq: CHEM 212
Antireq: CHEM 316
For Honours students only

CHEM 312L F,W 6L 0.5 Inorganic Chemistry Laboratory
Experiments appropriate to the inorganic chemistry program.
Coreq: CHEM 312 or 313
For Honours students only

CHEM 313 W 2C,1T 0.5 Chemistry of Inorganic Solid State Materials
Introduction to the structure and bonding of ionic and covalent solids; crystal defects and non-stoichiometry; relationships between structure and electrical properties of solids including metallic conductivity, semiconductor, superconductivity and ionic conductivity; special topics including one of: fast ion conductors, piezoelectric and ferroelectric oxides, magnetic oxides.
Prereq: CHEM 212
For Honours students only

CHEM 315 F 0.5 Coordination Chemistry
A basic coverage of first row transition elements for General and certain Honours students; preparation, nomenclature and general chemistry of transition metal complexes emphasizing structure, bonding, physical properties such as colour and magnetism, and chemical reactions.
Prereq: CHEM 218 or 212
Antireq: CHEM 312
By Distance Education only

CHEM 323 W 2C 0.5 Analytical Instrumentation
Detailed study of selected instruments and instrumental methods. Introduction to chemometrics and to computer interfacing.
Prereq: CHEM 223, 223L, 224L, plus the general knowledge expected of an Honours Chemistry student in Year Three
For Honours students only

CHEM 333 F,S 2C 0.5 Metabolism 1
Metabolism of carbohydrates, lipids and amino acids.
Prereq: CHEM 233 or 237
Coreq: CHEM 265 or 267

CHEM 334L F,W 3L 0.25 Advanced Biochemistry Laboratory
Selected experiments for students taking CHEM 333 and CHEM 357.
Prereq/Coreq: CHEM 333, 357

CHEM 357 W 2C,1T 0.5 Physical Biochemistry
The use of diffusion, ultracentrifugation, osmotic pressure, electrophoresis and X-ray diffraction to study the properties of biopolymers. Hyperbolic and allosteric enzyme kinetcs, inhibition and regulation. Some spectroscopies important to the life sciences.
Prereq: CHEM 123 or 125; 233 or 237, MATH 127/128 or equivalent

CHEM 358 W 2C,1T 0.5 Statistical Thermodynamics
Prereq: CHEM 254, 256
Antireq: PHYS 359
For Honours students only

CHEM 358L F,W 6L 0.5 Physical Chemistry Laboratory 2
Selected experiments for students in the 3B term.
Prereq: CHEM 254L
For Honours students only

CHEM 359 F 2C,1T 0.5 Kinetics and Dynamics
Rates and mechanisms of chemical reactions (rate laws, treatment of kinetic data, reaction mechanisms, complex and fast reactions); theory of reaction rates (collision theory, activated complex theory); selected recent topics, such as laser chemistry, atmospheric chemistry, heterogeneous catalysts.
Prereq: CHEM 265, 268
For Honours students only

CHEM 362 F 2C 0.5 Mechanistic Organic Chemistry
Simple molecular orbital theory with applications to pericyclic reactions. Carbocation, carbenes, carbenoids and other reactive intermediates. Linear free-energy correlations and applications to thermodynamics and kinetics. Isotope effects and transition state theory of organic reactions. Solvent effects on structure and reactivity.
Prereq: CHEM 265
For Honours students only

CHEM 366 W 2C 0.5 Structural and Synthetic Organic Chemistry
Stereochemistry in organic reactions; synthesis of selected organic compounds examined in detail with emphasis on cyclo-addition reactions and condensation reactions.
Prereq: CHEM 265 or 267
Antireq: CHEM 368

CHEM 368L W 3L 0.25 Organic Chemistry Laboratory
Selected experiments for students taking CHEM 366.

CHEM 388 W,S 2C 0.5 Synthetic Organic Chemistry
Prereq: CHEM 265
Antireq: CHEM 368
For Honours students only

CHEM 388L F,W,S 6L 0.5 Senior Organic Chemistry Laboratory
Selected microwave synthetic experiments for students in Year Three Chemistry and Biochemistry programs, including spectroscopic identification of organic compounds.
Prereq: CHEM 265
Antireq: CHEM 368L
For Honours students only
Course Descriptions
Chemistry

CHEM 392A F,W,S 9L 0.75
Research Project 1
Only for students in the Honours Chemistry (Thesis Option) program and exchange students spending a term at Waterloo.

CHEM 392B F,W,S 18L 1.5
Research Project 2
Only for students in the Honours Chemistry (Thesis Option) program and exchange students spending a term at Waterloo.

CHEM 404 W 2C 0.5
Physicochemical Aspects of Natural Water
Prereq: At least third year standing or consent of instructor

CHEM 408 F 2C 0.5
Environmental Organic Chemistry
Anthropogenic organic compounds in the environment; how and why they get there. Phase transport through the ecosystem. Biological and non-biological chemical transformations. Prevention and remediation.
Prereq: CHEM 264, 268 or permission of the instructor

CHEM 411 F 2C 0.5
Organometallic Chemistry
Prereq: CHEM 312

CHEM 412 F 2C 0.5
Radiochemistry
Prereq: At least third-year standing or consent of instructor.
Antireq: CHEM 311, SCI 270

CHEM 413A-Z F,W 2C 0.5 each
Special Topics in Inorganic Chemistry
CHEM 413A Properties of Solid State Materials
CHEM 413B Chemistry of the Main Group Elements
CHEM 413C Advanced Organometallic Chemistry
CHEM 413F X-Ray Crystallography
CHEM 413H Inorganic Clusters
For a current list of offerings see the Undergraduate Officer.
Prereq: At least third-year standing or consent of instructor

CHEM 421 W 2C 0.5
Mass Spectrometry
Principles involved in the use of electric and magnetic fields for mass analysis. Ionization methods. Applications of mass spectrometric analysis to the identification and quantitation of chemical compounds.
For Honours students only

CHEM 425A-Z F,W 2C 0.5 each
Special Topics in Physical Chemistry
CHEM 425A Analytical Separations
CHEM 425F Analytical Instrumentation
For a current list of offerings see the Undergraduate Officer.
Prereq: Third-year standing or consent of instructor

CHEM 432 F 2C 0.5
Metabolism 2
Prereq: CHEM 333

CHEM 433 W 2C 0.5
Advanced Biochemistry
Prereq: CHEM 333

CHEM 434A-Z F,W 2C 0.5 each
Special Topics in Biochemistry
CHEM 434A Bioinorganic Chemistry
CHEM 434B Enzymology
CHEM 434C Chemical and Biochemical Mechanisms of Drug Action
CHEM 434D Enzyme Kinetics
CHEM 434E Biochemistry and Structure of Molecules
For a current list of offerings see the Undergraduate Officer.
Prereq: CHEM 333

CHEM 435 F 2C 0.5
Bioorganic Mechanisms
Modern techniques of bioorganic studies. Enzyme reaction mechanisms.
Prereq: CHEM 253 or 257 and one of 386, 388

CHEM 450 W 2C 0.5
Spectroscopy and Molecular Structure
Introduction to concepts and applications of microwave, Raman, IR, electronic and resonance spectroscopy with respect to molecular parameters.
Prereq: CHEM 255

CHEM 452A-Z F,W 2C 0.5 each
Special Topics in Physical Chemistry
CHEM 452B Principles of NMR Spectroscopy
CHEM 452C Intermediate Quantum Chemistry
CHEM 452D Chemical Thermodynamics 2
CHEM 452E Electrochemistry
CHEM 452F Group Theory and Its Applications in Chemistry
CHEM 452H Topics in Reaction Dynamics
For a current list of offerings see the Undergraduate Officer.
Prereq: Third-year standing or consent of instructor

CHEM 454 F 2C 0.5
Surface Chemistry
An introduction to the physical chemistry of surfaces. Qualitative and quantitative descriptions of surfaces and interfaces and the development of relevant techniques and theories. Application to surface tension, spreading, wetting, adsorption, and other interfacial phenomena.
Prereq: CHEM 254, 256

CHEM 456 W 2C 0.5
Catalysis
An introduction to heterogeneous catalysis. Examination of the physical manifestations of catalysis and the development of experimental techniques and theoretical methods for the measurement and elucidation of catalytic phenomena.
Prereq: CHEM 254

CHEM 464 F 2C 0.5
Spectroscopy in Organic Chemistry
Elucidation and identification of organic structures by contemporary spectroscopic techniques.
Prereq: CHEM 255
Course Descriptions
Chemistry - Civil Engineering

CHEM 465A-Z F,W 2C 0.5 each Special Topics in Organic Chemistry
CHEM 465A Transition Metals in Organic Synthesis
CHEM 465B Asymmetric Synthesis & Catalysis
CHEM 465C Topics in Stereochemistry
CHEM 465D Industrial Organic Chemistry
CHEM 465E Molecular Modelling
CHEM 465F Organic Photochemistry
For a current list of offerings see the Undergraduate Officer.
Prereq/Coreq: CHEM 368

CHEM 470 F 3C 0.5 Introduction to Polymer Science
Basic definitions and polymer nomenclature, molecular weight averages and distributions, constitutional and configurational isomerism, rubber elasticity, step-growth and free radical chain growth polymerizations, emulsion polymerization.
Prereq: CHEM 470 or equivalents Antireq: CH E 542

CHEM 471 W 2C 0.5 Polymer Properties and Polymerization
Co-polymerization, ionic and coordinate polymerizations, introduction to polymer reaction engineering, mechanical properties of polymers, polymer mixtures.
Prereq: CHEM 470 or equivalent Antireq: CH E 542

CHEM 492A F 9L 0.75 Advanced Laboratory
Laboratory work on a senior year research project. See CHEM 492 co-ordinator for descriptive booklet and details.
For Honours students only

CHEM 492B W 9L 0.75 Advanced Laboratory
A continuation of CHEM 492A.
No credit or grade is given for the first term course unless the second term sequence, CHEM 492A/B, is completed.

CHEM 495A F 18L 1.5 Research Project 3
Only for students in the Honours Chemistry (Thesis Option) program.

CHEM 495B W 18L 1.5 Research Project 4
Only for students in the Honours Chemistry (Thesis Option) program.

CHEM 498A-E F,W,S R 0.5 each Independent Study in the Defined Field of Study
A – Analytical Chemistry
B – Biochemistry
C – Inorganic Chemistry
D – Organic Chemistry
E – Physical Chemistry
Open to students in the Honours Chemistry (Thesis Option) program only.

Chinese
For courses in Chinese see East Asian Studies.

Civil Engineering
Undergraduate Officer
G.W. Brodland, E2-2332, ext. 6211

CIV E 126 W,S 2C,4L,4T 0.5 Civil Engineering Concepts
Continuation and integration of PHYS 115, GEN E 165 and GEN E 170. Extension and application of relevant principles of Physics (vectors, forces, equilibrium, elasticity, fluids) and descriptive geometry (points, lines, planes, intersections, developments). Exercises include laboratory experiments to illustrate relation of physics principles to engineering and a team project/experiment involving planning, conducting and reporting results in written and oral presentations. Introduction to group dynamics.

CIV E 127 W,S 3C,2T 0.5 Statics

CIV E 204 F,W 3C,1T 0.5 Mechanics of Solids 1
Prereq: CIV E 127

CIV E 205 F,S 3C,1T 0.5 Mechanics of Solids 2
Prereq: CIV E 204, 221

CIV E 221 F,W 3C,1T 0.5 Advanced Calculus
Prereq: MATH 118

CIV E 222 F,S 3C,1T 0.5 Differential Equations
Prereq: CIV E 221

CIV E 224 F,W 3C,1T 0.5 Probability and Statistics
Prereq: MATH 117
Antireq: M SCI 251

CIV E 225 F,S 3C,1L,1T 0.5 Geology for Engineers
A study of earth processes and earth materials from an engineering point of view. Topics include: mineral and rock identification, the rock cycle, structural geology, geology of Canada, effects of water, ice and wind. Description of aggregates used in engineering works.

CIV E 226 F,W 3C,1T,3L 0.5 Structure and Properties of Materials
Three lab sessions
Course Descriptions
Civil Engineering

CIV E 290 S,F 4C,2T,2L 0.75
Fluid Mechanics and Thermal Sciences
Four lab sessions
Prereq: CIV E 127, 221

CIV E 291 F,S 1 wk flab 0.5
Survey Camp
A one-week course in surveying. Introduction to surveying, length measurements, levelling, transit surveys. Cost to each student; contact the Civil Engineering Undergraduate Office for details.
For Civil and Geotechnical Engineering students only.

CIV E 292 F,W 3C,1T 0.5
Engineering Economics
Prereq: MATH 117
Antireq: MSC 261

CIV E 298 F,W 25 0.0
Seminar
The engineer in society. Principles, methods and practice of Civil Engineering. Informal lectures.

CIV E 300 W,S 2C,5L 0.5
Civil Engineering Project 1
The development of problem-solving skills utilizing the system approach to the solution of Civil Engineering problems. Knowledge from previous courses and work term experience are integrated in a team/project-oriented environment. A written report and a verbal presentation are requirements.

CIV E 303 W,S 3C,1T 0.5
Structural Analysis 1
Prereq: CIV E 205

CIV E 306 F,W 3C,1T 0.5
Mechanics of Solids 3
Prereq: CIV E 205

CIV E 313 F,W 3C,1T 0.5
Structural Concrete Design 1
Prereq: CIV E 303

CIV E 342 W,S 3C,1T 0.5
Transport Principles and Applications
Introduction to basic principles and procedures of transport planning and engineering applied to Canadian intercity transport problems.
Prereq: CIV E 224

CIV E 343 F 3C,1T,1L 0.5
Traffic Engineering
Theories of road capacity; Capacity and quality of service on rural and urban roads. Traffic signals: capacity, delay, allocation and optimization of phase times. Control of combinations and networks of signals. Application of assignment in traffic models.
Prereq: CIV E 224, 342

CIV E 344 F 3C,1T 0.5
Urban Transport Planning
The course develops a number of standard methods for predicting travel in urban areas. General characteristics of urban travel and urban transport systems are presented along with a discussion of typical issues pertaining to urban areas. Methods used to evaluate alternatives and resolve issues are presented. These include trip generation, trip distribution and mode split.
Prereq: CIV E 224, 342

CIV E 351 F,W SC,1T,1L 0.5
Geotechnical Engineering 1
An introduction to geologic processes. Subsurface exploration. Classification systems. Weight-Volume relationships. Soil mechanics principles including state of stress, ground water flow, consolidation and shear strength.
Six lab sessions
Prereq: CIV E 204, 253

CIV E 354 F,W 3C,1T 0.5
Geotechnical Engineering 2
Prereq: CIV E 353

CIV E 375 W,S 3C,1T,2L 0.5
Water Quality Engineering
Six lab sessions
Prereq: CIV E 280 or equivalent

CIV E 376 W,S 2C,1T 0.5
Traffic Engineering
Four lab sessions
Prereq: CIV E 344 or equivalent

CIV E 388 W,S 25 0.0
CIV E 399 F,W 25 0.0
Seminars
The engineer in society. Principles, methods and practice of Civil Engineering. Informal lectures.

CIV E 400 F,S 1C,7L 0.5
Civil Engineering Project 2
The purpose is to provide the students with an opportunity to demonstrate their capacity to engage in the practice of civil engineering as a profession. Groups of students are encouraged to identify and resolve a problem within the scope of their chosen area of specialization utilizing knowledge gained from their academic and employment experiences. A written report and a verbal presentation are requirements.
Antireq: ENV E 430

CIV E 401 W 4T 0.5
Civil Engineering Project 3
An independent or team project dealing with engineering design or research, under the direction and with the consent of a faculty member.
CIV E 403  F.S  3C,1T  0.5  
Structural Analysis 2  
Advanced structural analysis; linear and nonlinear behaviour. Computer applications.  
Prereq: CIV E 303

CIV E 404  W 2C,2T  0.5  
Structural Analysis 3  
Approximate methods of analysis for a variety of structural forms. Application of approximate techniques to beams, building frames, shear wall structures, plates, buckling and vibration problems. Approximate structural design.  
Prereq: CIV E 313, 413

CIV E 405  W 3C,1T  0.5  
Structural Dynamics  
Prereq: CIV E 222, 303

CIV E 407  W 2C,2T  0.5  
Building Science and Technology  
Prereq: CIV E 313, 413, 414 or consent of instructor

CIV E 413  F.S  3C,1T  0.5  
Structural Steel Design  
Prereq: CIV E 303

CIV E 414  S.F  3C,1T  0.5  
Structural Concrete Design 2  
Prereq: CIV E 313

CIV E 415  W 2C,2T  0.5  
Structural Systems  
Geometries, loads, safety and serviceability, structural idealizations. Building design and bridge design. Proportioning of components and structures in concrete, steel, masonry and wood.  
Prereq: CIV E 313, 413, 414

CIV E 422  W 3C,1T  0.5  
Finite Element Analysis  
This course focuses on the development of the basic fundamentals of the finite element method with applications in fluid flow, mass transport, solid mechanics and structures. Topics include: discrete problems, matrix methods, variational principle, method of weighted residuals, element shapes, and interpolation functions.  
Prereq: CIV E 222, 303

CIV E 440  W 3C,1T  0.5  
Transport Systems Analysis  
Introduction to basic concepts of transport systems analysis: systems analysis framework, accounting methods, experimental design techniques, decision theory, basic approaches to simulation modelling. The emphasis is on development of methods of analysis for application to selected case studies in the transport sector.  
Prereq: CIV E 342

CIV E 442  W 3C,1L  0.5  
Pavement Structural Design  
Pavement design, soil identification, subgrade design, base courses, flexible pavement design, design and testing of asphaltic concrete mixes, surface treatments.  
Prereq: CIV E 353

CIV E 454  W 2C,2T  0.5  
Geotechnical Engineering 3  
Simulation of geotechnical consulting practice. Students are required to complete several projects, based on actual case studies, which require problem identification, evaluation of geotechnical data, analysis, design and report preparations.  
Prereq: CIV E 353, 354

CIV E 460  F 3C,2T  0.5  
Orthopaedic Biomechanics  
Introduction of engineering technology to the field of orthopaedics. Specific topics deal with the repair and reconstruction of portions of the musculoskeletal system affected by trauma or pathological response. Primary study is directed toward the skeletal joints and major load carrying structures.  
Prereq: CIV E 204, 265

CIV E 472  F.S  3C,1T,1L  0.5  
Wastewater Treatment  
Prereq: CIV E 375  
Cross-listed as ENV E 472

CIV E 473  W 3C,1T  0.5  
Contaminant Transport  
Prereq: CIV E 375  
Cross-listed as ENV E 473

CIV E 483  W 2C,5L  0.5  
Design of Urban Water Systems  
Design of water supply and distribution systems. Design of waste and storm water collection systems. Storm water management. The course consists of 24 hours of lectures and a subdivision design project. The emphasis is on computer aided design and sustainability, using commonly used software packages.  
Prereq: CIV E 375, 381 and 466  
Antireq: ENV E 431

CIV E 486  S.F  3C,1T  0.5  
Hydrology  
Basic components of the hydrologic cycle. Introduction to frequency analysis and time series analysis. Rainfall-runoff relationships. Unit hydrograph theory. Hydrologic and hydraulic routing. Introduction to hydrologic design: design storms and storm water management. Rural and urban simulation models.  
Prereq: CIV E 224

CIV E 491  W 3C  0.5  
Engineering Law  
Restricted to 4B Civil and Geotechnical Engineering students
CIV E 493 W 2C,2T 0.5 Engineering in the Canadian North

CIV E 496 W 3C,1T 0.5 Construction Engineering
Topics in construction management and engineering including non-deterministic computing methods for construction modelling and analysis, network methods, optimization, risk management and resource allocation. Construction methods and trenchless technology.

CIV E 499 W 2S 0.0

Seminar
The engineer in society. Principles, methods and practice of Civil Engineering. Informal lectures.

Classical Studies

Undergraduate Officer
S.L. Ager, ML 239, ext. 2943

CLASSICAL STUDIES
(Courses in Translation)

Note
Students should consult with the departmental Undergraduate Advisor for the latest information on course offerings. Some courses are offered in rotation.

CLAS 100 F,W 3C 0.5
An Introduction to Classical Studies
An introduction to Greek and Roman civilization, focusing on six key aspects of the discipline of classical studies: history, literature, philosophy, myth and religion, art and architecture, and classical archaeology. Not open to students with more than two CLAS courses.

CLAS 101 F 3C 0.5
Colossos – The Major Figures of Ancient Greece
An introductory study of the achievement of ancient Greece through some of its most prominent figures. Each year two of the following will be featured: Cleopatra and the Collapse of the Hellenistic World; Homer and Heroic Greece; Pericles and the Rise of Democracy; Socrates, Man and Martyr; Alexander the Great and The Age of Expansion.

CLAS 102 W,S 3C 0.5
Colossos – The Major Figures of Ancient Rome
An introductory study of the achievement of ancient Rome through some of its most prominent figures. Each year two of the following will be featured: Julius Caesar and the Collapse of the Republic; Augustus: The Empire Rises; Nero and the Corruption of Power; Hadrian and the Imperial Machine.

CLAS 201 F,W,S 3C 0.5
Ancient Greek Society
A survey of the civilization of Classical Greece, featuring such topics as the individual (male and female), political institutions, art, religion, philosophy, literature, social life and leisure activities.

Students are advised to preregister early for this course as enrolment is limited.

This course may be used toward the All requirement; it is not open to first-year students.

CLAS 202 W,S 3C 0.5
Ancient Roman Society
A survey of the civilization of the Roman Republic and Empire, featuring such topics as the individual (male and female), political institutions, art, religion, philosophy, literature, social life and leisure activities.

Students are advised to preregister early for this course as enrolment is limited.

This course may be used toward the All requirement; it is not open to first-year students.

CLAS 252 F 3C 0.5
Roman History
A survey of ancient Roman history, from the Republic to the Empire, emphasizing particularly its political and military aspects.

This course is acceptable for credit by the History Department.

CLAS 255 F 3C 0.5
Early Medieval Society
A survey of early Medieval civilization featuring such topics as the individual (male and female), political institutions, art, architecture, religion, philosophy, literature, social life and leisure activities.

CLAS 256 3C 0.5
Ancient Epic In Translation
This course examines ancient epic; through the Iliad and Odyssey of Homer, the Argonautica of Apollonius Rhodius and the Aeneid of Vergil. The evolution of the epic genre is traced in lectures and discussions. No knowledge of Greek or Latin is needed.

CLAS 301 W 3C 0.5
Ancient Tragedy In Translation
This course examines ancient drama through the Oresteia of Aeschylus, the Eumenides of Eschylus, the "Oedipoue" plays of Sophocles, and the Medea, Hippolytos and Bacoche of Euripides. Roman tragedy is also studied for comparative purposes through the plays of Seneca. No knowledge of Greek or Latin is needed.

CLAS 309 3C 0.5
Ancient Myth and Religion 1
A survey of the evidence for the lives of women, as well as the relations between women and men, in antiquity.

Prereq: One of CLAS 100, 201, 202, or permission of instructor.

CLAS 302 3C 0.5
Ancient Myth and Religion 2
A study of Greek and Roman myth, including the birth of the gods, creation, the Olympians, Prometheus and the fall, the flood, the four ages, and the Greek mystery religions.

Not open to first-year students.

CLAS 311 W 3C 0.5
Ancient Myth and Religion 1
A study of Greek and Roman myth, including the cycles of Troy, Mycenae, Thebes; the Argonauts, the heroes, Odysseus; and the oriental mystery religions (with their relation to Christianity).

Not open to first-year students.
CLAS 351 W 3C 0.5
Greek Art and Architecture
A survey of the art and architecture of the ancient Greek world from the Minoan to the Hellenistic periods.
Not open to first-year students. Cross-listed as FINE 310

CLAS 352 3C 0.5
Roman Art and Architecture
A survey of the art and architecture of the Roman world from Etruscan to Imperial Times.
Not open to first-year students. Cross-listed as FINE 311

CLAS 351 F 3C 0.5
History of Ancient Philosophy 1
From the beginnings to Plato. Cross-listed as PHIL 380 Offered by the Philosophy Department

CLAS 352 W 3C 0.5
History of Ancient Philosophy 2
From Aristotle to the close of classical antiquity. Cross-listed as PHIL 381 Offered by the Philosophy Department

CLAS 365 3C 0.5
Ancient Comedy in Translation
The comedy of the ancient Greeks and Romans will be examined through selected plays of Aristophanes, Menander, Laius and Terence. The different types of comedy, and their evolution, will be studied in lectures and discussions. No knowledge of Greek or Latin is needed.
Prereq: CLAS 258 or instructor’s permission
Cross-listed as DRAMA 385 (formerly DRAMA 358)

CLAS 366 S 2S 0.5
Ancient Lyric and Satire in Translation
Lyric poetry of Greece and Rome, including Sappho, Pindar, Catullus, Horace and others; classical satire, including Horace, Strabo, Juvenal, Lucian. No knowledge of Greek or Latin is needed.
Prereq: CLAS 265 or 266 or an appropriate course in literature, or instructor’s permission

CLAS 371 3C 0.5
Christianity and the Roman Empire
This course examines the relationship between Christianity and the Roman Empire, dealing in particular with the Christians in the social context of the Roman Empire generally and its various regions.
Prereq: CLAS 202, 252 or permission of instructor

CLAS 373 3C 0.5
The Fall of the Roman Empire
This course deals with the transition of the Roman Empire into the beginnings of the European states in the West and the Byzantine Empire in the East. Popular theories for the "decline and fall" of the old Roman Empire are examined.
Prereq: CLAS 202, 252 or instructor’s permission

CLAS 384 3C 0.5
Science and Technology of Ancient Greece and Rome
A study of scientific thought and achievements in such areas as astronomy, biology, anatomy and medicine, and of the technological skills which produced and distributed raw materials, manufactured goods and agricultural products.
Prereq: First-year science or engineering course, or CLAS 201 or 202 or 251 or 252 or instructor’s permission

CLAS 485 2C 0.5
Greco-Roman Civilization and History
This is a topic-oriented directed study course intended for senior students. Available only through Distance Education. Consult the Distance Education calendar for more details.

CLAS 486A-W F,W 2S 0.5
Senior Seminar
Each Fall and Winter term a senior seminar on some aspect of Greek or Roman civilization will be offered. Students taking this course at the expanded level as a thesis substitute will register in it as 486X or Y (see below).
Prereq: Completion of relevant core courses (CLAS 251/252 and 265 or 266) or permission of instructor.
This course is acceptable for credit for the History Department (but not as a History senior seminar).

CLAS 486X-Y 1.0
Expanded Senior Seminar
Those students who choose not to pursue the thesis option (CLAS 490A/B) may substitute an expanded senior seminar. Students registered in the course at this level will participate in the senior seminar offered in that term (CLAS 486A-W), but will be expected to produce a significant amount of extra work for 486X or Y.
Prereq: Completion of relevant core courses (CLAS 251/252 and 265 or 266) or permission of instructor.

CLAS 490A/B F,W 0.5/0.5
Senior Honours Thesis
In their third year, honours students should consult with the Department Chair and Undergraduate Advisor about writing their honours thesis. For further details, see above under "Classical Studies Programs" and consult the Department.
A letter grade for CLAS 490A will be submitted only after the completion of CLAS 490B.

CLAS 492-498
Directed Study
Under exceptional circumstances, and only with the prior approval of the Department, a student may substitute an individualized course of study at the senior level (worth a total of 1.0 credit) for the thesis work. Such circumstances might include, for example, the student's participation in an approved archaeological dig. For further details, consult the Department.

GREEK
Note
1. Students should consult with the departmental Undergraduate Advisor for the latest information on course offerings. Some courses are offered in rotation.
2. Senior standing in Greek is normally defined as successful completion of GRK 201 and 202; exceptional students may also be admitted to 300- or 400-level courses with instructor’s permission. For 400-level courses a 300-level course is strongly recommended as a preliminary.

GRK 100A F 4C 0.5
Introductory Ancient Greek 1
A course designed for students beginning the study of ancient Greek or who have not yet reached the level expected in GRK 201/202. The teaching approach emphasizes exposure to simple texts as soon as possible, but students desiring minimal competence in reading should go on to do GRK 100B.
Antireq: RS 106A

GRK 100B W 4C 0.5
Introductory Ancient Greek 2
Continuation of GRK 100A. Most of the rules of Greek grammar will be covered by the end of the year, and students should have a minimal competence in reading prose texts; but for the remaining grammar and further practice students should go on to do GRK 231.
Prereq: GRK 100A or RS 106A
Course Descriptions

Classical Studies

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Title</th>
<th>Credits</th>
<th>Prerequisites</th>
</tr>
</thead>
<tbody>
<tr>
<td>GRK 201 F 3C 0.5</td>
<td>Intermediate Greek</td>
<td></td>
<td>The course will complete the study of Greek grammar and move on to unadapted readings in Greek authors. Prereq: GRK 100B or equivalent (Formerly GRK 231)</td>
</tr>
<tr>
<td>GRK 202 W 3C 0.5</td>
<td>Selections from Greek Authors</td>
<td></td>
<td>A course designed to follow GRK 201 including both literature and grammar review. Authors normally read are Plato and Homer. Prereq: GRK 201 (Formerly GRK 232)</td>
</tr>
<tr>
<td>GRK 351 F 3C 0.5</td>
<td>Advanced Composition and Grammar</td>
<td></td>
<td>Intensive study of Greek language and style through composition and translation. Prereq: Senior standing in Greek</td>
</tr>
<tr>
<td>GRK 363 3C 0.5</td>
<td>Introduction to Greek Tragedy</td>
<td></td>
<td>An examination of the dramatic art of Euripides and Sophocles by translations from the Greek and readings in English translation. Prereq: Senior standing in Greek</td>
</tr>
<tr>
<td>GRK 370 3C 0.5</td>
<td>Greek Historians</td>
<td></td>
<td>One or more of Herodotus, Thucydides, Xenophon may be read. Prereq: Senior standing in Greek</td>
</tr>
<tr>
<td>GRK 375 3C 0.5</td>
<td>Homer</td>
<td></td>
<td>Extended reading of Homer. Prereq: Senior standing in Greek (Formerly GRK 452)</td>
</tr>
<tr>
<td>GRK 472 W 3C 0.5</td>
<td>Advanced Reading in Greek Poetry</td>
<td></td>
<td>Selections from one or more authors may be read, e.g., Aeschylus, the Lyric poets. Prereq: Senior standing in Greek</td>
</tr>
<tr>
<td>GRK 473 3C 0.5</td>
<td>Greek Comedy</td>
<td></td>
<td>Selected plays of Aristophanes and Menander. Prereq: Senior standing in Greek (Formerly GRK 462)</td>
</tr>
<tr>
<td>GRK 474 3C 0.5</td>
<td>Advanced Reading in Greek Prose</td>
<td></td>
<td>Demosthenes, Lysias and other authors may be read. Prereq: Senior standing in Greek</td>
</tr>
<tr>
<td>GRK 475 3C 0.5</td>
<td>Reading in Greek Philosophy</td>
<td></td>
<td>One or more authors may be read, e.g., the Pre-Socratics, Plato, Aristotle. Prereq: Senior standing in Greek</td>
</tr>
<tr>
<td>GRK 490-499</td>
<td>Senior Reading Courses</td>
<td></td>
<td>In special circumstances, and with the approval of the Department, a student or small group of students may arrange to pursue individualized readings under the supervision of a faculty member. Prereq: Senior standing in Greek</td>
</tr>
<tr>
<td>LAT 351 3C 0.5</td>
<td>Latin Composition and Grammar</td>
<td></td>
<td>Composition, translation and grammar with intensive analysis of selected passages. Prereq: Senior standing in Latin</td>
</tr>
<tr>
<td>LAT 363 3C 0.5</td>
<td>Roman Comedy</td>
<td></td>
<td>The study in Latin of at least one play by Plautus or Terence, with supplementary readings in translation. Prereq: Senior standing in Latin</td>
</tr>
<tr>
<td>LAT 384 F 3C 0.5</td>
<td>Roman Oratory and Rhetoric</td>
<td></td>
<td>Selected orators and rhetoricians may be read, e.g., Cicero, Seneca, Quintilian, the Panegyricists. Prereq: Senior standing in Latin (Formerly LAT 361)</td>
</tr>
<tr>
<td>LAT 385 3C 0.5</td>
<td>Roman Lyric Poetry</td>
<td></td>
<td>Selections from Catullus and Horace. Prereq: Senior standing in Latin</td>
</tr>
<tr>
<td>LAT 371 3C 0.5</td>
<td>Early Roman Historians</td>
<td></td>
<td>Readings from one or more of the early historians, e.g., Sallust, Livy. Prereq: Senior standing in Latin</td>
</tr>
<tr>
<td>LAT 375 3C 0.5</td>
<td>Vergil</td>
<td></td>
<td>Selections from the Aeneid, Georgics, Eclogues may be read. Prereq: Senior standing in Latin</td>
</tr>
<tr>
<td>LAT 381 3C 0.5</td>
<td>Medieval Latin</td>
<td></td>
<td>Survey of Medieval Latin poetry and prose. Prereq: Senior standing in Latin</td>
</tr>
<tr>
<td>LAT 391 3C 0.5</td>
<td>Advanced Latin Reading</td>
<td></td>
<td>A reading course designed to follow the second year of Latin. By the end of the course students should be competent to read moderately difficult prose and poetic texts. Authors and teaching techniques will be chosen to fit the needs of the students. Prereq: Senior standing in Latin Recommended: LAT 351</td>
</tr>
<tr>
<td>LAT 421 W 3C 0.5</td>
<td>Latin Epigraphy</td>
<td></td>
<td>The course introduces and investigates Latin inscriptions as evidence for the Latin language and Roman political, religious, legal, social and economic history. Prereq: Senior standing in Latin</td>
</tr>
</tbody>
</table>
Combinatorics and Optimization

**Undergraduate Officer**

W.H. Cunningham, MC 5033A, ext. 4627
e-mail: whcunning@math.uwaterloo.ca

**Note**

More detailed course descriptions and course outlines are available in the C&O Undergraduate Handbook.

**C&O 203 S 3C, I/IT 0.5**

Discrete Mathematics (for Engineers)


Prerequisite: E&CE 223, E&CE 250

Antirequisite: C&O 220

Cross-listed as E&CE 203

Not open to students in the Faculty of Mathematics

**C&O 220 W 3C 0.5**

Introductory Combinatorics

Elementary principles of enumeration. Principle of inclusion-exclusion, generating functions, recurrence equations. Elementary graph theory and graphical algorithms. Introduction to design theory.

Antirequisite: C&O 230

C&O 220 cannot be counted for credit toward a BMath Honours degree.

**C&O 227 F 3C 0.5**

Introduction to Optimization Models


Prerequisite: MATH 108, 125 or equivalent

Antirequisite: C&O 350, 355

C&O 227 cannot be counted for credit toward a BMath Honours degree.

**C&O 230 F,W,S 3C 0.5**

Introduction to Combinatorics

Introduction to the combinatorics of ordinary generating functions. Introduction to basic graph theory and graphical algorithms.

Prerequisite: MATH 136, 138

Antirequisite: C&O 220

Also offered at St. Jerome's College in the fall term

**C&O 330 F 3C 0.5**

Combinatorial Enumeration

The combinatorics of the ordinary and exponential generating functions. Matrix methods, and decompositions. Applications to the enumeration of sequences, permutations, trees, lattice paths and partitions.

Prerequisite: C&O 230

**C&O 331 W 3C 0.5**

Coding Theory

A first course in error-correcting codes. Linear block codes, Hamming-Golay codes and multiple error-correcting BCH codes are studied. Various encoding and decoding schemes are considered.

Prerequisite: MATH 235

**C&O 342 F,S 3C 0.5**

Introduction to Graph Theory

An introduction to the ideas, methods and applications of graph theory. Finding shortest paths and maximum matchings in weighted graphs. Determining the connectivity of a graph.

Prerequisite: C&O 230

**C&O 350 F,W,S 3C 0.5**

Linear Optimization


Prerequisite: MATH 136

Antirequisite: C&O 227, ACTSC 335

C&O 355 may be substituted for C&O 350 in any degree program or for prerequisite purposes.

**C&O 351 F,W,S 3C 0.5**

Network Flow Theory


Prerequisite: C&O 350 or 355

**C&O 355 F 3C 0.5**

Mathematical Optimization

Linear optimization: feasibility theorems, duality, the simplex algorithm. Discrete optimization: integer linear programming, cutting planes, network flows. Continuous optimization: local and global optima, feasible directions, convexity, necessary optimality conditions.

Prerequisite: MATH 235, 237

C&O 355 may be substituted for C&O 350 in any degree program or for prerequisite purposes.
Course Descriptions

Combinatorics and Optimization

C&O 367 F W 3C 0.5
Nonlinear Optimization
Prereq: MATH 235, 237

C&O 370 FW 3C 0.5
Deterministic OR Models
An applications-oriented course that illustrates how various mathematical models and methods of optimization can be used to solve problems arising in business, industry and science.
Prereq: C&O 350 or 355

C&O 380 WS 3C 0.5
Mathematical Discovery and Invention
A course in problem solving. 100 problems are studied. Problems are taken mainly from the elementary parts of algebra, geometry, number theory, combinatorics and probability.
Prereq: MATH 135, 136, 138 and third-year standing

C&O 430 W 3C 0.5
Algebraic Enumeration
The Lagrange implicit function theorem, hypergeometric series, and the ring of formal Laurent series. The combinatorics of Eulerian generating series, enumeration under the action of a group, the algebra of symmetric functions, the group algebra of the symmetric group, with applications.
Prereq: C&O 330

C&O 434 F 3C 0.5
Combinatorial Designs
Prereq: PMATH 336

C&O 437 W 3C 0.5
Cryptography and Communications Security
Conventional or single key cryptography from the Caesar cipher to the U.S. Data Encryption Standard. Public or two key cryptography. Applications include secrecy/privacy, user or message authentication, financial transactions security.
Prereq: STAT 230. At least one of C&O 331 and PMATH 340 is recommended.

C&O 438 F 3C 0.5
Combinatorial Computing
Applications of computers to combinatorial problems. General procedures - backtrack programming, generation of permutations, partitions, etc., as well as the solution of many specific problems. Includes an introduction to computational complexity.
Prereq: C&O 230. Some programming experience is required.

C&O 439 3C 0.5
Topics in Combinatorics
An undergraduate seminar in combinatorics. The primary objective is to study current work in specific areas of combinatorics. Course content may vary from term to term.
Prereq: Consent of instructor

C&O 440 F 3C 0.5
Topics in Graph Theory
An in-depth study of one or two topics in graph theory. Course content may vary from term to term. Topics may include planar graphs, extremal graph theory, directed graphs, enumeration, algebraic graph theory, probabilistic graph theory, connectivity, graph embedding, colouring problems.
Prereq: C&O 342 or consent of instructor

C&O 442 F 3C 0.5
Graph Theory
Prereq: C&O 342 or consent of instructor

C&O 444 W 3C 0.5
Algebraic Graph Theory
Prereq: C&O 230, PMATH 336

C&O 450 F 3C 0.5
Combinatorial Optimization
Characterizations of optimal solutions and efficient algorithms for optimization problems over discrete structures. Topics include network flows, optimal matchings, T-joins and postman tours, matroid optimization.
Prereq: C&O 351 or 355

C&O 452 W 3C 0.5
Integer Programming
Formulation of problems as integer linear programs. Solution by branch-and-bound and cutting plane algorithms. Introduction to the theory of valid inequalities and polyhedral combinatorics.
Prereq: C&O 351 or 355

C&O 453 F 3C 0.5
Network Design
Prereq: C&O 350 or 355. C&O 351 is recommended.

C&O 454 S 3C 0.5
Scheduling
Sequencing algorithms for scheduling tasks on single machines, parallel machines, and flow shops. Applications to scheduling computers and manufacturing facilities. Combinatorial techniques used in algorithm development and convergence proofs.
Prereq: C&O 350 or 355. C&O 351 or 370 is recommended.

C&O 456 3C 0.5
Topics In Optimization
An undergraduate seminar in optimization. The primary objective is to study recent work in specific areas of optimization. Course content may vary from term to term.
Prereq: Consent of instructor
Course Descriptions
Combinatorics and Optimization
Computer Science

Computer Science

Undergraduate Advisors
B.W. Reckter, DC 3105, ext. 4681
G. Vreugdenhil, DC 3106, ext. 4452

Notes
1. The Department of Computer Science
has two distinct streams of courses,
one for students who have been
admitted into a Computer Science
Major program, and another designed
for non-specialists who wish to
become sophisticated computer users.
CS courses numbered with middle
digits 4 through 9 are considered CS
Major courses. All other CS courses
numbered with a middle digit of 0
through 3 are non-major courses.
As such, they will not normally be
open to Computer Science Major stu-
dents, but they will be available to all
other students in the University, sub-
ject to resource limitations. CS 120,
130 and 134 are normally restricted
to students in the Faculty of Mathematics.
Several CS Major courses are also
open to other students. In addition,
where resources permit, students with
exceptionally high academic standing
in other programs may be considered
for admission to restricted CS Major
courses on an individual basis. To be
considered, students should consult a
Computer Science Undergraduate
Advisor.

2. Computer Science Major courses
require students to have experience
programming with a block-structured
imperative language such as Pascal,
C or Turing. These concepts of com-
puter programming are covered in CS
130. Students who have substantial
programming experience will be per-
mitted to start their program with CS
134, which is an introduction to the
basic concepts of computer science.
Students in CS Major programs who
do not take CS 130 will be required to
take an additional third or fourth-year
CS Major course.

3. The Computer Science Department
is experiencing demand for its courses
beyond available resources. Thus,
access to Computer Science courses
cannot be guaranteed to all students.
Every effort will be made to accommo-
date the students who preregister dur-
ing published University preregistra-
tion periods, during which time, priority
will be given to students who are at
the appropriate year level. However,
admission to specific courses cannot
be guaranteed and course substitu-
tions may be required to satisfy
degree requirements.

4. Regular students will not normally be
permitted to enrol in Computer
Science major courses during the
Spring term.
Co-op students will not normally be
permitted to enrol in Computer
Science courses while on a work term.
All other part-time students, as well
as full-time non-degree and post-
degree students, will normally be
limited to at most one Computer
Science course per term from the non-
specialist offerings. (Post-degree stu-
dents on academic leave from their
home institution should consult a
Computer Science Advisor.) Priority
for registration will normally be given
to students registered full-time in a
degree program.

5. Students in first and second year are
limited to one Computer Science
course per term. Students in CS Major
programs are limited to three CS
courses per term in third and fourth
year. Other students are limited to two
CS courses per term in third and
fourth year.

6. Please note that the terms in which
courses are offered may deviate from
those indicated below. Students are
advised to consult the University
Course Offerings List published at
pre-registration time.

7. Where there is significant overlap
between major and non-specialist
courses, the major course can be
used to satisfy the prerequisite for
non-specialist courses, unless
otherwise specified.

8. Students who have demonstrated
exceptionally strong academic perfor-
mance will be permitted to enrol in 800-
level CS courses at the discretion of
the instructor, if there is available
capacity. Courses at the 600 level
may not be used to satisfy a program
requirement for minimum number of
courses in Computer Science at the
400 level.

9. The prerequisite phrase "x-year stand-
ing" means that a student must be
registered in year x or higher.

10. The standard penalty for cheating
will be the assignment of a grade of
100% for the assignment, test or
examination in question, with a minimum
deduction of 5% from the final course
grade. All such incidents will also be
reported to the Associate Dean
11. Since CS 462 and 476 are offered only in the Fall term, Co-op students in Stream 8 will need to carefully plan the sequence of prerequisites in order to take these courses in the Fall term.

CS 100 F,W,S 1C,3L 0.5
Introduction to Computer Usage
Introduction to using personal computer hardware and software. Using personal computers as effective problem solving tools for the present and the future. Experience with common application software including word processing, spreadsheets, database management, and electronic communications. Exposure to the Internet and World Wide Web. Programming principles to support the understanding of application software. Antireq: Ontario Academic Course Computer Science or equivalent. May not be taken after any other Computer Science course. CS 100 cannot be taken for credit toward a BMath Honours degree.

CS 102 F,W,S 3C,2L 0.5
Introduction to Programming for Scientific Applications
Fundamental techniques of algorithm design and program development. Topics include: structured programming, simple data elements, sequential operations, iterative statements, selection statements, data aggregations, functions and subroutines. Emphasis is placed on mathematical and statistical computing.
   Prereq: Computer literacy (e.g. CS 100 or extensive high school computing)
   Antireq: CS 112, 130
   CS 102 cannot be counted for credit toward a BMath Honours degree.

CS 112 W 2C,2T,2L 0.5
Introduction to Computer Programming
Fundamental techniques of algorithm design and program development. Topics include: structured programming, simple data elements, sequential operations, iterative statements, selection statements, data aggregations, functions and procedures, and an introduction to the development of databases. The examples demonstrate a variety of applications for computer programming.
   Prereq: Computer literacy (e.g. CS 100 or extensive high school computing)
   Antireq: CS 102, 130
   CS 112 cannot be counted for credit toward a BMath Honours degree.

CS 120 F 2C,2T,2L 0.5
Computers as Problem Solving Tools
Effective problem solving using current computer environments and ones in years to come. A broad understanding of how to use personal computers. Problem solving through computer programming and application software. Strategies for learning about computer technology.
   Prereq: Full-time degree registration in the Faculty of Mathematics
   Antireq: CS 100 or OAC Computer Science or equivalent.
   CS 120 should be taken before CS 130 by students who have little or no computing experience.

CS 130 F,W,S 2C,2T,2L 0.5
Developing Programming Principles
Review of fundamental programming concepts, including data types, structured programming, and looping and decision control structures. Extension to modularity and elementary data structures. Emphasis on the software engineering life cycle, including algorithm design, implementation, testing and debugging, and maintenance, culminating in team projects.
   Prereq: Exposure to programming, such as Grade 10 or 11 Computer Science or CS 120, and full-time degree registration in the Faculty of Mathematics
   Antireq: CS 102, 112
   CS 120 should be taken before CS 130 by students who have little or no computing experience. CS 130 should be taken before CS 134 by students who have not had substantial programming experience.
   Also offered at St. Jerome's College in the Fall term

CS 134 F,W,S 3C,1T,3L 0.5
Principles of Computer Science
An introduction to basic concepts of computer science, including the paradigms of theory, abstraction, and design. Broad themes include the design and analysis of algorithms, the management of information, and the programming mechanisms and methodologies required in implementations. Topics discussed include iterative and recursive sorting algorithms; lists, stacks, queues, trees, and their application; and the history and philosophy of computer science.
   Prereq: Full-time degree registration in the Faculty of Mathematics and CS 130 or an equivalent level of knowledge and experience.
   Antireq: CS 212
   Also offered at St. Jerome's College in the Winter term

CS 212 F 3C 0.5
Programming Principles and Practice
High-level languages, including their specification and translation. Structured programming. Use of data structures, including lists and trees. Recursion. Sorting. Introduction to computational complexity and correctness.
   Prereq: One of CS 102, 112, or equivalent
   Antireq: CS 134
   CS 212 cannot be counted for credit toward a BMath Honours degree.

CS 230 F,W,S 3C 0.5
Introduction to Computers and Computer Systems
Basic computer architecture, operating system services, and programming languages in support of development of software systems.
   Prereq: One of CS 134, 212
   Antireq: CS 241, 246, 342
   CS 230 cannot be counted for credit in a Computer Science Major program.

CS 241 F,W,S 3C 0.5
Foundations of Sequential Programs
The relationship between high-level languages and the computer architecture that underlies their implementation, including basic machine architecture, assemblers, specification and translation of programming languages, linkers and loaders, block-structured languages, parameter passing mechanisms, and comparison of programming languages.
   Prereq: CS 246
   Antireq: CS 230

CS 246 F,W,S 3C 0.5
Software Abstraction and Specification
Systematic methods for designing, coding, testing, and documenting medium-sized programs. Major topics include formal specification, abstraction, modularity and reusability. Students will become strong apprentice programmers able to write a clear specification for a problem, read a specification and design the software to implement it, use appropriate data structures in a program, write reusable code and reuse existing code when possible, debug a program, and adequately test a program.
   Prereq: CS 134
   Antireq: CS 230
CS 316 W 3C,1L 0.5
Introduction to Statistical Problem Solving by Computer
This is an applications oriented course which prepares the nonmathematical student to use the computer as a research tool. Topics include aids for statistical analysis and the preparation of documents such as reports and theses. The course provides sufficient background for application to other problems specific to the individual's field.
Prerequisite: One statistics course and computer literacy (e.g. CS 100 or high school computing), or consent of instructor
CS 316 cannot be counted for credit toward a BMath degree.
CS 330 F,W,S 3C 0.5
Management Information Systems
An introduction to information systems and their strategic role in business. Topics include types of information systems, organizational requirements, systems development strategies, decision support systems, data and information management, and information systems management, control and implementation.
Prerequisite: 2D standing and one of CS 134, 212
Antirequisite: CS 480, M SCI 441, ACC 241, 442
CS 330 cannot be counted for credit in a Computer Science Major program.
CS 334 W 3C 0.5
Data Types and Structures
Top-down design of data structures. Using representation-independent data types. Introduction to commonly used data types, including lists, sets, mappings, and trees. Selection of data representation.
Prerequisite: Third-year standing and one of CS 230, 246
Antirequisite: CS 340
CS 334 cannot be counted for credit in a Computer Science Major program.
CS 337 W 3C 0.5
Introduction to Numerical Analysis
Pitfalls in computation; solution of linear algebraic equations; polynomial interpolation; least squares; numerical integration and differentiation. The intent is to expose students to the theory behind modern algorithms for solving mathematical problems.
Prerequisite: CS 134 or 212, MATH 136, 138. One of CS 230, 246 is recommended.
MATH 235 and 237 are recommended.
Antirequisite: CS 370
CS 337 cannot be counted for credit in a Computer Science Major program.
CS 338 F,W,S 3C 0.5
Computer Applications in Business: Databases
A user-oriented approach to the management of large collections of data. Methods used for the storage, selection and presentation of data. Common database management systems.
Prerequisite: One of CS 230, 246, 330
Antirequisite: CS 448
CS 338 cannot be counted for credit in a Computer Science Major program.
CS 340 F,W,S 3C 0.5
Data Structures and Algorithms
The use of abstract data types in the design of data structures; efficiency dictionaries; sorting and priority queues. Techniques for designing efficient algorithms; application to problems on graphs; design of heuristics and approximate solutions to apparently intractable problems.
Prerequisite: CS 241, C&O 230, and registration in a Computer Science Major program
Antirequisite: CS 394
CS 342 F,W,S 3C 0.5
Concurrent Programming
An introduction to understanding concurrency and writing concurrent programs, with an emphasis on language constructs used to express and control concurrency, and different concurrent programming techniques and styles. Major topics include: coroutines, mutual exclusion, semaphores, high-level concurrency, deadlock, interprocess communication and process structuring. Students will learn how to structure, implement and debug basic concurrent programs.
Prerequisite: CS 241 and registration in a Computer Science Major program
Antirequisite: CS 230, 242
CS 351 F,W,S 3C 0.5
Digital Design and Architecture
Boolean algebra. Design and analysis of both combinational and sequential circuits. Registers, counters, memory, programmable logic. CPU control logic, the arithmetic-logic unit, input/output and interrupts.
Prerequisite: CS 241 and registration in a Computer Science Major program
Antirequisite: E&CE 223
CS 354 F,W 3C 0.5
Operating Systems
An introduction to the basic components of a modern operating system. Major topics include: concurrency in the large, memory management, device management, file systems, security, networks and distributed systems. Students will learn how to write complex programs that accomplish part of their operation through interaction with the operating system.
Prerequisite: CS 342 and registration in a Computer Science Major program
CS 356 F,W 3C 0.5
Introduction to the Theory of Computing
Models of computers including finite automata and Turing machines. Basics of formal languages with applications to syntax of programming languages. Unsolvable problems and their relevance to the semantics of programming. Concepts of computational complexity including NP completeness.
Prerequisite: CS 241, C&O 230
CS 370 F,W 3C 0.5
Numerical Computation
Principles and practices of basic numerical computation as a key aspect of scientific computation. Visualization of results. Approximation by splines, fast Fourier transforms, solution of linear and nonlinear equations, differential equations, floating point number systems, error, stability. Presented in the context of specific applications to image processing, analysis of data, scientific modeling.
Prerequisite: MATH 235, 237 and one of CS 230, 246
Antirequisite: CS 337
CS 430 F 3C 0.5
Applications Software Engineering
An investigation into the role and function of software engineering practice in the construction of computer based systems. Topics include: requirements and specification; documentation techniques; analysis and design; implementation; testing and maintenance; management issues.
Prerequisite: CS 330 or permission of instructor and third-year standing
Antirequisite: CS 446
CS 430 cannot be counted for credit in a Computer Science Major program.
CS 445 F,W,S 3C 0.5
Software Requirements Specification and Analysis
Introduction to the requirements definition phase of software development. Models, notations, and processes for software requirements identification, representation, validation, and analysis. An important component of the course is a group project: the software requirements specification of a large software system.
Prereq: CS 342, CS 360
Cross-listed as E&CE 451
Antireq: CS 432

CS 446 S 3C,1T,3L 0.5
Software Design and Architectures
Software design process and its models, representations of design/architecture, software architectures and design plans, design methods, design state assessment, design quality assurance, design verification. Implementation of a group project specified in CS 445.
Prereq: 445
Cross-listed as E&CE 452
Old version of CS 446, Software System Design and Implementation, will be offered during the Spring and Fall 1996 terms.

CS 447 W 3C,1T,3L 0.5
Software Testing, Quality Assurance and Maintenance
Systematic testing of software systems, software verification, symbolic execution, software debugging, quality assurance, measurement and prediction of software reliability, project management, software maintenance, software reuse, reverse engineering. Application to the group project from CS 445 and CS 446.
Prereq: CS 446
Cross-listed as E&CE 453

CS 448 F,W,S 3C 0.5
Introduction to Database Management
The course introduces the student to the techniques that have been developed for processing very large collections of data. The requirement that data be held on secondary storage (disks and tapes) has an enormous impact on the design of algorithms to access that data.
Prereq: CS 340, 354 and registration in a Computer Science Major program
Antireq: CS 338

CS 450 W 3C 0.5
Computer Architecture
The course is intended to provide the student with an appreciation of modern computer design and its relation to system architecture, compiler technology and operating system functionality. The course places an emphasis on design based on the measurement of performance and its dependency on parallelism, efficiency, latency and resource utilization.
Prereq: CS 351 or (CS 342 and E&CE 223), and registration in a Computer Science Major program

CS 452 F,S 3C 0.5
Real-time Programming
Intended to give students experience with tools and techniques of real-time programming, this course includes not only issues of microcomputer architecture and a real-time programming language and operating system, but also hands-on experience programming a microcomputer for applications such as process control, data acquisition and communication.
Prereq: CS 354 and registration in a Computer Science Major program.
CS 351 is recommended.

CS 454 F,W,S 3C 0.5
Distributed Systems
An introduction to distributed systems, emphasizing the multiple levels of software in such systems. Specific topics include fundamentals of data communications, network architecture and protocols, local-area networks, concurrency control in distributed systems, recovery in distributed systems, and clock synchronization.
Prereq: CS 354 and registration in a Computer Science Major program. CS 351 is recommended.

CS 457 W 3C 0.5
System Performance Evaluation
Basic techniques of system performance evaluation. Specific topics include: performance modeling, discrete event simulation, verification and validation of simulation models, analysis of simulation output, analysis of single server queue and queueing networks, modeling of computer systems, networks, and other queuing or non-queuing systems.
Prereq: CS 230 or 246. For non-CS majors, CS 334 is strongly recommended.
Antireq: CS 437
CS 458 W 3C 0.5
Design of Microprocessor-Based Systems
An introduction to the design of digital systems such as those used in microcomputers, control and industrial applications, or those dedicated to specific tasks. Topics include: digital electronics, microprocessors, memory chips and systems, standard and specialized peripheral chips, development and integration systems, and case studies. Laboratory-oriented: small team design and implement microprocessor-based systems.
Prereq: CS 351 and registration in a Computer Science Major program

CS 475 F 3C 0.5
Numeric Computation for Dynamic Simulation
Prereq: CS 370 or 337 and consent of instructor
Cross-listed as AM 441

CS 476 F 3C 0.5
Introduction to Artificial Intelligence
Prereq: CS 340 and registration in a Computer Science Major program

CS 477 W 3C 0.5
Introduction to Symbolic Computation
An introduction to the use of computers for symbolic mathematical computation, involving traditional mathematical computations such as solving linear equations (exactly), analytic differentiation and integration of functions, and analytic solution of differential equations.
Prereq: CS 241, PMATH 334 or consent of instructor

CS 478 F,W,S 3C 0.5
Introduction to Computer Graphics
Software and hardware for interactive computer graphics. Implementation of device drivers, 3-D transformations, clipping, perspective, and input routines. Data structures, hidden surface removal, colour shading techniques, and some additional topics will be covered.
Prereq: CS 340, 342, MATH 235, and registration in a Computer Science Major program

CS 480 W 3C 0.5
Information Systems Management
The integration of business and technical considerations in the design, implementation, and management of information systems. Topics include: IS planning and development; business, management, executive, and strategic information systems, including case studies of selected large-scale systems; decision support systems; end-user training and development; systems security, disaster planning and recovery. Practical examples of information systems in industry.
Prereq: CS 340 and registration in a CS major program
Antireq: CS 330, MSCI 441, (ACC 241/442)

CS 482 F,W 3C 0.5
Techniques in Systems Analysis
This course emphasizes the role of systems analysis in the production of quality software systems to meet organizational needs. Topics include systems development life cycle; skills required by systems analysts, such as communication, fact-finding and project management; data modelling and management; logical and physical data flow diagrams; feasibility and cost-benefit analysis; process modelling (decision tables, trees and structured English); and CASE tools for analysis. When possible, the course will provide experience with a group systems analysis project, report and presentation.
Prereq: CS 340 and registration in a Computer Science Major program
Coreq: CS 448
Antireq: CS 432
Last offering: Winter 1997

CS 488 F,W,S 3C 0.5
Computers and the Law of Information Technology
An introduction to the subject of computer law, examining current legal issues and problems relating to the use of computer-based information systems, the protection of computer software and data bases, and the acquisition and sale of computer systems.
Prereq: Third-year standing in a Computer Science Major program
DANCE 111 F,W PC,letd 0.5
Advanced Topics in Computer Science
See the Course Offerings List for topics available.
Prereq: Third-year standing in a Computer Science Major program

CS 498 0.5
Readings in Computer Science
This course cannot be used to satisfy any 400-level course requirement in a Computer Science Major program.

COURSES NOT OFFERED 1998-97
DANCE 200 Special Studies in Dance 1
DANCE 234 Women and Theatre Dance
DANCE 241 Benesh Notation 1
DANCE 242 Labanotation 1
DANCE 264 Developmental Aspects of Movement (see KIN 264)
DANCE 300 Special Studies in Dance 2
DANCE 333 Canadian Perspectives on Theatre Dance
DANCE 371 Issues in Dance and Society
DANCE 474 Directed Studies on Special Topics

Note
Laboratory sessions and rehearsal periods may be added to any course at the discretion of the instructor.

COURSES OFFERED 1998-99
DANCE 204 Elementary Modern Dance 2 W
DANCE 301 Intermediate Ballet 1 F
DANCE 302 Intermediate Ballet 2 W
DANCE 401 Advanced Ballet 1 F
DANCE 402 Advanced Ballet 2 W

Fine and Performing Arts
The University offers courses in Dance, Drama, Fine Arts, and Music.
For program information please see the Faculty of Applied Health Sciences and the Faculty of Arts.

Drama and Speech Communication
Undergraduate Officer
M. van Dijk, ML 129, ext. 3672
Co-ordinator of Speech Communication
J. Tomasson Goodwin, ML 122, ext. 5056

COURSES OFFERED 1998-99
DANCE 110 F 3C 0.5
Introduction to Dance
An examination of theatre dance and the various professional activities which contribute to its growth. Extensive viewing of films and videos as well as lectures, discussions, and workshop sessions.
No dance background necessary.

DANCE 111 F,W 2C,1std 0.5
The Elements of Dance
An examination, practical and theoretical, of the formal and thematic components of dance. Studio sessions deal with problem solving in space, dynamics and rhythm.
No dance background necessary.

Technique Courses
Entrance to Technique Courses is by permission of the instructor. Students are advised to check with their home department regarding the acceptability of Technique Courses for credit.
Each of the following courses consists of two 1 and 1/2 hour classes per week. Credit 0.25.
DANCE 201 Elementary Ballet 1 F
DANCE 202 Elementary Ballet 2 W
DANCE 203 Elementary Modern Dance 1 F

COURSES OFFERED 1998-99
DANCE 204 Elementary Modern Dance 2 W
DANCE 301 Intermediate Ballet 1 F
DANCE 302 Intermediate Ballet 2 W
DANCE 401 Advanced Ballet 1 F
DANCE 402 Advanced Ballet 2 W

Introduction to the Theatre 2
An extension of the studies described in 101A.

DRA 101 W 3C 0.5
Introduction to Acting
An introduction to acting. The class will be structured as a rehearsal, where the students will explore improvisation and text work, concentrating on the practical problems of an actor's experiences in creating a role.
Prereq: DRA 223 for Speech Communication majors
Prereq or Coreq: DRA 101A or B
Limited Enrolment. Must attend first class.

DRA 221 F 6L 0.5
Intermediate Acting 1
An extension of DRA 102. This course stresses development of the actor through scene study.
Prereq: DRA 101A or 101B, 102
Audition required

DRA 222 W 6L 0.5
Intermediate Acting 2
An extension of DRA 221.
Prereq: DRA 221
Audition required

DRA 223 W, S 4L 0.5
Public Speaking
Theory and practice of public speaking. A workshop course involving design and delivery of various kinds of speeches, and the development of organizational, vocal, listening and critical skills. Students will be videotaped.
Prereq: ACC 432
Open to students in all faculties but limited enrolment. Must attend first class.

DRA 224 W, S 3L 0.5
Interpersonal Communication
Focuses on the one-to-one, face-to-face communication in both the personal and professional realms. Such topics as verbal and non-verbal interactions, listening, and the better management of interpersonal communication will be studied.
Prereq: DRA 223 (Can be coreq for first-year prospective majors only)

DRA 225 F 3L 0.5
Interviewing
Theory and practice of interviewing. A workshop course which teaches theory, design, and presentation of interviews. Videotaping student exercises will enhance interview design and delivery, as well as listening and critical skills.
Recommended: DRA 223 and 224
DRAMA 243 F 2C,2L 0.5
Introduction to Technical Production 1
Theory and practice of building, painting, rigging and shifting scenery; construction of properties; familiarity with lighting instruments, sound equipment and their control systems. Students must spend a certain number of hours working on department productions.
Prereq: Permission of instructor

DRAMA 244 W 2C,2L 0.5
Introduction to Technical Production 2
An extension of the studies described in DRAMA 243.
Prereq: DRAMA 243

DRAMA 251 F 3C 0.5
Survey of Dramatic Literature and Dramatic Theory 1
The Greek and Roman periods.
Cross-listed as CLAS 266

DRAMA 259 3C 0.5
Masterpieces of Western Drama—A Study of Performance 1
Plays on film. This course will entail studying a play and then viewing it as a movie.

DRAMA 306 A/B/C F std 0.5
Special Studies in Theatre Production 1
Production participation and the study of selected problems of theatrical production.
Prereq: Permission of play director

DRAMA 307 A/B/C W std 0.5
Special Studies in Theatre Production 2
See DRAMA 306.
Prereq: Permission of play director

DRAMA 311 3C 0.5
Survey of Dramatic Literature and Theory 2
The Middle Ages, the Elizabethans and Jacobean (excluding Shakespeare), and the Spanish Golden Age.
Cross-listed as ENGL 232

DRAMA 312 3C 0.5
Survey of Dramatic Literature and Theory 3
French neo-classicism, the Restoration period and sentimental drama.
Cross-listed as ENGL 233A

DRAMA 313 3C 0.5
Survey of Dramatic Literature and Theory 4
The late 18th and 19th centuries; romanticism and naturalism.
Cross-listed as ENGL 233B

DRAMA 314 3C 0.5
Survey of Dramatic Literature and Theory 5
The first part of the 20th century.
Cross-listed as ENGL 233C

DRAMA 315 3C 0.5
Survey of Dramatic Literature and Theory 6
The second part of the 20th century.
Cross-listed as ENGL 233D

DRAMA 316 3C 0.5
Survey of Dramatic Literature and Theory 7
A survey of the modern drama of Australia, New Zealand, and the drama, in English, of Africa and the West Indies.
Cross-listed as ENGL 234

DRAMA 317 3C 0.5
Survey of Dramatic Literature and Theory 8
American drama from the 1920s to the present.

DRAMA 318 3C 0.5
Musical Theatre
Traces the development of the musical theatre with particular emphasis on the American contribution. The focus is divided between a historical overview using key texts, and a study of the form: the book, the lyrics, the music, and the economics.

DRAMA 321 F 6L 0.5
Advanced Acting 1
Advanced work in acting. Course involves individual and ensemble work in selections from specific plays with attention given to various periods and styles in acting.
Prereq: DRAMA 221, 222
Audition required

DRAMA 322 W 6L 0.5
Advanced Acting 2
An extension of the studies described in DRAMA 321.
Prereq: DRAMA 321
Audition required

DRAMA 323 F 3L 0.5
Speech Writing
The analysis, writing and performance of speeches. Analysis will focus on the theory of communication and speech models for imitation; writing, in-class workshops; and performance, on student evaluation of speeches.
Recommended: DRAMA 223
Cross-listed as ENGL 308E

DRAMA 324 W 3L 0.5
Small Group Communication
A workshop course which works from theory to develop the skills to work in groups effectively. The principles of group dynamics, leadership, and conflict resolution will be studied and implemented in small group meetings and presentations.
Recommended: DRAMA 224

DRAMA 326 F 3L 0.5
Voice Technique
A workshop course in voice for the speaker, designed to increase vocal power, range, flexibility and variety in presenting the spoken word.
Prereq: DRAMA 221 or 223

DRAMA 331 F 3LD 0.5
Design for the Theatre 1
An introduction to the problems of designing for the theatre. Work for the course will include the preparation of drawings and models as well as practical experience in the theatre.
Prereq: DRAMA 244 and permission of instructor

DRAMA 332 W 3LD 0.5
Design for the Theatre 2
An extension of the studies described in DRAMA 331, concentrating on the practicalities of set design.
Prereq: DRAMA 331

DRAMA 341 F 4L 0.5
Lighting Design for the Theatre 1
An introduction to the theory and practice of theatre lighting design through studio experience.
Prereq: DRAMA 244 and permission of instructor

DRAMA 342 W 4L 0.5
Lighting Design for the Theatre 2
Advanced studies in theatre lighting design, including major production experience.
Prereq: DRAMA 341 and permission of instructor

DRAMA 343 F 2L,2C 0.5
Theatre Management and Technology 1
The theory and practice of theatre technology. Special attention will be given to stage management, production management and house management. The course is an integral part of the departmental production season.
Prereq: DRAMA 243, 244 and permission of instructor
DRAMA 344 2L, 2C 0.5
Theatre Management and Technology 2
A continuation of the studies described in DRAMA 343.
Prereq: DRAMA 343 and permission of instructor.

DRAMA 348 3C 0.5
Arts Administration 1
An introduction to the problems and techniques of contemporary not-for-profit arts administration. Topics include: budgeting and financial control, marketing, volunteerism and board management relations.

DRAMA 349 3C 0.5
Arts Administration 2
An extension of the studies in DRAMA 348.
Prereq: DRAMA 348

DRAMA 350 3C 0.5
Arts Administration 3
An advanced course in management and development in the not-for-profit sector. Topics include: the context of philanthropy in Canada, understanding organized culture and the role of the not-for-profit board in fundraising.
Prereq: DRAMA 348 or permission of instructor.

DRAMA 361 F std 0.5
Russian Drama
Cross-listed as RUSS 341

DRAMA 362 3C 0.5
Russian Drama
Cross-listed as RUSS 342

DRAMA 363 3C 0.5
The Stage as Forum: German Drama in Translation
Cross-listed as GER 355

DRAMA 364 3C 0.5
The Stage as Forum: Russian Drama in Translation
Cross-listed as RUSS 356

DRAMA 365 3C 0.5
Ancient Comedy in Translation
Cross-listed as CLAS 365

DRAMA 366 3L 0.5
Children's Theatre
Principles, methods, forms and styles of theatre for children. Children's theatre play-scripts examined and evaluated in a workshop situation.

DRAMA 367 3C 0.5
Theatre History 1
Theatre history from Classical Greece to the Renaissance.

DRAMA 368 3C 0.5
Theatre History 2
Theatre history from the Classical French and English Restoration periods to the present era.

DRAMA 369 3C 0.5
Canadian Drama
See ENGLISH 316.
Cross-listed as ENGL 316

DRAMA 371 3C 0.5
Theatre History 1
Theatre History from Classical Greece to the Renaissance.

DRAMA 372 3C 0.5
Theatre History 2
Theatre history from the Classical French and English Restoration periods to the present era.

DRAMA 380 3C 0.5
Canadian Drama
See ENGLISH 316.
Cross-listed as ENGL 316
Course Descriptions
Earth Sciences

EARTH 121L F 3L 0.25
Introductory Earth Sciences Laboratory 1
For students taking EARTH 121. Laboratory exercises on selected topics from EARTH 121 lectures.
Antireq: GEO E 126, EARTH 126, SCI 250

EARTH 122L W 3L 0.25
Introductory Earth Sciences Laboratory 2
For students taking EARTH 122. Laboratory exercises on selected topics from EARTH 122 lectures.

EARTH 123 F 3C,1T 0.5
Introductory Hydrology
Introduction to components of the hydrologic cycle, the interaction of these components and their relevance to current environmental concerns. Particular consideration will be given to geologic factors as they influence precipitation, surface runoff, urban runoff, streamflow generation, soil moisture, groundwater and surface water-groundwater interactions.
Antireq: EARTH 223

EARTH 128 S 2C,3L 0.5
Geological Engineering Concepts
An introduction to physical geology and earth processes. Geological time, introduction to earth, air and water processes including volcanism, sedimentation, weathering, lithification, continental drift, radioactive dating, hydrogeology, pedology, resources, mass wasting, erosion. Cross-listed as GEO E 126
Antireq: EARTH 121 and 122, SCI 250

EARTH 221 W.S 3C,1T 0.5
Geochemistry 1
Prereq: EARTH 121 and 121L, 122 and 122L or 126 or First Year Chemistry or permission of instructor

EARTH 223 F 3C,1T 0.5
Hydrology
A review of the main components of the hydrologic cycle with a focus on quantitative analysis. The basic statistical treatment of hydrologic data and the evaluation of stream flow generation. Hydrologic processes related to land development and watershed management will be stressed.
Prereq: EARTH 121/121L, 122/122L or 126 (= GEO E 126), or permission of instructor

EARTH 231 F 2C,3L 0.5
Mineralogy
Systematic mineralogy. Classification and interrelationships of chemical, structural and physical properties of the major rock-forming minerals. Elementary petrology of igneous, metamorphic and sedimentary rocks in outcrop and hand specimen.
Prereq: EARTH 121/121L, 122/122L or 126 (= GEO E 126), or permission of instructor

EARTH 232 W,S 2C,3L 0.5
Petrography
An introduction to optical mineralogy. The study and occurrence of important rock forming minerals and their identification in igneous, metamorphic, and sedimentary rocks. The nature and origin of textural features of rocks.
Prereq: EARTH 231

EARTH 235 F 2C,3L 0.5
Stratigraphy
An introduction to the nature, origin and interpretation of stratified earth materials. Emphasis on principles and approaches.
Prereq: EARTH 121/121L, 122/122L

EARTH 236 F 2C,3L 0.5
Principles of Paleontology
The principles of paleontology with particular stress on the species concept and evolution; examples will be drawn primarily from the fossil record of plants and vertebrates. Laboratory work will include projects related to lecture topics.
Prereq: EARTH 121/121L, 122/122L

EARTH 238 W,S 3C,3L 0.5
Introductory Structural Geology
Major structural features of the earth. Concepts of stress and strain; elementary rock mechanics. The deformation of earth materials, continuous and discontinuous structures. Introduction to regional tectonics as applied to structures.
Prereq: EARTH 121/121L, 122/122L

EARTH 260 F 3C,2L 0.5
Applied Geophysics 1
An introduction to seismic, gravity, electric, electromagnetic and magnetic methods of exploration geophysics.
Prereq: PHYS 111/112 or 121/122 or consent of instructor

EARTH 331 F 2C,3L 0.5
Igneous Petrology
The principles and theories of igneous rock genesis. Silicate phase equilibria in magmatic systems. Magnatic differentiation; distribution and occurrence of magma types.
Prereq: EARTH 231, 232
Course Descriptions
Earth Sciences

EARTH 322 W 2C,3L 0.5
Metamorphic Petrology
Prereq: EARTH 232

EARTH 333 W 2C,3L 0.5
Introductory Sedimentology
The origin, transport and deposition of sediments. Size analysis and sedimentary structures. Recent sedimentary environments as a key to the interpretation of ancient sediments. Sedimentary petrology.
Prereq: EARTH 232, 235

EARTH 336 F 2C,3L 0.5
Paleontology
Advanced paleontology emphasizing morphology, classification, evolution, paleoecology and stratigraphic value of fossils invertebrates. Laboratory study of fossil collections.
Prereq: EARTH 236

EARTH 342 F 2C,3L 0.5
Applied Geomorphology
Prereq: EARTH 121/121L, 122/122L or GEO E 126
Artreq: GEOG 201

EARTH 345 W 2C,2L 0.5
Historical Geology
A systematic review of the geological history of North America from the Precambrian to the Recent exemplified by regional geology. Laboratory work will include study of maps and cross sections.
Prereq: EARTH 236

EARTH 355 F 3C 0.5
Statistical Methods in Geology
Introduction to the principles of probability and statistics and their application in the earth sciences. Evaluation of quantitative data; statistical models.
Prereq: CS 100 or equivalent computing experience
Artreq: STAT 200, 204, 220 or 221, CIV E 224, ME 202, SY DE 213, 214

EARTH 358 W 3C,1T 0.5
Environmental Geology for Earth Scientists
The influence of geology on the natural environment with special emphasis on hazards and the role of groundwater; hydrogeology in the runoff cycle; groundwater resources development and subsurface waste disposal; environmental geology as a factor in health and disease.
Prereq: EARTH 121/121L or GEO E 126, CHEM 123 or equivalent

EARTH 359 F 3C,1T 0.5
Flow Through Porous Media
Quantitative introduction to the physical principles that govern the flow of fluids through porous and fractured geologic materials. Physical properties of fluids and porous media will be presented and conservation, flux and state equations will be developed. Physics of slow immiscible fluids, including air-water and oil-water combinations will be included.
Prereq: EARTH 121/121L, 122/122L or GEO E 126 or CIV E 253, MATH 217, 228 or CIV E 221, 222

EARTH 360 W 2C,1T 0.5
Earth Physics and Plate Tectonics
Principles of seismology, geomagnetism, heat flow and gravity applied to problems such as earth structure and earthquake prediction. A quantitative discussion of plate tectonics.
Prereq: EARTH 121/121L, 122/122L or GEO E 126, PHYS 121 or equivalent

EARTH 370 W 3C,2L 0.5
Earth Resources
Diverse exploitable resources: metals, rocks, fuels, soils, and water, and their use by civilizations. Geology and occurrence of resources in the earth; concentration and exploitation. Impact of alternatives on society and environment. Laboratory involves geological applications, sampling methods, and ore mineral suites from mines and quarries.
Prereq: EARTH 231, 232

EARTH 390 W Idaho
Methods in Geological Mapping
Week long field study in Sudbury and Whitefish Falls area. Held at end of Winter term. Geological and geotechnical field techniques, map construction, report writing.
Prereq: EARTH 232, 235, 238

EARTH 421 F 2C,3L 0.5
Geochemistry 2
The application of chemical thermodynamics to geochemical problems. Development of the three laws of Thermodynamics; Gibbs free energy and equilibria constants. Introduction to various topics in aqueous geochemistry such as mineral equilibria, ion exchange and redox equilibria. Laboratory session will involve various experiments related to mineral solubility, chemical kinetics, acid-base equilibria and chemical modelling.
Prereq: First-year chemistry, EARTH 221
Restricted to fourth-year and graduate students.

EARTH 427 W 2C,3S 0.5
Crustal Evolution
The application of geological knowledge and reasoning to significant contemporary earth science problems including that of global tectonics and global change. Normally restricted to fourth-year Earth Sciences students.

EARTH 432 F 3C,2S 0.5
Precambrian Geology
The geology, tectonics, stratigraphy and history of the Canadian Precambrian Shield. The early evolution of the Earth's crust. The Precambrian time scale and problems of geochronology. Life, climate and physical conditions in Precambrian time.

EARTH 433 W 2C,3S 0.5
Applied Sedimentology
The source, migration and sedimentary environment of hydrocarbons, exploration, types of traps, extraction. Carbonate sediments and their diagenesis. The environmental impact and control of recent sedimentation.
Prereq: EARTH 333

EARTH 434 W 2C,3S 0.5
Biostratigraphy
Methods of using palaeontological data to solve stratigraphic problems. Faunal provinces in space and time. Effects of continental drift and climatic change on biogeography through the Phanerozoic.
Prereq: EARTH 336

EARTH 435 F 3C,2L 0.5
Advanced Structural Geology
The geometry, kinematics and dynamics of structural geology. The relationships of structures from the microscopic to the megascopic scale; statistical studies of structural elements.
Prereq: EARTH 238
Course Descriptions
Earth Sciences

EARTH 438A/B F/W 6L 0.5/0.5
Honours Thesis
Each student will work under the direction of a member of the Department on a short research project. The results of this will be presented in thesis form and will be critically examined by members of the and, where pertinent, other departments.
For Honours Earth Sciences students or consent of instructor

EARTH 437 F 2C,3L 0.5
Rock Mechanics
Review of stress and strain. Mohr's circle, strength theories, laboratory tests, classification of rocks. Rock mechanics considerations in the construction of shafts, drifts, tunnels, foundations and rock slopes. Laboratory exercises will deal with uniaxial, triaxial, flexure, hardness and tensile testing of rock. Problem sets will be assigned.
Prereq: A course in Statics and Mechanics of deformable materials, or consent of instructor

EARTH 438 W 2C,3wkshp 0.5
Engineering Geology
Review of basic concepts in soil and rock mechanics. Field and laboratory methods used to define and characterize the properties of geological materials and their use in selected engineering geologic design and construction problems. Laboratory assignments will focus on the determination of physical properties and site assessment problems.

EARTH 440 F 2C,3L 0.5
Stratigraphy
Stratigraphy and history of the Quaternary era with emphasis on glaciation. Laboratory studies on glacial deposits. Field trips. A previous course in geomorphology is recommended.
Not to be taken by third-year Earth Sciences students.

EARTH 441 W 2C,3L 0.5
Introduction to Quaternary Ecology
An introduction to Quaternary ecology. The morphology, biostatigraphy, distribution and paleoecological significance of major plant and animal groups in the Quaternary sciences. Relationships of fossil assemblages to modern ecosystems. Students will be expected to arrange with an instructor 1 field trip in the preceding term.
Prereq: EARTH 440 or consent of instructors

EARTH 456 F 3C 0.5
Groundwater Modelling
An introduction to numerical techniques for groundwater modelling, focusing on the understanding of fundamental principles and an appreciation of the role of models. Finite difference, finite element, and particle tracking methods are studied and applied to the solution of problems in groundwater flow, aquifer mechanics, flownet generation, and advective-dispersive transport. Proper modelling approaches, error analysis, stability, discretization constraints, pitfalls, and model misuse are discussed. The student will write some simple FORTRAN programs, and obtain hands-on experience with state-of-the-art interactive groundwater models in the PC laboratory.
Prereq: GEN E 121, or equivalent. FORTRAN-based computing course, one of EARTH 359 or 458, or equivalent. MATH 125 is recommended.

EARTH 458 F,S 3C,1T 0.5
Physical Hydrogeology
An introduction to physical hydrogeology, including Darcy's law, the groundwater flow equations for steady-state and transient conditions, applications to flow nets, aquifer testing, groundwater resources evaluation, and construction-project dewatering. The role of groundwater in the hydrologic cycle is explored with emphasis on natural groundwater flow systems and their influence on stream flow, slope stability, and soil drainage. Physical processes controlling groundwater contamination are introduced.
Prereq: EARTH 121/121L, 122/122L or GEO E 126 or CIV E 253. MATH 213/1B or equivalents are recommended.

EARTH 459 W 3C,1T 0.5
Chemical Hydrogeology
An introduction to the chemical side of hydrogeology with emphasis on groundwater quality and contaminants in the groundwater zone, the geochemical origin of major ions in natural groundwater, causes of hardness, groundwater age determination using isotopes, common causes of groundwater contamination; processes governing contaminant behaviour including dispersion, diffusion and adsorption, hydrogeologic aspects of site selection for waste disposal.
Prereq: EARTH 221 or CIV E 375 and EARTH 231 or permission of instructor; and EARTH 458

EARTH 460 W 3C,1T 0.5
Applied Geophysics 2
A detailed examination of selected topics in exploration geophysics, with an emphasis on data processing, time series analysis and computer modelling of geophysical responses.
Prereq: EARTH 260
Recommended: MATH 217 and an introductory course in computer programming.

EARTH 461 F 2C,1T,3L 0.5
Metallic Mineral Deposits
The petrology and genesis of metallic ore deposits. The description of classic deposits; the stability of ore minerals; ore minerals in aqueous systems. The laboratory will include instruction and practice in ore microscopy.
Prereq: EARTH 370

EARTH 466 W 3C,1T 0.5
Applied Geophysics 3
A field oriented course emphasizing current methodology in environmental geophysics, including waste management and hydrogeological applications.
Prereq: EARTH 260

EARTH 470 W 3C,2L 0.5
Metallic Mineral Deposits
The petrology and genesis of metallic ore deposits. The description of classic deposits; the stability of ore minerals; ore minerals in aqueous systems. The laboratory will include instruction and practice in ore microscopy.
Prereq: Consent of instructor

EARTH 480 S 1C,2L 0.5
Field Study
Depending on the demand and the availability of an instructor, a six week field course may be offered in an area of unusual geological interest during the spring or summer. This course will consist of two weeks of classroom lectures and one month in the field location. Expenses are to be paid by the student.
Prereq: Consent of instructor

EARTH 490 F 1C,2L 0.5
Field Course
One or more geology field trips normally conducted at the beginning of the Fall term. These trips will emphasize field observations of a wide-ranging nature; some trips will augment field observations with study of specimens, core laboratory data, etc. Field exercises and reports may be part of the requirements. Enrollment limits will apply to all trips.
Honours Earth Sciences students are required to attend at least one of these trips. Open to other students only if places are available.
Field trip fees will apply; listing of current trips and respective costs available from department office.
Course Descriptions
East Asian Studies

EASIA 201R F,W 3C 0.5
East Asian Culture
An introductory survey of the history and cultures of East Asia with particular reference to China, Japan, and Korea.
Open to all students above first year
This course may be used toward the All requirement

CHINA 101R F,W 3C,1L 0.5
First-Year Chinese 1
An introductory course for students who have no knowledge of Chinese to develop basic listening, speaking, reading and writing skills. Practical oral and written exercises are used to provide a firm grammatical foundation for further study. The pronunciation used is the Mandarin (Pu-tung-hua) dialect.
Division "R1" of CHINA 101R is appropriate for students with no prior background in writing, speaking or understanding any dialect of the Chinese language. Division "R2" is for students who have been exposed to Chinese at school, home or work but who have no prior written knowledge of Chinese characters. Ballots must be completed at Renison College prior to enrolment (see Note 4).

CHINA 102R F,W 3C,1L 0.5
First-Year Chinese 2
With the completion of the study of the rudiments of phonetics (as provided in CHINA 101R), the emphasis in this course will shift to Mandarin Chinese tonality. Six types of questions and four kinds of simple sentences will be introduced. Vocabulary will be expanded to 500 to 700 words.
Prereq: CHINA 101R (R1) and Renison permission
Ballot must be completed at Renison College prior to enrolment (see Note 4).

CHINA 202R W 3C,1L 0.5
Second-Year Chinese 2
The study of Chinese characters will receive more emphasis. Grammar instruction will include four types of comparison, different kinds of complements and complex sentences. Phonetic concentration will be on the rhythm of long sentences, pauses, logical stress, etc. Some study of Chinese culture is included.
Prereq: CHINA 101R and Renison permission
Ballot must be completed at Renison College prior to enrolment (see Note 4).
Upon completion of CHINA 201R and 202R, the student should have a reading vocabulary of 1,000 to 1,500 Chinese characters and a writing vocabulary of 700 to 1,000 characters.

JAPAN 101R F,W,S 1C,2T,1L 0.5
First-Year Japanese 1
An introductory course for students who have little or no knowledge of Japanese to develop basic listening, speaking, reading and writing skills. Practical oral and written exercises incorporating the Hiragana Writing System are used to provide a firm grammatical foundation for further study.

JAPAN 102R F,W,S 1C,2T,1L 0.5
First-Year Japanese 2
Listening, speaking, reading and writing skills acquired in JAPAN 101R are further developed. Practical oral and written exercises incorporating the Katakana Writing System will be used to develop a more solid grammatical base.
Prereq: JAPAN 101R or consent of instructor

JAPAN 201R F,W,S 3C,1L 0.5
Second-Year Japanese 1
A continuation of the study of grammar and vocabulary through development of listening, reading, writing and speaking skills. Some study of Japanese culture is also included. By the end of the course, 120 Kanji (Chinese characters in their Japanese readings) will have been introduced.
Prereq: JAPAN 102R

JAPAN 202R W 3C,1L 0.5
Second-Year Japanese 2
In this course, students will continue to develop their language skills with an increased emphasis on spoken Japanese. In addition, students will work on improving grammatical accuracy and vocabulary development as well as continue to acquire more basic information about Japanese culture. The writing of an additional 200 Kanji will be taught.
Prereq: JAPAN 201R
COURSES NOT OFFERED 1996-97

ASIA 210R Chinese Literature in phrases for advanced reading.

ECONOMICS

ECON 200 F 3C 0.5
Contemporary Policy Issues
The basic principles of economics used to examine contemporary economic issues and to evaluate current public policy debates.
Prereq: ECON 101, 102

ECON 201 F,W,S 3C 0.5
Microeconomic Theory 1
Theory of consumer choice; the economics of production; price and output under perfect and imperfect competition.
Prereq: ECON 101

ECON 202 F,W,S 3C 0.5
Macroeconomic Theory 1
Theory of the determination of income/output (GDP), employment, unemployment, prices (inflation), and interest rates; an analysis of monetary and fiscal policy.
Prereq: ECON 101 and 102

ECON 210A F,S 3C 0.5
Political Economy 1: Microeconomics
Technical, ideological and social aspects of production, distribution and employment in the evolution of capitalism. Inter-dependenCies in commodity and labour markets, monopoly power, instability, alienation, and the contradictions of capitalist and democratic governance. The 'moral society' and prescriptions for social change.
Prereq: ECON 101 or instructor's consent

ECON 210B F,S 3C 0.5
Political Economy 2: Macroeconomics
Social class, power, institutions, and system-specific and other values in explanation and evaluation of the effects of capitalism on aggregate production, employment, income distribution and prices. The state, fiscal and monetary policy and the control of unemployment and inflation. Macro-level insights into the 'moral society' and prescriptions for social change.
Prereq: ECON 102 or instructor's consent

ECON 211 W,S 3C 0.5
Introduction to Mathematical Economics
Application of mathematics to problems in economic theory. Topics include introduction to matrix algebra, differentiation, partial derivatives, optimization techniques including constrained optimization — all developed within the context of economic theory.
Prereq: ECON 101, 102, OAC Calculus or MATH 104
Students should complete ECON 211 in the second year.

ECON 210A F,S 3C 0.5
Political Economy 1: Microeconomics
Technical, ideological and social aspects of production, distribution and employment in the evolution of capitalism. Inter-dependenCies in commodity and labour markets, monopoly power, instability, alienation, and the contradictions of capitalist and democratic governance. The 'moral society' and prescriptions for social change.
Prereq: ECON 101 or instructor's consent

ECON 210B F,S 3C 0.5
Political Economy 2: Macroeconomics
Social class, power, institutions, and system-specific and other values in explanation and evaluation of the effects of capitalism on aggregate production, employment, income distribution and prices. The state, fiscal and monetary policy and the control of unemployment and inflation. Macro-level insights into the 'moral society' and prescriptions for social change.
Prereq: ECON 102 or instructor's consent

ECON 211 W,S 3C 0.5
Introduction to Mathematical Economics
Application of mathematics to problems in economic theory. Topics include introduction to matrix algebra, differentiation, partial derivatives, optimization techniques including constrained optimization — all developed within the context of economic theory.
Prereq: ECON 101, 102, OAC Calculus or MATH 104
Students should complete ECON 211 in the second year.

ECONOMICS

Undergraduate Officer
E. Carvalho, HH 217, ext. 3017

Courses not offered in the current academic year are listed at the end of this section.

Notes
1. Some Economics courses do not have a "term offered" indicated. This information will be available at preregistration and students can confirm the "term offered" with their departmental advisor.
2. The "normal" number of lectures per week in each course is three; however, each instructor determines how often he/she in particular class will meet.
3. Additional ECON courses may be offered in the spring term from time to time. Consult departmental listing at time of preregistration.
4. Due to sabbatical leaves, some courses normally offered may be cancelled in the next year. Consult departmental listing at time of preregistration for deletions or additional course offerings.

ECON 101 F,W,S 3C 0.5
Introduction to Microeconomics
This course provides an introduction to microeconomic analysis relevant for understanding the Canadian economy. The behaviour of individual consumers and producers, the determination of market prices for commodities and resources, and the role of government policy in the functioning of the market system are the main topics covered.

ECON 102 F,W,S 3C 0.5
Introduction to Macroeconomics
This course provides an introduction to macroeconomic analysis relevant for understanding the Canadian economy as a whole. The determinants of national output, the unemployment rate, the price level (inflation), interest rates, the money supply and the balance of payments, and the role of government fiscal and monetary policy are the main topics covered.

KOREA 201R F,W 3C,1L 0.5
Second-Year Korean 1
A continuation of KOREA 201R. Emphasis is placed on reading and composition. Students will learn complex sentence structure and widely-used idiomatic phrases for advanced reading.
Prereq: KOREA 200R or permission of instructor

KOREA 202R 3C,1L 0.5
Second-Year Korean 2
A continuation of KOREA 201R. Emphasis is placed on reading and composition. Students will learn complex sentence structure and widely-used idiomatic phrases for advanced reading.
Prereq: KOREA 201R or permission of instructor

KOREA 101R F,W 3C,1L 0.5
First-Year Korean 1
An introductory course for students who have no or little knowledge of Korean to develop listening, speaking, reading and writing skills along with a sound basis of grammar. The distinctive features of the Korean language and writing system will be introduced. Practical oral, reading and writing exercises will develop the students' grammatical skills. Particular emphasis is placed on the acquisition of a basic working vocabulary.

KOREA 102R W 3C,1L 0.5
First-Year Korean 2
Students will deepen their understanding of basic grammatical (particularly verb, noun and adverb) forms and sentence construction and enlarge their general vocabulary. Reading ability will be expanded and more attention will be given to idiomatic expressions and the use of the language in actual contexts.
Prereq: KOREA 101R

KOREA 201R 3C,1L 0.5
Second-Year Korean 1
Designed for students who have completed KOREA 102R or the equivalent. To achieve a balanced Korean language proficiency in listening, speaking, reading and writing, a variety of teaching materials and methods is used. The text includes adapted versions of short stories, essays, and poems.
Prereq: KOREA 202R or permission of instructor

JAPAN 301R F 3C,1L 0.5
Third-Year Japanese 1
This course will concentrate on advanced conversation, polite forms, and idioms. It will provide an opportunity to revise and practise the Hiragana and Katakana writing forms. Upon completion, students should be able to write 800 characters and use a Japanese dictionary with ease.
Prereq: JAPAN 220R

Course Descriptions
East Asian Studies
Economics
ECON 220 F 3C 0.5
The Principles of Entrepreneurship
The role of entrepreneurship in the economy, especially with respect to competition, innovation and investment; historical experience, theoretical framework, market dynamics, public policy and practical applications.
Prereq: ECON 101, 102

ECON 221 F,S 3C 0.5
Statistics for Economists
An introduction to statistical procedures commonly employed by economists. Topics include descriptive statistics, probability distributions, sampling, statistical estimation, hypothesis testing, and simple regression analysis.
Prereq: ECON 101, 102
Refer to overlapping content note under Grading System

ECON 231 F,W 3C 0.5
Introduction to International Economics
Theory of comparative advantage and the gains from trade; tariff theory; concepts and measurement of balance of payments; exchange rate systems; reform of international monetary system.
Prereq: ECON 101, 102

ECON 301 F,W 3C 0.5
Microeconomic Theory 2
An extension of the tools developed in Microeconomic Theory 1 to analyse topics such as unemployment and inflation, government spending, finance, consumption, investment, growth, and the open economy.
Prereq: ECON 202, 211

ECON 302 F,W 3C 0.5
Macroeconomic Theory 2
An extension of the tools developed in Microeconomic Theory 1 to analyse topics such as unemployment and inflation, government spending, finance, consumption, investment, growth, and the open economy.
Prereq: ECON 202, 211

ECON 304 W 3C 0.5
Financial Markets
A discussion of topics in finance and financial markets. Topics may include implementation of monetary policy in Canada; the demand for money; efficiency of financial markets; futures and options markets; pricing of financial assets; immunization and duration; global financial markets.
Prereq: ECON 201, 202
(Recommended: ECON 231 or 332)

ECON 310 F 3C 0.5
History of Canadian Economic Development
A study of the economic development of Canada; development theories, industrial structure and national policies analysed in a Classical-Marxian framework.
Prereq: ECON 101, 102

ECON 311 F,W 3C 0.5
Mathematical Economics
Mathematical treatment of partial and general equilibrium models. Topics usually include some of the following: duality, applications of the envelope theorem, discussion of sufficiency conditions for optimisation problems, programming, and growth models.
Prereq: ECON 201, 202, 211
Strongly recommended for students who intend to do graduate work in Economics
Refer to overlapping content note under Grading System

ECON 321 W,S 3C 0.5
Introduction to Econometrics
An introductory course in the theory and practice of econometrics, focusing on multiple regression analysis and associated topics such as multicollinearity, heteroskedasticity and serial correlation. Simultaneous equation models will also be introduced. Computer assignments make up part of the course.
Prereq: ECON 221
Refer to overlapping content note under Grading System

ECON 331 F,W 3C 0.5
International Trade
An examination of theories of international trade at an intermediate level. Topics include the gains from trade, theories of trade determination (Ricardian, Heckscher-Ohlin, increasing returns to scale), the effects of tariffs, the gains from trade, multinational corporation behaviour and factor mobility.
Prereq: ECON 201

ECON 332 W 3C 0.5
International Finance
An analysis of the main issues in international finance. Topics include international borrowing and lending, intertemporal gains from trade, current account and balance of trade movements, the determination of exchange rates and foreign exchange markets.
Prereq: ECON 201, 202

ECON 333 W 3C 0.5
Interregional Economics
An economic analysis of regional development: theories and policies, with special reference to Canada.
Prereq: ECON 201

ECON 335 W 3C 0.5
Economic Development
The nature of the problem of economic development; theories of economic development; major policy issues in economic development.
Prereq: ECON 201, 202, 231

ECON 341 F,W 3C 0.5
Public Finance 1
The economic rationale of governmental fiscal activity; the structure and economic effects of public expenditures and revenues; the analysis of income, consumption and wealth taxes.
Prereq: ECON 102, 201

ECON 343 F 3C 0.5
Urban Economics
Application of economic analysis to urban areas. Topics include location decisions of households, firms, structure and growth of cities, land and housing market, transportation market, labour market, and public finance—all developed within the context of economic theory. Policy issues will be stressed.
Prereq: ECON 201

ECON 344 F 3C 0.5
Consumer Theory
Economic principles for consumer analysis; market responsiveness; conditions causing problems; public and private consumption; alternative economic policies.
Prereq: ECON 201

ECON 345 W 3C 0.5
Industrial Organization
An economic analysis of market structure, behaviour and performance with special reference to the Canadian manufacturing sector.
Prereq: ECON 201

ECON 351 F 3C 0.5
Labour Economics
A study of the supply of labour by individuals (and unions) and the demand for labour by firms; topics include the labour market effects of social assistance, unemployment insurance and minimum wages, discrimination in the labour market, efficient wage contracts, the determinants of wage inflation and unemployment.
Prereq: ECON 201, 202
ECON 355 W 3C 0.5
Economics of Energy and Natural Resources
An analysis of the economics of conservation, especially the adequacy of the market mechanism as an allocator of resource use over time. Issues concerning the economic behaviour of Canada's fishery, forest, fuel and nonfuel mineral industries will be considered.
Prereq: ECON 201

ECON 357 F 3C 0.5
Environmental Economics
Application of economic theory to problems of the environment, in particular, air, water, and land pollution. Emphasis is on the theory of the management of common property resources.
Prereq: ECON 201

ECON 361 F,W 3C 0.5
Cost-Benefit Analysis and Project Evaluation
Methods for evaluating private and public projects; decision rules, efficiency conditions and methods of conducting cost-benefit analysis. Application of the technique.
Prereq: ECON 201

ECON 363 W 3C 0.5
Contemporary Canadian Problems
A "topic oriented" seminar course. Problems are selected from a list that includes regulatory economics, poverty, unemployment, industrial policy, safety and others. The format assists the student in gaining analytical skills through work on the selected topics.
Prereq: ECON 201, 202

ECON 365 W 3C 0.5
Economic Development of Modern Europe
A survey of Europe's economic development; case studies of England, France, Germany and Russia. Emphasis on technology, economic institutions, capital formation, standards of living and the role of the State.
Prereq: ECON 101, 102

ECON 371 F 3C 0.5
Business Finance 1
The course explores decisions faced by managers of firms. In particular, decision-makers must determine which long-term real investment opportunities to exploit. Once undertaken, managers must decide how to finance the projects, for example, by debt or equity. The course develops both the conceptual framework and the tools required for these decisions.
Prereq: ECON 101, 102, and 221 or other course in Statistics
Antireq: ACC 371

ECON 372 W 3C 0.5
Business Finance 2
This course examines a number of topics relevant to financial practitioners. The topics examined may include options, derivatives securities, futures markets, swaps and hedging.
Prereq: ECON 371
Antireq: ACC 372

ECON 381-389 SS each 0.5
Special Topics
One or more special half courses will be offered at different times as announced by the Department.
Prereq: Consent of instructor

ECON 401 F,W 3C 0.5
Microeconomics Theory 3
The course considers a number of topics in microeconomics. Possible topics include decision theory, the analysis of uncertainty, information theory, principal-agent problems, game theory and social choice theory.
Prereq: ECON 301

ECON 402 W,S 3C 0.5
Macroeconomic Theory 3
The course develops and applies simple models of the economy that recognize explicitly the dynamic nature of decision making and market interactions. These models will be used to interpret and understand macroeconomic phenomena including money and inflation, unemployment, savings and investment, and the national debt.
Prereq: ECON 302

ECON 403 W 3C 0.5
Topics in Economic Forecasting
The course focuses on the problems of forecasting economic variables. Topics include the importance of economic forecasting; a survey of major forecasting methods including subjective probability, survey methods, exponential smoothing, econometric models, and time series models; forecast evaluation; and methods for managing forecast systems. Applications will be drawn from microeconomics, macroeconomics, finance, and special issues involving new product demand, population and technology forecasting.
Prereq: ECON 301, 302, 321

ECON 404 3C 0.5
Topics in Money and Finance
A discussion of topics in monetary policy. Topics may include: foundations of monetary theory; portfolio choice; term structure of interest rates; money supply and money demand; decision-making under uncertainty; capital asset pricing models; financial flow analysis; rational expectations and monetary policy.
Prereq: ECON 301, 302, 304, 371

ECON 410 F 3C 0.5
Economic Thought
A critical survey of the development of Economic Theory from Classical Political Economy to the Keynesian Revolution.
Prereq: ECON 231, 301, 302

ECON 411 F 3C 0.5
Advanced Mathematical Economics
Mathematical formulation of economic theory; introduction to dynamic optimisation and optimal control theory; analysis of stability conditions; introduction to linear and nonlinear programming and game theory.
Prereq: ECON 301, 302, 311

ECON 420 3C 0.5
Economic Development of the United States
A survey of U.S. Economic Development from the beginnings of organized settlement, with special emphasis on the methods and techniques applied by the New Economic Historians since 1958.
Prereq: ECON 201, 202, 321

ECON 421 F 3C 0.5
Econometrics
Advanced treatment of topics covered in ECON 321 through the extensive use of matrix algebra and statistical theory. A review of required matrix algebra and statistical theory will be part of the course. Topics covered will include classical linear models and associated problems such as multicollinearity, functional form, heteroskedasticity and autocorrelation; restricted least squares; generalized least squares; and introduction to simultaneous equations.
Prereq: ECON 211, 321
ECON 422 W 3C 0.5
Topics in Econometrics
An applied topics course involving extensive use of computers, requiring the completion of a term project. While topics covered will vary with the instructor’s interests, they will normally be drawn from the following: estimation of stochastic linear regression models; distributed lags and time series models; identification and estimation of simultaneous equations; non-linear estimation; maximum likelihood method; pooling cross-sections and time series; limited dependent variable models; and specification issues.
Prereq: ECON 211, 321

ECON 431 W 3C 0.5
International Economic Policy
Analysis of selected policy problems of open economies from an institutional perspective. Topics include GATT and trade policy, customs unions, multinational firms, exchange rate management and international monetary reform.
Prereq: ECON 301, 302 and 231 or 331

ECON 441 W 3C 0.5
Public Finance 2
This course will examine topics in public expenditure and taxation theory. Potential topics are: public choice; social choice, the theory of second best; asymmetric information, incentive mechanisms for preference revelation; incentive effects of taxation; transfers to individuals and social security; and multi-governmental public finance. Topics covered will vary from year to year.
Prereq: ECON 301, 341

ECON 461 3S 0.5
Comparative Economic Systems
This course concentrates on the criteria which are relevant for comparing different economic systems, how well various forms of economic theory make comparisons, the development of capitalist and socialist economies, together with the analysis of alternative types of price system and planning.
Prereq: ECON 201, 202

ECON 463A/B
Studies in Political Economy
Either ECON 463A or ECON 463B will be offered in the Winter term. Check departmental listing on course offering. See course descriptions below.

ECON 463A F 3S 0.5
Political Economy of Capitalist Development
A study of the main tools and models of modern political economy. Micro and macro tools and concepts, based on the work of Robinson, Staal, Kalev, Pasinetti, Howorth, Neill, Sweezy and others are integrated in what can be termed the “Classical Marxian” tradition.
Prereq: Consent of instructor or Undergraduate Officer

ECON 463B F 3C 0.5
The Political Economy of Socialism
An examination of programs for the creation of socialist economy based on the work of Horvat, Nove, Medvedev and others.
Prereq: Consent of instructor or Undergraduate Officer

ECON 483A F 3S 0.5
Computable General Equilibrium Modelling
Basic concepts and techniques of computable general equilibrium modelling, fixed-point theory and algorithm, data and calibration, system sensitivity, applications in various fields of economics, e.g., taxation, international trade, industrial organization, economic history, economic development, and fixed-price equilibria.
Prereq: ECON 211, 301 (Recommended: ECON 311, 331, or 341)

ECON 483B F 3C 0.5
The Political Economy of Socialism
An examination of programs for the creation of socialist economy based on the work of Horvat, Nove, Medvedev and others.
Prereq: Consent of instructor or Undergraduate Officer

ECON 487 W 3C 0.5
Senior Honours Seminar
Students required to do research and write a paper on a topic in their area of specialization. Topics selected by honours students not pursuing an area of specialization must be approved by the instructor of the course.

ECON 488 F 3C 0.5
Advanced Macroeconomic Theory
The course includes a more advanced treatment of selective topics in microeconomic theory.
Prereq: ECON 311, 401

ECON 489 W 3C 0.5
Advanced Macroeconomic Theory
This course considers a number of advanced topics such as growth, business cycle theory, search theory and co-ordination failures.
Prereq: ECON 311, 402

ECON 493-499 3S 0.5 each
Special Studies
Research and reading courses under the direction of individual instructors. Admission by consent of instructor. See Economics Undergraduate Officer for course registration.

COURSES NOT OFFERED 1996-97
ECON 210A Political Economy 1: Microeconomics
ECON 210B Political Economy 2: Macroeconomics
ECON 483A Political Economy of Capitalist Development
ECON 483B The Political Economy of Socialism

Electrical and Computer Engineering

Undergraduate Officers
Computer Engineering
W.M. Loucks, DC 2597C, ext. 2942
Electrical Engineering
M.M.A. Salame, DC 2567B, ext. 2609

Notes
1. The Department reserves the right, where preregistration in a course is less than six, to cancel the course.
2. In extraordinary cases an instructor may override the prerequisite conditions listed below.

E&CE 102 W,S 1C 0.0
Seminar
General Seminar

E&CE 100 W,S 5C,2T,3L 1.0
Fundamentals of Electrical Engineering
Introduction to electrostatics, basic dc circuits, circuit simplification techniques, introduction to magnetic fields, ac circuit components, the dynamic of circuits, analysis of ac circuits, resonance, sinusoids and phasor, three phase power systems, operational amplifiers, transistors as amplifiers, diodes and transistors as switches. This course has a double weight.
Prereq: MATH 114, 117
Prereq/Coreq: MATH 118
1 Alternate weeks
Course Descriptions
Electrical and Computer Engineering

E&CE 150 W,S 3C,2T 0.5
Introduction to Computing
High level language syntax, procedures and functions, recursion, searching and sorting algorithms for linear arrays, arrays and record data types, pointer variables, linked lists, linked list data structures, binary trees, tree traversals, numerical error propagation, numerical root finding and integration algorithms.

E&CE 201 F,W 1C 0.0
Seminar
General Seminar

E&CE 202 F,S 1C 0.0
Seminar
General Seminar

E&CE 203 S 3C,1T 0.5
Discrete Mathematics
Prereq: E&CE 202, 260

E&CE 205 F,W 3C,1T 0.5
Advanced Calculus for Electrical and Computer Engineers 1
Fourier Series; Ordinary differential equations; Laplace transform; applications to linear electrical systems.
Cross-listed as MATH 211

E&CE 206 F, S 3C,1T 0.5
Advanced Calculus for Electrical Engineers 2
Partial differentiation, relative maxima and minima, directional derivatives, divergence and curl of vector fields with applications; multiple integrals, double and triple integrals; line and surface integrals, applications of divergence and Stokes theorems. Complex analysis: limits, analytic functions, complex line integral, Cauchy's integral formula, residues. Partial differential equations.
Cross-listed as MATH 212

E&CE 209 F,W 3C,1T 0.5
Electronic and Electrical Properties of Materials
Quantum mechanical concepts, band structure, bonding in molecules and solids, energy bands; electrical, optical, magnetic and thermal properties of materials used in electrical engineering.
Prereq: PHYS 125

E&CE 222 W,S 3C,1T,3L 0.5
Digital Computers
Computer organization. Assembly language programming, basic programming techniques. Memory units, arithmetic logic units, control units, I/O devices. Translation and loading. Computer case studies.
Prereq: E&CE 150, 223
Open

E&CE 223 F,W 3C,1T,3L 0.5
Digital Circuits and Systems
Prereq: E&CE 100 or GEN E 123
Open

E&CE 231 F,S 3C,1T,3L 0.5
Electronic Devices
Review of band theory and doped semiconductors in thermal equilibrium, charge neutrality, mass action law, recombination and transport mechanisms, Boltzmann relations, derivation of p-n junction dc and ac characteristics, charge storage effects, The bipolar transistor; derivation of dc and ac terminal characteristics, equivalent circuits. The junction field effect transistor (JFET) and metal oxide semiconductor FET, derivation of dc characteristics.
Prereq: PHYS 125 or equivalent, E&CE 100, 209
Alternate weeks

E&CE 241 S,F 3C,1T,3L 0.5
Circuit Analysis and Design
An introductory level course on circuit analysis techniques for use in circuit design. The course covers linear circuit analysis and design in detail and touches on extensions for circuits with simple nonlinearities such as opamps, diodes and transistors.
Prereq: MATH 114, 117, 118, 211, E&CE 100
Alternate weeks

E&CE 250 F,W 3C,1T,3L 0.5
Algorithms and Data Structures
Algorithms and Data Structures emphasizes the following topics: data structures, abstract data types, recursive algorithms, algorithm analysis, sorting and searching, and problem-solving strategies.
Prereq: E&CE 150
Alternate weeks

E&CE 251 S 3C,1T,3L 0.5
Programming Languages and Translators
History, virtual machines, representation of data types, sequence control, data control, type checking, run-time storage management, finite state automata, regular expressions, grammars, parsers, language translation systems, programming paradigms.
Prereq: E&CE 150, 250
Project

E&CE 252 F,S 3C,1T,3L 0.5
Energy Systems and Components 1
Prereq: E&CE 100, MATH 211
Alternate weeks

E&CE 301 W,S 1C 0.0
Seminar
General Seminar

E&CE 302 F,W 1C 0.0
Seminar
General Seminar

E&CE 304 F,S 3C,1T 0.5
Numerical Methods
Application of computers to engineering problems. Number systems, errors and error propagation. Roots of nonlinear equations. Solution of systems of linear equations. Interpolation and numerical integration. Solution of ordinary differential equations. A non-numeric algorithm (e.g. sorting). Emphasis will be placed on algorithm development and programming style.
Prereq: E&CE 150 or equivalent

E&CE 309 W,S 3C,1T 0.5
Introduction to Thermodynamics and Heat Transfer
Prereq: MATH 211, 212
Course Descriptions

Electrical and Computer Engineering

E&CE 316 W,S 3C,1T 0.5
Introduction to Probability Theory
Conditional probability and independence; Bayes' Theorem; random variables; functions of random variables; distribution functions; marginal and conditional distributions; correlation; reliability; the Poisson process, applications to reliability theory, continuous-time birth and death processes, queueing theory.
Prereq: MATH 211

E&CE 318 F,W 3C,1T,3L 1 0.5
Communication Systems
Orthogonality and signal representation in continuous time. Fourier spectrum, Fourier transforms and applications to communications. Convolution. Transfer functions and filters. Power spectral density. Amplitude modulation and applications to techniques such as DSB, AM, SSB, etc. Angle modulation and the spectra of frequency modulated signals. Techniques for the generation and demodulation of FM signals. Introduction to noise and its effects in AM and FM systems.
Prereq: MATH 211, E&CE 241, 316, 342
1 Alternate weeks

E&CE 324 W 3C,1T,3L 1 0.5
Microprocessor Systems and Interfacing
Microprocessor system architecture, buses, memories, peripheral connections, parallel, serial, analog interfaces, magnetic storage media, data communications, testing and debugging.
Prereq: E&CE 222, 223, 250, 251
1 Alternate weeks

E&CE 332 F,W 3C,1T,3L 1 0.5
Electronic Circuits
Amplifier biasing networks, single and multi-stage small-signal amplifiers, small-signal equivalent circuits; high and low frequency effects; negative feedback amplifiers; oscillators; noise in electronic circuits; introduction to large signal amplifiers.
Prereq: E&CE 231
1 Alternate weeks

E&CE 342 W,S 3C,1T 0.5
Signals and Systems
Discrete and continuous signals, convolution, network equations, simulation graphs. Fourier series and transform, frequency response of networks, Laplace transformation, z-transform.
Prereq: E&CE 100, 241, MATH 114, 117, 118, 211

E&CE 354 W 3C,1T,3L 1 0.5
Real-Time Operating Systems
Introduction, basic concepts, process management, interprocess communication and synchronization, memory management, file systems, resource management, interrupt handling, concurrent programming.
Prereq: E&CE 250, 251
1 Project

E&CE 382 F,W 3C,1T,3L 1 0.5
Energy Systems and Components 2
Prereq: E&CE 100, 241, 261, MATH 211
1 Alternate weeks

E&CE 370 W,S 3C,1T,3L 1 0.5
Electromagnetic Fields
Coulomb's law and Gauss' law; electric field; energy and potential; conductors; dielectrics and capacitances; Poisson's and Laplace's equations, the magnetic field of currents in free space; magnetic effect of iron, self and mutual inductances; electromagnetic induction; energy and mechanical forces in the magnetic field; Maxwell's Equations; wave equation; basic plane waves; and transverse electromagnetic transmission lines.
Prereq: E&CE 100, MATH 212
1 Alternate weeks

E&CE 380 F,W 3C,1T,3L 1 0.5
Control Systems
Prereq: E&CE 342
1 Alternate weeks

E&CE 401 F,S 1C 0.0
Seminar
General Seminar

E&CE 402 W 1C 0.0
Seminar
General Seminar

E&CE 403-409, 490-497 0.5
Special Topics in Electrical Engineering
Special courses on advanced topics will be offered from time to time, when resources are available. For current offerings, inquire at the Department.
Prereq: Permission of Instructor

E&CE 411 F,S 3C,1T 0.5
Digital Communications 1
Prereq: E&CE 316, 318

E&CE 412 W 3C,1T 0.5
Digital Communications 2
Representation of signals, gaussian processes, optimum receiver design, equivalent signal sets, non-white channel noise, maximum likelihood receiver. Performance of coherent and noncoherent communication systems, phase shift keying, frequency shift keying. Information and its measure, source encoding, error-free communication, channel capacity. Error-correcting codes: linear block codes, cyclic codes, convolutional codes.
Prereq: E&CE 316, 411

E&CE 413 W 3C,1T 1 0.5
Digital Signal Processing
Prereq: E&CE 316, 342
1 Project

E&CE 427 W,S 2C,1T,3L 1 0.5
Digital Systems Engineering
Complexity in large digital systems. Control of design, interaction complexity, control of consequences of complexity. The topics covered include control unit design, microprogram control, design for testability, fault tolerance, multiprocessor systems.
Prereq: E&CE 222, 223
1 Open

E&CE 428 F,S 3C,1T 0.5
Computer Communications Networks
Prereq: E&CE 222, 316, 318
E&CE 429 W 3C,1T 0.5
Computer Structures
Organization and performance of conventional uniprocessors, pipelined processors, parallel processors and multiprocessors; memory and cache structures; multiprocessor algorithms and synchronization techniques; special-purpose architectures.
Prerequisite: One of E&CE 354, 450 or CS 354
Corequisite: E&CE 427

E&CE 435 F,S 3C,1T 0.5
Semiconductor Devices
Metal-Semiconductor junctions (Schottky barriers), heterojunctions, solar cells, light emitting diodes, photodetector diodes, JFET's, MESFET's, MOSFET's, VLSI bipolar and MOS devices, CCD's, power devices (SCRs, power switching transistors, PIN rectifier diodes).
Prerequisite: E&CE 209, 231

E&CE 436 W 2C,1T,3L 0.5
Design of Integrated Circuits and Devices
Design and process details of bipolar, JFET and MOSFET devices. Design and implementation of digital and analog integrated circuits. Processes, device and circuit CAD.
Prerequisite: E&CE 209 (231 or 435) 1 Project

E&CE 437 W 2C,1T,3L 0.5
Integrated VLSI Systems
Integrated system design, memory cells and systems, logic arrays, VLSI design methodologies, applications in digital signal and data processing systems.
Prerequisite: E&CE 222, 223, 332 1 Project

E&CE 438 F,S 2C,1T,3L 0.5
Digital Integrated Circuits
Switching characteristics of transistors and diodes, non-sinusoidal wave generation and shaping, comparators, digital integrated circuits, including ECL, T2L, I2L, STL, MOS, CMOS, BICMOS.
Prerequisite: E&CE 231, 332 or 333 1 Project

E&CE 439 W 2C,1T,3L 0.5
Analog Integrated Circuits
Analog applications of bipolar and field-effect transistors. Analysis of operational amplifiers. IC temperature compensation and biasing. Differential, low noise and power amplifiers, receiver front end design, noise analysis. Modulators, mixers, detectors. Power supplies, A to D and D to A converters.
Prerequisite: E&CE 231 or 333 1 Project

E&CE 443 W 3C,1T 0.5
Electrical Networks
Topics from the following: two-port descriptions of ideal devices, including operational amplifiers; network functions, formulation and solution of network equations; sensitivity calculations in the frequency domain; active network analysis; simple filter design; time domain solutions; simulation; introduction to digital and switched capacitor networks; computer-aided analysis and design of networks.
Prerequisite: E&CE 241, 342 or equivalent

E&CE 446 F,S 3C,1T 0.5
Linear Systems
Three types of linear multivariable systems are studied: 1. real time-continuous systems; 2. real time-discrete systems; and 3. module-two time-discrete systems. The unifying approach of state equations is developed and the importance of linear algebra is emphasized. Topics include: time domain analysis, transform analysis (Laplace- and Z-transforms), stability considerations, system equivalence, system decomposition, system realization. The necessary matrix and linear-algebra theory is developed as required.
Prerequisite: E&CE 342 or 380

E&CE 450 F,S 2C,1T,3L 1
Software Systems
Structured software design, software testing and maintenance. Data structures, arrays, lists, stacks, associative structures. Searching and sorting. Operating system organizations. Real-time software, principles of real-time executive (RTX), kernel, primitives, interprocess communication and synchronization, memory management, interrupts. Block structured languages, actual and formal parameters, recursion, formal description, relationship to machine code. Compilers.
Prerequisite: E&CE 222 or equivalent. 1 Project

E&CE 451 F 3C,1T,3L 0.5
Software Requirements Specification and Analysis
This course is intended to introduce students to the requirements definition phase of software development. It will discuss models, notations, and processes for software requirements identification, representation, validation, and analysis. An important component of the course is a group project: the software requirements specification of a large software system.
Prerequisite: E&CE 203, 250, 251, 354; or CS 230, CS 245, 354, 360; or equivalent.
Cross-listed as CS 445 1 Project

E&CE 452 S 3C,1T,3L 0.5
Software Design and Architectures
Software design process and its models, representations of design/architecture, software architectures and design plans, design methods, design state assessment, design quality assurance, design verification.
Prerequisite: E&CE 451 or CS 445
Cross-listed as CS 446 1 Project

E&CE 453 W 3C,1T,3L 0.5
Software Testing, Quality Assurance and Maintenance
Systematic testing of software systems, software verification, symbolic execution, software debugging, quality assurance, measurement and prediction of software reliability, project management, software maintenance, software reuse, reverse engineering.
Prerequisite: E&CE 452 or CS 446
Cross-listed as CS 447 1 Project

E&CE 455 F 3C,1T,3L 0.5
Software Engineering
Requirement analysis, specifications, software design, software development environments, testing, software project management, quality assurance and control.
Prerequisite: E&CE 203, 250, 251, 354, Computer Engineering Program or Computer Engineering Option 1 Project

E&CE 456 W 3C,1T,3L 0.5
Database Systems
Introduction, data models, file systems, database system architectures, query languages, integrity and security, database design.
Prerequisite: E&CE 250 or 252 or 450 1 Project

E&CE 457 S 3C,1T,3L 0.5
Applied Artificial Intelligence
Artificial intelligence concepts and techniques, including search, inference, knowledge representation and planning. Knowledge-based systems. Applications in electrical and computer engineering, with emphasis on design and maintenance.
Prerequisite: E&CE 251 1 Project
Course Descriptions

Electrical and Computer Engineering

ECE 463 S, F 2C, 1T, 3L 0.5
Power Electronics
Characteristics and ratings of power semiconductor devices with emphasis on the thyristor. General methods of achieving design objectives. Performance and analysis of power conversion circuits for both static and rotating loads.
Prereq: ECE 100, MATH 211
1Open

ECE 464 W 2C, 1T, 3L 0.5
Insulation and High Voltage Engineering
Prereq: ECE 100, MATH 211
1Alternate weeks

ECE 465 W 3C, 1T 0.5
Power Systems
Introduction to system concepts; aspects of power system planning and operation. Energy sources, environmental and resource implications. Per-unit and co-ordinate systems. Representation of equipment such as generators, transformers and transmission lines in system analysis. Analysis of unbalanced systems and faults. Voltage and reactive power control. Load/frequency control. Power transfer and system stability. Introduction to load flow methods. High voltage dc transmission.
Prereq: ECE 100, 261, MATH 211

ECE 471 S, F 3C, 1T, 3L 1
Electromagnetic Waves
Review of Maxwell’s and Wave Equations; Applications of Plane Waves: reflection, refraction, lossy medium; Transmission Line Applications; co-axial and micro-strip lines, impedance matching, losses; Waveguides: metalic wave guides – rectangular and cylindrical, Dielectric wave guides – slab and fiber; Antenna Technology.
Prereq: ECE 100, 370, MATH 212
1Alternate weeks

ECE 473 W 2C, 1T, 3L 0.5
Microwave Engineering
The theory and practice of microwave engineering, transmission line theory and scattering matrices; waveguides and cavities; microstrip lines, directional couplers and other microstrip components; computer aided design of microwave integrated circuits; Butterworth and Chebyshev filters, frequency transformations, side coupled microstrip filters and coupled waveguide cavity filters; microwave system considerations for communications.
Prereq: ECE 371 or 471
1Every third week

ECE 474 S, F 2C, 1T, 3L 0.5
Antenna Engineering
An introduction to the theory of radiation and of antenna and propagation engineering; linear antennas, linear arrays, aperture antennas, frequency independent antennas, measurement theory.
Prereq/Coreq: ECE 371 or 471
1Every third week

ECE 475 W 3C, 1T, 3L 0.5
Guided Wave Photonics Engineering
Conducting waveguiding structures; rectangular and circular waveguides, microstrip theory and applications, numerical field analysis on microstrip lines, microstrip components. Dielectric waveguiding structures; dielectric slab waveguides, propagation theory for step-index fibres and graded-index fibres. Fibre measurements; loss measurements, time-domain and frequency-domain measurements, measurement of refractive index profiles. Fibre-optical telecommunication systems; system design considerations, fibre characteristics, source and detector characteristics.
Prereq: ECE 371 or 471
1Project

ECE 476 W 2C, 1T, 3L 0.5
Design of Digital Control Systems
Performance specifications for design. Sampled data systems. Design of digital control systems using transform and pole placement techniques.
Prereq: ECE 342, 380
1Alternate weeks

ECE 482 W 2C, 1T, 3L 0.5
Multivariable Control Systems
Prereq: ECE 380, 446
1Open lab

ECE 485 W 2C, 1T, 3L 0.5
Computer Control Applications
Prereq: ECE 380, 481
1Project

ECE 486 W 3C, 3L 0.5
Robot Dynamics and Control
Prereq: ECE 380, 446
1Project

ECE 499 A, F, S 9L 0.5
Project
An engineering assignment requiring the student to demonstrate initiative and assume responsibility. The student will select a project at the end of the 38 term.
Students can propose their own project. A faculty member will provide supervision.
For a one term project, a report is required at the end of the 4A term. For a two term project, a short progress report at the end of the 4A term and a full report at the end of the 4B term are required.
Prereq: Fourth-year standing in either Electrical or Computer Engineering

ECE 499 B 9L 0.5
Project
Either a continuation of ECE 499 A or a separate one-term project.
Prereq: Fourth-year standing in either Electrical or Computer Engineering

ECE 495 W 2C, 1T, 3L 0.5
Robotics
Special topics in robotics. 2C, 1T, 3L 0.5
ENGLISH

Undergraduate Officer
M.G. McArthur, HH 269, ext. 8873

Notes
1. Although the Department of English provides advisors to help students choose their programs, arrange their courses and conform with the University, Faculty, and Department regulations, students are urged to study the Calendar carefully because they are themselves responsible for failure to abide by these regulations.

2. Courses normally meet three hours per week; however, each instructor determines the pattern of meetings for her/his courses.

3. In all English courses, emphasis will be placed on student essays written in connection with the reading.

4. Information on availability of courses in this section is accurate at the time of publication. Sometimes, however, course offerings must be altered because of budget restraints or availability of faculty. For precise information on course offerings, students should check with the English Department.

5. Enrolment in certain English courses which are in heavy demand and which are program requirements for English students may be subject to priority enrolment restrictions. While all English courses may be affected, those most likely to be subject to enrolment restrictions will include ENGL 200A/B, 209, 210C, 210E, 210F, 219, 251A/B, 306A-F, 309A-E, 343, 344, 362, and 363. Because of its place in the Applied Studies requirements, ENGL 109 may also on occasion be subject to registration restrictions.

Most courses are also taught at St. Jerome's College. 'R' courses are administered by Renison College.

GROUP ONE

Note
Courses in this group count towards a degree as electives in any program in the University. Normally, none of them qualifies as a major credit for a General or Honours program in English. These courses are primarily designed to make students aware of the different functions of language in various contexts and to assist them to improve their writing.

ENGL 109 Introduction to Academic Writing

ENGL 129R Introduction to Written English

ENGL 140R The Use of English 1

ENGL 240R Form and Function 1

ENGL 241R Form and Function 2

Students completing any of ENGL 109, 140R, 141R with at least a B average may petition the English Department (through the Undergraduate Officer) to accept these courses for English major credit. This option became effective as of the Fall term 1984 and may not be applied retroactively.

ENGL 109 F,W,S 0.5
Introduction to Academic Writing

The course will explore a variety of issues in academic writing such as style, argument, and the presentation of information. Frequent written exercises will be required.

Prereq: ENGL 129R

May be subject to priority enrolment

ENGL 129R F,W 3C,3T 0.5
Introduction to Written English

Instruction provided in basic grammar, sentence and paragraph structure, elements of composition and essay writing including focus on theme, development of central idea, exposition and argumentation. Minimum of four hours of instruction each week with additional tutorial hours as required.

Prereq: Open only to students whose maternal language is not English and who lack language mastery sufficient for admission to other introductory English language courses

Antireq: ENGL 109

Offered at Renison College

ENGL 140R F,W 3C 0.5
The Use of English 1

The use and abuse of spoken and written English. The study and evaluation of language as it is used for various purposes (e.g., colloquial, scientific, legal, political, commercial, journalistic, literary) in order to increase critical awareness and to help students to write clearly and effectively.

Offered at Renison College

ENGL 141R W 3C 0.5
The Use of English 2

A continuation of ENGL 140R. The study of factual, emotive, scientific and imaginative writing; relevance, context, meaning, tone, feeling, and intention.

Prereq: ENGL 140R

Offered at Renison College

GROUP TWO

Note
Courses in this group carry degree credit and may be counted as fulfilling the minimum requirements for a General or Honours program in English.

ENGL 102A F 3C 0.5
The Major Forms of Literature: Short Stories and Drama

A study of short stories and drama to determine how the shape of a literary work contributes to its meaning.

Also offered at Renison College

ENGL 102B W 3C 0.5
The Major Forms of Literature: Novels and Poetry

A study of novels and poetry to determine how the shape of a literary work contributes to its meaning.

Also offered at Renison College

ENGL 103A F 0.5
The Nature and Structure of the English Language

Introduction to the study of the English language. Topics to be discussed include the nature and origin of language, the structure of English and its development, and the relations between language and reality.

ENGL 103B W 0.5
Varieties of English

Introduction to the study of varieties of the English language - regional, social, temporal, functional, and stylistic. The relations of languages and literature and of speech and writing will be discussed.

Prereq: ENGL 103A or consent of instructor

ENGL 14OR A,B 3C 0.5
The Use of English 1

The use and abuse of spoken and written English. The study and evaluation of language as it is used for various purposes (e.g., colloquial, scientific, legal, political, commercial, journalistic, literary) in order to increase critical awareness and to help students to write clearly and effectively.

Offered at Renison College

ENGL 141R W 3C 0.5
The Use of English 2

A continuation of ENGL 140R. The study of factual, emotive, scientific and imaginative writing; relevance, context, meaning, tone, feeling, and intention.

Prereq: ENGL 140R

Offered at Renison College
ENGL 105A F,W,S 0.5
20th-Century Literature in English, 1900-45
A close examination of a representative selection of works by major authors writing in English such as Yeats, Woolf, Lawrence, Eliot, Hemingway, and Faulkner.

ENGL 105B W 0.5
20th-Century Literature in English, 1945-Present
A continuation of ENGL 105A. A close examination of a representative selection of works by major authors writing in English such as Thomas, Bellow, Lawrence, and Atwood.
Prereq: ENGL 105A or consent of instructor

ENGL 107 F 0.5
Introduction to Canadian Literature
A survey of major developments in Canadian literature in English from its beginnings to the present.

ENGL 108E F,W 0.5
Women in Literature
A study of the nature and role of women in British, Canadian, and American literature. Works by both men and women will be studied in which women are seen in such forms as mothers, saints, sex objects, and witches.

ENGL 108F F,W 0.5
The Rebel
A study of various works of literature in which the protagonist is a rebel against existing norms. The course will examine a number of rebel types and concepts, moral implications, and final outcomes either in successful realization or in tragic defeat.

ENGL 108H F,W 0.5
Isolation and Alienation
The study of a variety of works centering on the theme of individuals in crisis, the stress being on people at variance with their inner selves, other persons, or their world. The course will discuss the process in which wisdom and maturity are gained as the ultimate products of suffering.

ENGL 108M F,W,S 0.5
Youth and Adolescence
Studies the portrayal of young protagon-ists as they respond to the mores of adult society; their own physical, mental, and psychological development; and the expectations placed upon them by themselves and by others.

ENGL 100 F,W 0.5
Shakespeare
Designed for students in all faculties, the course examines some of Shakespeare's comedies, history plays, and tragedies. Shakespeare's variety and flexibility in developing characters and dramatic structures are stressed, as are significant themes.
No previous work in Shakespeare is required.

ENGL 200A F 0.5
Survey of British Literature 1
An historical survey of major figures, types, and trends in British literature from the Middle Ages to the late 18th century.
May be subject to priority enrolment

ENGL 200B W,S 0.5
Survey of British Literature 2
An historical survey of major figures, types, and trends in British literature from the late 18th century to the present.
May be subject to priority enrolment

ENGL 201 F,S 0.5
The Short Story
This course deals with the history and techniques of the short story, with emphasis upon works by such British, American, and Canadian writers as Henry James, James Joyce, D.H. Lawrence, Ernest Hemingway, and Alice Munro.

ENGL 205R W 3C 0.5
Canadian Short Story
An introduction to Canadian short story literature, including the history, techniques, and trends in Canadian short story writing from its beginnings in the late 19th century to the present. Emphasis will be on the concerns of these writers with the roles of women, the writer's search for new meanings, and their innovations in literary forms.

ENGL 205V W 3C 0.5
Science Fiction
Various examples drawn, for instance, from Utopian and anti-Utopian science fiction, social science fiction, "gadget" science fiction, parapsychology, and alternate worlds and beings will be considered. Some attention will be given to the historical development of the genre.

ENGL 205E F,W 0.5
Studies In Children's Literature
This course will deal with classic works of children's literature, including fantasy written primarily for children. Selections from such authors as Kipling, Woolf, C.S. Lewis, George MacDonald, Kenneth Grahame, and Thurtain will be studied.

ENGL 205F W 0.5
Women Writers of the 20th Century
A study of such major 20th-century writers as Woolf, Helman, Murdoch, McCarthy, Lessing, Lawrence, Plath, and Atwood. Emphasis will be on the concerns of these writers with the roles of women, the writer's search for new meanings, and their innovations in literary forms.

ENGL 205H W 0.5
Arthurian Legend
The story of Arthur and his knights of the Round Table will be discussed as it is treated at various times in various works and genres. Such matters will be considered as the character of Arthur, the concept of Camelot, and the Fellowship of the Round Table.

ENGL 208L W 0.5
Colonialism and Imperialism in Literature
A study of texts in English about race, colonialism, and imperialism. Emphasis may be placed on the analysis of discursive elements, including narrative forms, imaginative geography, rhetorical strategies, and issues of gender, race, and sexuality. Writers may include Shakespeare, Behn, Conrad, X, Morrison, Kogawa, and Highway.

ENGL 209 W 0.5
Writing Strategies
Students practise effective writing along with the study of established models. The goal is to develop language competence to meet a variety of academic, business, and professional situations.
Prereq: Second-year standing or above, or successful completion of ENGL 109
Counts as an English Major credit as of Fall 1984
May be subject to priority enrolment
ENGL 210C F,W,S 0.5
Report Writing
A study in the principles and practice of good report writing including report lan-
guage and style and various forms of report organization — various kinds of short
reports as well as the long formal research report.
Prereq: Second-year standing or above
May be subject to priority enrolment

ENGL 210E F 0.5
Technical Writing
A study of the principles, processes and
products which constitute technical writing.
This course provides an introduction to
techniques of audience analysis and
principles of document design as well as experience in the process of creating tech-
nical documents. Writing practice will be
provided in the many roles of the technical writer — from researcher to editor.
Prereq: Second-year standing or above
Not open to students who have taken
ENGL 210A in 1992 or earlier
May be subject to priority enrolment

ENGL 210F S 0.5
Business Writing
This course examines business communi-
cation from a rhetorical perspective.
Various forms and processes of business
communication will be studied with an emphasis on producing rhetorically
effective business writing.
Prereq: Second-year standing or above
Not open to students who have taken
ENGL 210A in 1992 or earlier
May be subject to priority enrolment

ENGL 214 F 0.5
Themes in Canadian Literature
The course will survey a theme which is
significant to the understanding of the
Canadian literary mind. Topics will vary
from section to section.

ENGL 217 F 0.5
Canadian Children's Literature
A study of 19th- and 20th-century
Canadian literature for children.
(Formerly ENGL 317)

ENGL 219 S 0.5
Contemporary Usage
An in-depth, applied study of the conven-
tions governing contemporary English
grammar, punctuation, syntax, diction,
spelling, and sentence structure. In addi-
tion, the course will examine variations
and changes in conventions; the question
of the determiners of correct usage; and
the impact of dictionaries, textbooks, jour-
nale, large publishing houses, and interna-
tional wire services on accepted English
usage in general and on Canadian usage
in particular.
Prereq: Second-year standing or above
May be subject to priority enrolment

ENGL 251A F 0.5
Literary Criticism: Practice
Close reading of poetry and narrative;
acquisition of critical vocabulary and termi-
nology. Three to five written assignments.
May be subject to priority enrolment

ENGL 251B W,S 0.5
Literary Criticism: Theory
Introduction to classical and contemporary
theoretical approaches to literature; literary
emphasis on drama. Three to five written assignments.
Prereq: ENGL 251A
May be subject to priority enrolment

ENGL 292 F 0.5
Contemporary Issues in Language,
Writing, and Rhetoric
The course inductively defines the fields of
rhetoric and Professional Writing through
an exploration of contemporary issues in
language, writing, and rhetoric, as those
issues are identified and dealt with, in the
pertinent scholarly and professional journ-
als, by current researchers and their work.
Prereq: Enrolment limited to RPW
students

ENGL 305A F 0.5
Old English 1
An introduction to the English language in
its earliest form and to English prose in
pre-Conquest England, examining Old
English prose style, its principal
practitioners, and their world view.
Prereq: ENGL 305A

ENGL 305B W 0.5
Old English 2
An introduction to Old English poetry, not-
ing in representative Old English poems
those things about its purpose, style, and
its audience which make it unique but
which also provide the beginnings of the
English poetic tradition.
Prereq: ENGL 305A

ENGL 306A/B/C/D/E/F
English Language and Linguistics
A study of basic linguistic principles and
concepts, historical and formal.
(Formerly ENGL 373 and 375)

ENGL 306A F,W,S 0.5
Introduction to Linguistics
Introduction to linguistics and the princi-
pies of linguistic analysis through an
examination of English phonology, forms,
syntax, and discourse.
(Formerly ENGL 375A)
May be subject to priority enrolment

ENGL 306F W 0.5
Introduction to Semiotics
A study of systems of signs, codes, and
signification in language, culture, and
literature.
Prereq: ENGL 306A

ENGL 309A F 0.5
Rhetoric: Principles and Practice 1
A study of rhetorical theories from the
Classical period (Pre- Socratic to
Augustine) with an emphasis on how
these theories reflect changing attitudes
towards language, reality, and the self.
Prereq: Third-year standing, or consent
of instructor
Priority may be given to RPW students

ENGL 309C F,W 0.5
Contemporary Rhetorical Theory
An examination of contemporary rhetorical
theory and its relationships to criticism,
interdisciplinary studies and computer
applications.
Prereq: A 200-level writing course or
consent of instructor
May be subject to priority enrolment

ENGL 309D S 0.5
Approaches to Style
Theories of style and approaches to the
stylistic analysis of both literary and non-
literary texts. Students will consider contrib-
tutions to the study of style from such
areas as traditional stylistics, New
Criticism, formalism, affective stylistics,
speech act theory, discourse analysis, and
sociolinguistics.
Prereq: Consent of instructor

ENGL 309E F 0.5
Speech Writing
The analysis, writing, and performance of
speeches. Analysis will focus on the theo-
ry of communication and speech models
for imitation; writing, in class-work-
shops; and performance, on videotaping
and student evaluation of speeches.
Cross-listed as DRAMA 323
May be subject to priority enrolment
<table>
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<tr>
<th>Course Descriptions</th>
<th>English</th>
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| ENGL 310A F 0.5     | Chaucer 1  
An introduction to the poetry and the prose translations of Geoffrey Chaucer, including his dream allegories, "Troilus and Criseyde," and related compositions. |
| ENGL 310B W 0.5     | Chaucer 2  
A study of Geoffrey Chaucer's "Canterbury Tales." |
| ENGL 313 F 0.5      | Canadian Literature to 1920  
A study of Canadian prose and verse to 1920, with particular attention to the poetry of the School of the Sixties and to the historical and idyllic novels of the 19th and early 20th centuries. |
| ENGL 314 F 0.5      | Canadian Poetry Since 1920  
| ENGL 315 W,S 3C 0.5 | Canadian Prose Since 1920  
The Canadian novel since the appearance of Morley Callaghan, with brief consideration of the essay and short story during the period. Also offered at Renison College |
| ENGL 316 W 0.5      | Canadian Drama  
A study of plays by such dramatists as Merril Denison, Robertson Davies, Gratien Gélinas (in translation), James Reaney, John Coulter, George Ryga, and Michel Tremblay (in translation). Background for 20th-century drama will be provided in lectures. Cross-listed as DRAMA 360 (formerly DRAMA 351) |
| ENGL 318 W 0.5      | Canadian Literature Since 1967  
A study of developments in Canadian literature since 1967 in prose, poetry, drama and criticism. |
| ENGL 330A F 0.5     | 16th-Century Literature 1  
(excluding Drama)  
A study of the principal writers of prose and lyric and narrative poetry in England during the Tudor period, including its culmination in the reign of Elizabeth I. |
| ENGL 330B S 0.5     | 16th-Century Literature 2  
(excluding Drama)  
A continuation of ENGL 330A, with a consideration of selected topics and works specific to the Elizabethan period. Authors studied may include Sir Philip Sidney, Mary Sidney, and Edmund Spenser. Prereq: ENGL 330A or consent of instructor |
| ENGL 335 F,W 0.5    | Creative Writing 1  
Aimed at encouraging students to develop their creative and critical potentials, the course consists of supervised practice, tutorials, and seminar discussions. Also offered at Renison College |
| ENGL 334 W,S 0.5    | American Literature  
The meaning of America – the myth, the dream, and the reality – as experienced through its major literary works. Sin, guilt, madness, mysticism, and grace: the search for fulfillment and peace by such writers as Poe, Thoreau, Whitman, Twain, and Crane.  
May be subject to priority enrollment |
| ENGL 344 W,S 0.5    | Modern American Literature  
Approaches to reality amid the confusion and uncertainty of 20th-century America. Emphasis on such major writers as Faulkner, Miller, and Cummings. May be subject to priority enrollment |
| ENGL 347A F 0.5     | Contemporary American Literature  
A study of American Literature from World War 2 to the present. Prereq: ENGL 343 or consent of instructor |
| ENGL 350A F 0.5     | 17th-Century Non-Dramatic Literature 1  
A study of secular and religious lyric poetry by poets such as Donne, Jonson, Herrick, Herbert, Vaughan, and Marvell. |
| ENGL 350B W 0.5     | 17th-Century Non-Dramatic Literature 2  
A study of selected prose works of Bacon, Burton, and Browne. A more intensive study of Milton’s English poetry and a selection of his prose works. |
| ENGL 352 F 0.5      | Shakespeare 1  
A study of the plays written before 1599-1600, excluding Julius Caesar. |
| ENGL 353 W 0.5      | Shakespeare 2  
A study of the plays written after 1599-1600, including Julius Caesar. |
| ENGL 368/369        | Selected Studies  
Designed to provide a study in depth of problems and/or authors selected by the instructor. Students interested in initiating such courses are encouraged to do so by bringing their ideas to the attention of individual instructors.  
Prereq: Consent of instructor and permission of English Undergraduate Officer |
| ENGL 376R F 3C 0.5 | Applied English Grammar 1  
In exploring different definitions and types of grammar (e.g. descriptive vs. prescriptive), students develop their own critical framework for explaining the structure of English. Of interest to intending teachers of English as the native or second language.  
Prereq: A minimum of a 100-level writing course or consent of instructor Offered at Renison College |
| ENGL 377R W 3C 0.5  | Applied English Grammar 2  
A continuation of ENGL 376R. Practical applications of language theories to error analysis and correction.  
Prereq: ENGL 376R Offered at Renison College |
| ENGL 392A S 0.5     | Theories and Practices of Documentation  
This course will introduce students to recent research on documentation in fields such as information design, reading, and technical writing. Students apply this knowledge by developing or revising documents.  
Prereq: ENGL 292 or consent of instructor |
| ENGL 392B S 0.5     | The Rhetoric of Text and Image  
This course introduces students to the interaction of texts and images in such professional writing fields as advertising, book illustration, technical documentation, journalism, and public relations. Issues may include visual and textual literacy, the semiotics and rhetoric of design, and the ideological basis of social communication.  
Prereq: ENGL 292 or consent of instructor |
Course Descriptions
English

ENGL 409 W 1.0
Writing for Special Purposes
Topics may include editing; magazine, newspaper and editorial writing; advertising and public relations writing; instruction manuals; interpretation of specialized information for general audiences; writing for non-print media; ethics in writing; etc. Substantial use of non-academic experts may be made.
Prereq: Fourth-year standing in RPW. RPW students below fourth year are not eligible for the course.

ENGL 410A F 0.5
Satire and Sense: The Restoration and Early 18th Century
The Restoration comedy of manners, heroic and high tragedy, poetry of the court wits and other amused commentators on society, and the major writings of Dryden, Swift, Addison, Defoe, and the early Pope.

ENGL 410B W,S 0.5
Sense and Sensibility: The Middle and Later 18th Century
The probing of mores and manners by Pope and Johnson, the emergence of the novel with Fielding and Sterne, and the transformation (in "the age of sensibility") of literary attitudes and practice from classical to romanticism.

ENGL 430A F 0.5
The Romantic Movement 1
The poetry and critical theory of Blake, Wordsworth, and Coleridge. Emphasis is primarily on poetry; selected minor writers may be considered.

ENGL 430B W 0.5
The Romantic Movement 2
The poetry and critical theory of Byron, Shelley, and Keats. Emphasis is primarily on poetry; selected minor writers may be considered.

ENGL 451A F 0.5
Literature of the Victorian Age 1
An historical and critical study of major poets (Browning, Tennyson, Arnold) and of the literary criticism of the period.

ENGL 451B W 0.5
Literature of the Victorian Age 2
An historical and critical study of major novelists (Dickens, Thackeray, Eliot) and major essayists (Newman, Ruskin, Mill, Huxley).

ENGL 460A F 0.5
British Literature, 1855-1918
A study of works by such writers as Shaw, Conrad, and Yeats.

ENGL 460B F 0.5
British Literature, 1918-1945
A study of works by such writers as Joyce, Lawrence, and Woolf.

ENGL 460C W 0.5
British Literature, 1945 to the Present
A study of works by such writers as Beckett, Pinter, Churchill, Murdoch, Rushdie, Carter, Desai, Naipaul, Ackroyd, Larkin, Heaney, Hill.

ENGL 470A W 0.5
Contemporary Critical Theory
An examination of recent influential critical theories. Among the schools studied will be feminist criticism, Marxist criticism, psychoanalytic criticism and, especially, deconstruction.

ENGL 485A/B 0.3/0.5
Supervision of Honours Essay
A letter grade for ENGL 485A will be submitted only after the completion of ENGL 485B.

ENGL 481-492
Senior Seminars
From time to time, the Department may offer senior special topic seminars in the following areas. Consult with the Undergraduate Officer for details.
Courses ENGL 481 - 492 may substitute for other required Period and Genre courses.
Prereq: Fourth-year standing normally, and permission of instructor

ENGL 481 (A-Z) 0.5
Special Topic Seminars in Rhetoric and Professional Writing

ENGL 482 (A-Z) 0.5
Special Topic Seminars in Linguistics and Lexicography

ENGL 483 (A-Z) 0.5
Special Topic Seminars in Old and Middle English

ENGL 484 (A-Z) 0.5
Special Topic Seminars in Elizabethan Literature

ENGL 485 (A-Z) 0.5
Special Topic Seminars in Early Seventeenth-Century Literature

ENGL 486 (A-Z) 0.5
Special Topic Seminars in Restoration and Eighteenth-Century Literature

ENGL 487 (A-Z) 0.5
Special Topic Seminars in Romantic Literature

ENGL 488 (A-Z) 0.5
Special Topic Seminars in Victorian Literature

ENGL 489 (A-Z) 0.5
Special Topic Seminars in Twentieth-Century British Literature

ENGL 490 (A-Z) 0.5
Special Topic Seminars in Canadian and Commonwealth Literature

ENGL 491 (A-Z) 0.5
Special Topic Seminars in American Literature

ENGL 492 (A-Z) 0.5
Special Topic Seminars in Critical, Theoretical and Generic Studies

COURSES NOT OFFERED 1996-97
ENGL 108N The Wars
ENGL 202A/B The Bible and Literature
ENGL 208D Modern Satire
ENGL 208F The Literature of Aging
ENGL 215 Canadian Regional Literature
ENGL 232 The Development of English Drama to 1660
ENGL 233 Drama from 1660
ENGL 233A Drama of the Late 17th and Early 18th Centuries
ENGL 233B Drama of the 18th, 19th, and Early 20th Centuries
ENGL 233C Drama of the 20th Century
ENGL 233D Modern Drama
ENGL 234 Modern Drama in English from Australia, New Zealand, Africa and the West Indies
ENGL 240R Form and Function 1
ENGL 306B Modern English Grammar
ENGL 306D The History of English
ENGL 308F Linguistics and Literature
ENGL 307A Computer-Aided Learning and Literature
ENGL 309B Rhetoric: Principles and Practice 2
ENGL 310C Non-Chaucerian Middle English Literature
ENGL 312 Literature of the Commonwealth
ENGL 325 Reading, Leisure, and Human Development
ENGL 335 Creative Writing 2
ENGL 345B American Fiction
ENGL 346C American Fiction
ENGL 470B History of Literary Criticism
Course Descriptions
Environment and Resource Studies

ERS 241 F 2C,1T 0.5
Introduction to Environmental Assessment
A theoretical and practical introduction to processes and techniques for incorporating environmental considerations in planning and evaluating proposals for future undertakings that may have significant social and biophysical effects. The course provides an overview of methodologies for, and controversies surrounding, the design and conduct of biophysical and socioeconomic impact studies, and the testing of reported findings. The main focus is on the purposes and design of environmental assessment processes, with particular reference to the Canadian federal and Ontario provincial regimes. Consideration of case examples is emphasized.
Prereq: At least second-year standing

ERS 275A-Z F,W,S 2R 0.5
Special Readings
Background reading and study in consultation with Faculty. Typically utilized when a student must study a topic in connection with other work, but no course offering that topic is available.
Prereq: Consent of instructor and contract required

ERS 285 W,S 3C 0.5
Greening the Campus
This course will use the campus as a laboratory for exploring how to evaluate the environmental appropriateness of an activity. Students will be asked to take some activity on the campus and perform a quantitative systems analysis to evaluate its environmental performance. Various kinds of environmental audits will be covered (i.e., energy, water, waste, etc.) as well as the basis of a systems approach to analysis. Students will be expected on the basis of their analysis to identify areas where environmental performance might be improved. The course will involve considerable field work on the campus.
Prereq: ERS 218 and ENV S 178 or consent of instructor

ERS 317 W 3C 0.5
Waste Management
This course will deal with the solid waste system, landfilling, incineration, energy from waste, recycling, composting, reduction and reuse. The context will be primarily Ontario and municipal waste management.
Prereq: Students with third-year standing or consent of instructor
Field trip fee: $20-$25

ERS 319 F 2C,1T 0.5
Greenways
A Greenway system is a linked open space network. A Greenway Plan provides an ecological and human system of trails and routeways made up of existing trails, riverine lands, coastal lands and rail trails. The objectives of the course will be to understand how to design, realize and manage a greenway system.
Prereq: Second-year standing or above

ERS 339 F 3C 0.5
Biophysical and Socioeconomic Impact Assessment
Consideration of major problems and issues in the assessment and management of environmental impacts of projects, policies and plans. The course provides a synthesis of ecological, physical, economic, socio-cultural and institutional concerns, as well as experience in the use of impact assessment methodologies and approaches as a key element in achieving more informed and responsible decision making.
Prereq: ERS 241, and ENV S 200 (or equivalent)
Field trip fee: $20-$25

ERS 360 F 3C 0.5
Nature: Art, Myth and Folklore
This course explores the symbolic representation of nature in art, architecture, myth and literature from a multi-cultural perspective. The ideas about sacred spaces and environments will also be discussed.
Prereq: Students with second-year standing or consent of instructor
ERS 361 W 3C 0.5
International Communication System and Development
Information and ideas constitute the most basic resource of a people. This course will explore the role of various mass media, newspapers, TV, cinema, magazines, radio, travelers, in the process of development. What is the nature of mass education in a developing society? How do the media hinder or contribute to social change? These and many related questions will be explored in the context of a number of different societies.
Prereq: At least second-year standing or consent of instructor

ERS 3622 F 2.5
Waterloo in USA - Michigan
Description in Environmental Studies program section

ERS 3632 W 2.5
Waterloo In USA - Michigan
As 3622.

ERS 3642 S 2.5
Waterloo In USA - Michigan
As 3622.

ERS 370 F 3C 0.5
"Green" Business: Context, Prospects and Pitfalls
A seminar course that allows students to examine in detail the problems and opportunities involved in making the private sector more environmentally sustainable. This exploration will take place within the broader social, political and economic context of the debates about "shallow" and "deep" ecology.
Prereq: Second-year standing or above

ERS 375A-Z F,W,S 2R 0.5
Special Readings or Seminars on Selected Topics
Prereq: Consent of instructor and contract required
The letter designation allows this course to be taken more than once for credit

ERS 385 F 3C,1S 0.5
Technology/Lifestyles for a Conserver Society
What is a Conserver Society? What must we do to make our society into a Conserver Society? How do we evaluate the appropriateness of a lifestyle or technology for a Conserver Society? Is a Conserver Society realistic? This course will explore these questions, with emphasis on student participation in discussion and in seminar presentations. Lectures will focus on the basics of various technologies and lifestyles, and on qualitative techniques for comparing these.
Prereq: At least second-year standing

ERS 390A F,S 2C,1T 0.5
Environmental Research Project
Individual or small group project emphasizing multidisciplinary treatment of environmental problems. Work encouraged on situations of interest to community organizations, government agencies or other groups.
Prereq: Students with third-year standing in Environment and Resource Studies

ERS 390B F,W,S 4S, workshop 0.5
Environmental Research Project
Normally a continuation of 390A; may also be a separate project as described in 390A.
Prereq: ERS 390A

ERS 395 F 2C,1S 0.5
Development of Environmental Thought 1
Examination of conflicting positions on how we do and should view the natural world and ourselves, beginning with review of the history of attitudes to the environment and our place in it. Emphasis on evolution of attitudes to human nature and the environment in industrial society, critiques of these attitudes and implications for approaches to modern environmental issues.
Prereq: Environment and Resource Studies students only with at least second-year standing or consent of instructor

ERS 406 W 3C 0.5
Women and Environments
This seminar examines theoretical and practical aspects of the relationship between women and the environments they inhabit. Includes an examination of ecofeminism and its historical antecedents and other topics, including feminist geography and women in architecture and planning.
Prereq: Fourth year standing or permission of instructor

ERS 408 W 1C,2S 0.5
Atmospheric Resource Management
The atmosphere as a natural resource system, and human interactions with it. Topics chosen from: weather modification, climate change scenarios, impact assessments (past, present and future), policy implications for abatement and adaptation. Particular emphasis on the enhanced greenhouse effect.
Prereq: GEOG 208 or permission of instructor
Cross-listed as GEOG 408

ERS 474A-Z F,W,S 3C 0.5
Special Topics in Environment and Resource Studies
These courses allow for additions to the program on a short-term basis, and for the development of future permanent courses.
Prereq: Consent of instructor

ERS 475A-Z F,W,S 2R 0.5 each
Special Readings or Seminar on Selected Topics
See course descriptions under ERS 275 and 375.
Prereq: Consent of instructor and contract required
The letter designation allows this course to be taken more than once for credit.

ERS 490A F,W,S 2C 0.5
Senior Honours Project
A project of sufficient scope to demonstrate mastery of problem-solving and communication skills on a selected problem or issue concerning human interrelationships with the environment. Credit weights for 490, 491 and 492 vary depending on the amount of work involved and the depth of the subject matter.
Prereq: Students with fourth-year standing in Environment and Resource Studies only
Students wishing to do their senior honours for more than 0.5 credits (i.e. take ERS 491A&B or 492A&B) must get approval of 90's Co-ordinator and selected advisor. Only one of 490A&B, 491A&B, or 492A&B may be taken.

ERS 490B F,W,S 2C 0.5
Senior Honours Project
Continuation of ERS 490A
Prereq: ERS 490A

ERS 491A F,W,S 4C 1.0
Senior Honours Project
See description for ERS 490A.
Prereq: Students with fourth-year standing in Environment and Resource Studies only. Permission of 90's Co-ordinator and selected advisor.

ERS 491B F,W,S 4C 1.0
Senior Honours Project
Continuation of ERS 491A.
Prereq: ERS 491A

ERS 492A F,W,S 6C 1.5
Senior Honours Project
See description for ERS 490A.
Prereq: Students with fourth-year standing in Environment and Resource Studies only. Permission of 90's Co-ordinator and selected advisor.

ERS 492B F,W,S 6C 1.5
Senior Honours Project
Continuation of ERS 491A.
Prereq: ERS 491A
Course Descriptions
Environmental Engineering

ERS 492B F,W,S 6C 1.5
Senior Honours Project
Continuation of ERS 492A.
Prereq: ERS 492A

ERS 496 W 2C,1S 0.5
Development of Environmental Thought 2
Examination of twentieth century concerns about industrial progress and treatment of people and the environment. Focus on problems and promises of efforts to dominate nature through scientific and technological advance; alternative views on the nature of scientific knowledge and human well-being, and the rise of modern environmentalism. Assessment of alternative futures.
Prereq: ERS 395 and third-year standing or consent of instructor

COURSES NOT OFFERED 1996-97
ERS 150 Environmental Issues: Methods and Techniques
ERS 280 Applied Field Studies
ERS 330 Environmental Journalism 1
ERS 352 Current Issues in the Canadian North
ERS 418B Seminar on Strategies for Sustainable Development
ERS 430 Environmental Journalism 2
ERS 445 Environmental Assessment, Planning and Design
ERS 480 Special Topics Seminar

Environmental Engineering
Chair of the Environmental Engineering Board, Co-ordinator of Environmental Engineering Option
G.E. Schneider, CPH 1325K, ext. 4792
Representative for Environmental Engineering Program (Chemical Branch)
J. Scharer, E1 2546, ext. 2703
Representative for Environmental Engineering Program (Civil Branch)
W.C. Lennox, E2 3314, ext. 6959

ERS 492B F,W,S 6C 1.5
Senior Honours Project
Continuation of ERS 492A.
Prereq: ERS 492A

ERS 496 W 2C,1S 0.5
Development of Environmental Thought 2
Examination of twentieth century concerns about industrial progress and treatment of people and the environment. Focus on problems and promises of efforts to dominate nature through scientific and technological advance; alternative views on the nature of scientific knowledge and human well-being, and the rise of modern environmentalism. Assessment of alternative futures.
Prereq: ERS 395 and third-year standing or consent of instructor

COURSES NOT OFFERED 1996-97
ERS 150 Environmental Issues: Methods and Techniques
ERS 280 Applied Field Studies
ERS 330 Environmental Journalism 1
ERS 352 Current Issues in the Canadian North
ERS 418B Seminar on Strategies for Sustainable Development
ERS 430 Environmental Journalism 2
ERS 445 Environmental Assessment, Planning and Design
ERS 480 Special Topics Seminar

Course Descriptions
Environmental Engineering

ERS 126 F 2C,1L 0.5
Environmental Engineering Concepts 1
An introduction to Environmental Engineering and the basic methods and principles used in the analysis and design of physical processes; units, dimensions, and measurement; mass balances; introduction to the WATERSTAR computing environment; use of word processing, spreadsheet, and database software; WHMIS; laboratory on visual communication (joint with CH E students) is included.
For Environmental Engineering students, Chemical branch

ERS 127 F 2C,1L 0.5
Environmental Engineering Concepts 2
A continuation of Environmental Engineering Concepts 1 (ERS 100) incorporating energy balances and phase equilibria. Laboratory experiments (joint with CH E students) illustrate the physical principles discussed.
For Environmental Engineering students, Chemical branch

ERS 128 S 2C,1L 0.5
Environmental Engineering Concepts 3
Environmental Engineering Concepts 2
A continuation and integration of PHYS 115, ENV E 161 and 170. Extension and application of relevant principles of Physics (vectors, forces, equilibrium, elasticity, fluids) and descriptive geometry (points, lines, planes, intersections, developments) as applied to environmental engineering concerns. Exercises include laboratory experiments to illustrate relations of the principles of physics and chemistry to environmental engineering and a team project/experiment involving planning, conducting and reporting results in written and oral presentations. Introduction to group dynamics. This course will be taught to students within the Environmental Engineering program. The intent of this course will be, in part, to provide some unity and direction to the environmental engineering students.

ERS 161 F 1C,1T,1L 0.25
Environmental Engineering Concepts 1
An introduction to some of the basic methods and principles used by engineers in general, and environmental engineers, in particular. The course includes the fundamentals of technical communication, measurement, analysis, and design. Some aspects of the engineering profession, including standards, safety, and intellectual property. This course will be taught in the same classroom as GEN E 165. Examples to be utilized within the course, appropriate to environmental engineering concerns, will be provided.

ERS 213 F 3C,2L 0.5
Fluid Mechanics
Prereq: ENV E 101
Cross-listed as CH E 025
For Environmental Engineering students, Chemical branch

ERS 220 F,W 3C 0.5
Environmental Chemistry and Ecotoxicology
Prereq: Second-year standing

ERS 222 W 3C,1T 0.5
Applied Mathematics 1: Statistics
Introduction to statistical ideas, probability theory, distribution theory, sampling theory, confidence intervals and significance tests. Introduction to regression analysis. Introduction to design of experiments and statistical quality control.
Prereq: MATH 115, 117, or consent of instructor
Cross-listed as CH E 022
For Environmental Engineering students, Chemical branch

ERS 231 F,S 3C,1T,3L 0.5
Inorganic Environmental Process Principles
Atomic theory, bonding, stereochemistry and transition metal chemistry as related to catalysis and pollution abatement. Some thermodynamic aspects of inorganic chemistry, stability of metal complexes and complex ions in solution. Principles and applications of atomic and molecular structure to environmental chemistry and engineering (e.g. ozone, CFCs, NOx, and SOx). Selected inorganic chemical processes of industrial importance, e.g. sulphuric acid, nitric acid, ammonia, phosphate, caustic, iron ore, uranium. Impact of process design and chemistry on the environment.
Prereq: MATH 118, CH E 023
For Chemical Engineering students. Environmental Engineering students, Chemical branch

ERS 275 W 3C,1T,2L 1.0
Environmental Chemistry
Prereq: CH E 102
1Alternate weeks
For Environmental Engineering students, Civil branch
ENVE 320 W, S 3C, 1T 0.5
Environmental Resource Management

ENVE 322 S 3C, 1T 0.5
Advanced Mathematics
Introduction to partial differential equations of mathematical physics, classical solution techniques involving transforms, separation of variables, approximate techniques such as weighted residual methods including collocation, galerkin. Introduction to numerical techniques, finite difference methods, special emphasis on laplace equation, advection-dispersion equation. Prereq: CIV E 222
For Environmental Engineering students, Civil branch

ENVE 324 S 3C 0.5
Applied Mathematics 2: Advanced Mathematics
Prereq: MATH 115, 217, 218
Cross-listed as CH E 037
For Environmental Engineering students, Chemical branch

ENVE 330 W 3C, 2L
Lab Analysis and Field Sampling Techniques
An introduction to the fundamental concepts of instrumentation and measurement. Water analysis, physical parameters, membrane application, electrochemical probes. Direction toward how to obtain a good sample and how it can be analyzed, frequency of monitoring, remote sensing measuring devices and opportunities. Toward the development of an optimum monitoring strategy.

ENVE 331 W 3C, 2L 0.5
Instrumentation and Analysis Methods
Introduction to the fundamental concepts of instrumentation and measurement. The components of instrumentation (transducers, amplifiers, filters) are discussed. Specific measurement techniques including mass spectrometry, spectroscopy, chromatography (gas, ion exchange, HPLC), electro-chemical probes (membrane electrodes), biosensors and remote sensor devices are covered with emphasis on selection of methods and practical applications in environmental monitoring. Database management, data analysis, statistical treatment of data. Development of optimum monitoring strategy, scheduling, sampling frequency. The course includes laboratory exercises.
For Environmental Engineering students, Chemical branch

ENVE 333 W 3C 0.5
Chemical Reaction Engineering
Prereq: CH E 025, MATH 218
GEN E 121
Cross-listed as CH E 036
For Environmental Engineering students, Chemical branch

ENVE 334 S 3C, 1T 0.5
Environmental Chemistry

Prereq: CHEM 028, CH E 102, ENV E 231 or equivalent.
For Environmental Engineering students, Chemical branch
Chemical Engineering students take instead of ENV E 220 in the Environmental Engineering Option

ENVE 375 W.S 3C, 1T, 2L 0.5
Water Quality Engineering
Prereq: CH E 102, CIV E 280
Cross-listed as CIV E 375
6 lab sessions
For Environmental Engineering students, Civil branch

ENVE 403 F 3C, 1T 0.5
Environment: Regulations and Legal Issues
Philosophy of environmental controls; introduction to national and international regulatory structures relevant to industrial planning, emissions control, environmental impact assessment, occupational health; stance of government, industry and community pressure groups.

ENVE 410 F 3C, 1T 0.5
Transport Processes: Environmental Engineering Applications
Transport processes for mass, momentum, and energy in the natural environment. Transport in air, water, and soil and associated chemical changes are discussed. Basic meteorology, energy budget, general circulation, wind structure. Coastal hydrodynamics, tides, currents, shallow waves, current and thermal structure of natural bodies of water. Fundamental hydrogeology, transport through groundwater and rivers.
For Environmental Engineering students, Chemical branch

ENVE 420 W 3C, 1T 0.5
Modelling of the Environment
Cross-listed as SY DE 536
Course Descriptions

Environmental Engineering
Enviromental Studies

ENV E 422 F 3C 0.5
Economics for Environmental Engineering
Mathematics of finance. Time value of money, Taxes and depreciatiorn.
Capital and operating cost estimating.
Prereq: CH E 044
For Environmental Engineering students, Chemical branch

ENV E 430 F,S 9L 0.5
Environmental Engineering Project 1
Students may undertake an independent Environmental Engineering design project
during the last two terms of their program. The purpose of the project is to demonstrate
students' abilities to practise in an Environmental Engineering capacity in the
ir chosen area of expertise, using knowledge gained from their academic
and employment experiences. The first part of the project (ENV E 430) will include
problem identification, generation and selection of solutions and time manage-
ment. Incorporation of technical, ecological, social, political and economic issues in
the solution for the project will be required. A basic requirement of the proposed solution
is that it must be compatible with the principles of sustainability. Requirements include: proposal, progress report, and a
final report containing recommendations for part two of the project, ENV E 431.

ENV E 431 W 9L 0.5
Environmental Engineering Project 2
A continuation of ENV E 430. The final design of the major Environmental Engineering project proposed in ENV E 430 will be undertaken. The purpose of this phase of the project is to carry out a
detailed technical design of the solution proposed in ENV E 430. Requirements of this part of the two-term project include a
final report.

ENV E 472 F 3C,1T,1L 0.5
Wastewater Treatment
Wastewater quantity and characteristics. Primary treatment and secondary treat-
ment. Reverse osmosis, ultra filtration, adsorption, air stripping, air flotation,
chemical precipitation. Sludge treatment and disposal. Groundwater and leachate
treatment. Industrial wastewater management.
Prereq: ENV E 375
Cross-listed as CIV E 472
For Environmental Engineering students, Civil branch

ENV E 473 W 3C,1T 0.5
Contaminant Transport
Mathematical modelling of transport phe-
nomena in rivers, lakes and groundwater.
Analytic and numerical solution methods.
Sensitivity and uncertainty analysis, Monte
Carlo method, risk analysis. Data collec-
tion and analysis. Thermal pollution.
Prereq: ENV E 375
Cross-listed as CIV E 473
For Environmental Engineering students, Chemical branch

ENV E 477 W 3C,1L,1T
Engineering for Solid Waste Management
The engineering aspects of solid waste management are examined. Attention is
given to the engineering design and operational aspects of the control of genera-
tion, storage, collection, transfer and transport, processing and disposal of solid
wastes in landfill site. Design of natural attenuation sites and system reliability
features for landfill designs.

ENV E 480 F 3L 0.25
Environmental Engineering Project
Individual research or design on any
chemical/environmental engineering sub-
ject chosen by the student in consultation
with the supervising professor. A written
interim preliminary report is required.
Students enrolled in this course must take
ENV E 481 in 4B.
Cross-listed as CH E 043
For Environmental Engineering students, Chemical branch

ENV E 481 W 9L 0.75
Environmental Engineering Project
A continuation of ENV E 480. The individ-
ual research or design project started and
presented in proposal form in 4A is carried
out. An oral presentation of results and a
written report are required.
Prereq: ENV E 480
Antireq: CH E 047, ENV E 483
Cross-listed as CH E 048
For Environmental Engineering students, Chemical branch

ENV E 483 W 12L 1.0
Environmental Engineering Project
Student design teams of two to four mem-
bers work on design projects of industrial
scope and importance under the
supervision of a faculty member.
Antireq: CH E 048, ENV E 481
Cross-listed as CH E 047
For Environmental Engineering students, Chemical branch

Environmental Studies

Courses not offered in the current academic year are listed at the end of this section.

Note
There are a number of courses offered in the Faculty of Environmental Studies of an
integrative nature which extend across the academic interests of the four units:
School of Architecture, Department of Geography, Department of Environment
and Resource Studies, and School of Urban and Regional Planning. The
courses are of a general interest and are open to all students in the University.
There is not an actual Department of Environmental Studies. Students interest-
ed in this area are urged to consult the course offerings of the four individual units
mentioned above. These four depart-
ments/schools offer a variety of related
courses allowing in depth study of topics
covered in the Environmental Studies
courses.

ENV S 178 F,W 3C,1L 0.5
Introduction to Environmental Research Methods
Introduction to methods of developing, evaluating and using evidence in
Environmental Studies. Methods for summarizing and critical appreciation of data
describing environmental systems. Skill
development in applying statistical tech-
niques and in using microcomputers as a
research tool.
While not a prerequisite for this course,
CS 100 or a high school computing course
is helpful.

ENV S 195 F 2C,1S 0.5
Introduction to Environmental Studies
Provides an overview of human ecological
aspects of environmental studies from an
intercultural and global perspective.
ENV S 200  F, W  2C, 2L  0.5
Field Ecology
Introduces the main concepts and principles of ecology; the cycling of elements; energetics and structural organization of major ecological systems; population dynamics; impact of natural resource management practices and urban and industrial development on the environment; incorporating environmental quality considerations into development activities. The laboratory sessions include field trips to study natural and disturbed ecosystems, urban and applied ecology.
Prereq: Only second year students and above except for Planning
Lab fee: $10
Antireq: BIOL 250

ENV S 201  F  3C, 1.5S  0.5
Introduction to Environmental and Planning Law
Introduction to legal concepts generally and to environmental and planning law concepts in particular. Designed both for students who do not plan to take further in depth legal courses and as a prerequisite for senior legal courses — ENV S 401 and PLAN 402. Topics to be covered include Sources of Law, Nature of Legal Remedies, Common Law, Administrative Agencies, Planning Act, Environmental Protection and Assessment Acts, and Federal Environmental Protection Act.

ENV S 220  F, W  2C, 1T  0.5
Environmental Economics
Evaluation of various economic approaches to the environment. The links between economics, systems and the natural environment will be explored and future directions examined.

ENV S 252  F  3C  0.5
Media Tools for Environmental Studies
Instruction in basic black and white photography relating to photography's role as a media tool; basic darkroom functions, camera operation, composition, photographic theory, and photo essay production. Much of the course work and projects will be done outside the classroom in field situations of environmental concern using initiative in project development. Students are expected to supply their own cameras. A limited number of cameras will be available on a rental basis.
Prereq: Environmental Studies students; others with consent of instructor
Lab fee: $5 for use of ES Student Darkroom
Materials at student's expense

ENV S 278  F, W  3C, 1L  0.5
Advanced Environmental Research Methods
Advanced methods for developing, evaluating and using primary and secondary data in Environmental Studies. Builds upon ENV S 178 by introducing probability and inferential statistics, statistical sampling procedures and hypothesis testing. Standard parametric and nonparametric statistical tests up to the linear regression model and extensions. Modelling of environmental phenomena in space and time using the microcomputer for data entry, storage and analysis.
Prereq: ENV S 178
See overlapping content note (Grading System Item 7)

ENV S 334  W  3C, 1L  0.5
Introduction to Park Management
Basic administrative procedures in park management. Operational techniques are examined together with general policies of acquisition, operation and development.
Prereq: REC 230
Cross-listed as REC 334

ENV S 3952  F  2.5
Waterloo in UK — Leeds
Description in Environmental Studies program section
Cross-listed as GEOG 3652

ENV S 3962  W  2.5
Waterloo in UK — Leeds
As 3652.
Cross-listed as GEOG 3662

ENV S 3822  F  2.5
Waterloo in Australia — RMIT
Description in Environmental Studies program section

ENV S 3832  W  2.5
Waterloo in Australia — RMIT
Description in Environmental Studies program section

ENV S 3842  S  2.5
Waterloo in Australia — RMIT
Description in Environmental Studies program section

ENV S 3922  F  2.5
Waterloo in Australia — Deakin
Description in Environmental Studies program section

ENV S 3932  W  2.5
Waterloo in Australia — Deakin
As 3922.

ENV S 3942  S  2.5
Waterloo in Australia — Deakin
As 3922.

ENV S 3952  F  2.5
Waterloo in Australia — Griffith
Description in Environmental Studies program section

ENV S 3962  W  2.5
Waterloo in Australia — Griffith
As 3952

ENV S 3972  S  2.5
Waterloo in Australia — Griffith
As 3962

ENV S 401  W  3C  0.5
Environmental Law
Detailed consideration of recent developments in Canadian environmental and resources regulatory regimes combined with guidance on presentation of expert evidence to courts and tribunals.
Prereq: ENV S 201

ENV S 433  F  3C, 2st  0.5
People in Natural Areas
Concepts, philosophy and practices of social science research will be discussed. Visitor management and interpretation and their relevance to cultural and natural heritage areas and facilities will be emphasized. Also included are the planning, design and management issues related to visitors, customary users, Indigenous people, neighbours and stakeholders.
Prereq: REC/ENV S 334
Cross-listed as REC 439

ENV S 500  W  3C  0.5
Professional Development in Environmental Management
Professional practice issues, such as concepts of professionalism, ethics, the client-consultant relationship, expert testimony, interdisciplinary frameworks, private practice roles versus public or government roles, contract law, liability, communications, media and project management, will be addressed in the context of a studio project related to current environmental management issues.
Prereq: Fourth-year students or consent of instructor
Field trip fee: $15

COURSES NOT OFFERED 1996-97
ENV S 320 Environmental Economics: An Historical Perspective
ENV S 417 Field Studies in Land Use History and Landscape Change
ENV S 434 Advanced Park Planning and Management
ENV S 499 Field Aspects of Applied Ecology
Course Descriptions
Fine and Performing Arts
Fine Arts

Fine and Performing Arts

The University offers courses in Dance, Drama, Fine Arts, and Music.

For program information, please see the Faculty of Applied Health Sciences and the Faculty of Arts.

Fine Arts

Undergraduate Officer
B. Taylor, ECH 1211, ext. 5358

Note
Students should consult the "Fine Arts Course Offerings" lists, available from the departmental secretary, before each semester, to ensure that the courses they select are offered. Budget restrictions, enrolment and availability of faculty may cause some courses to be withdrawn.

ART HISTORY OFFERINGS

FINE 110 F 3C 0.5
Introduction to Art History 1
A comparative survey of Prehistoric, Ancient, Classical and Medieval Art, emphasizing visual form as an expression of its historical and cultural context.

FINE 111 W 3C 0.5
Introduction to Art History 2
A comparative survey of art from the Renaissance to the present, emphasizing visual form as an expression of its historical and cultural context.

FINE 210 F 3C 0.5
Modern Art 1
An examination of the history of Modern Art from the late 18th century up to the time of Impressionism.

FINE 211 W 3C 0.5
Modern Art 2
A continuation of FINE 210, commencing with Impressionism and proceeding through the major trends of the early 20th century up to the contemporary period.

FINE 212 F 3C 0.5
Italian and Northern Renaissance Art 1
A survey of the innovations in European painting, sculpture, and architecture between 1260 and 1500.
Prereq: FINE 111 or consent of instructor

FINE 213 W 3C 0.5
Italian and Northern Renaissance Art 2
A continuation of FINE 212 starting with the masters of the High Renaissance and concluding with the art of the Mannerists.
Prereq: FINE 212 or consent of instructor

FINE 214 3C 0.5
Medieval Art and Architecture
A study of Early Christian Romanesque and Gothic art.
Prereq: FINE 111 or consent of instructor

FINE 215 3C 0.5
Baroque Art
A study of 17th-century painting, sculpture and architecture in Italy, Spain, Flanders, France and Holland.
Prereq: FINE 212 or consent of instructor

FINE 216 3C 0.5
Art of the 18th Century in Europe
A study of painting, sculpture, graphic arts and architecture in 18th-century Europe.

FINE 219 3C 0.5
Canadian Art
A survey that begins with the art of British and French settlers in the 17th century and concludes with developments in contemporary Canadian art.

FINE 310 3C 0.5
Greek Art and Architecture
A survey of the art and architecture of the ancient Greek world from the Minoan to the Hellenistic periods.
Consult Classical Studies
Cross-listed as CLAS 351

FINE 311 3C 0.5
Roman Art and Architecture
A survey of the art and architecture of the Roman world from Etruscan to Imperial times.
Consult Classical Studies
Cross-listed as CLAS 352

FINE 313 3C 0.5
Special Topics in 18th- and 19th-Century Art
A seminar course that examines the Neoclassic and Romantic currents of art between 1750 and 1850.

FINE 319 3C 0.5
Contemporary Art
A survey of contemporary international art movements with emphasis on work since 1970. Readings in contemporary criticism and gallery visits are an integral part of the course.
Prereq: FINE 210 and 211

FINE 319A 3C 0.5
Special Topics in 20th-Century Art: 1900-1940
A study of the major innovations in early 20th-century painting, sculpture and architecture. Honours Art History majors interested in the modern period are encouraged to use this course as preparation for the fourth-year Honours presentation.
Prereq: FINE 211 or consent of instructor

FINE 330 3C 0.5
Fine Arts Exhibition Curatorship
The development, design, documentation, security, conservation, installation, and interpretation of visual art exhibitions will be explored through lectures on the history, purpose and function of fine art exhibitions; gallery visits and student projects which analyse various art gallery operations.

FINE 390 F R 0.5
Selected Subjects in Fine Arts
Research and reading courses under the direction of individual instructors.
This course may be taken only as an elective after a student has completed 30 term courses and has taken all the courses available in the area related to the independent course.
Admission by consent of instructor

FINE 390A W 3S 0.5
Methods in the History of Art
For students planning a Senior Honours Presentation in Art History. Students will examine methods of formal and stylistic analysis, iconographical interpretation and the application of social and political history to the understanding of works of art. Required of all art history majors who take FINE 490/491 and 490A.
Admission by consent of instructor

FINE 391 W R 0.5
Selected Subjects in Fine Arts
Research and reading courses under the direction of individual instructors.
This course may be taken only as an elective after a student has completed 30 term courses and has taken all the courses available in the area related to the independent course.
Admission by consent of instructor
Course Descriptions
Fine Arts

FINE 472 F R 0.5
Senior Seminar 1
Admission by consent of instructor

FINE 473 W R 0.5
Senior Seminar 2
Admission by consent of instructor

FINE 490 F S,std,R 0.5
Senior Honours Presentation 1
Each student will work under the direction of a Fine Arts faculty member on an advanced research project, subject to the approval by the Fine Arts Department. The work in this course will be evaluated by a committee of Fine Arts faculty members. Required of all Honours students in Art History Specialization.

FINE 490A F S,std,R 0.5
Senior General Seminar
As in FINE 390A, each student will work under the direction of a Fine Arts faculty member on an advanced research project. Required of all fourth-year general art history majors.

FINE 491 S,std,R W 0.5
Senior Honours Presentation 2
A continuation of FINE 490. Required of all Honours students in Art History Specialization.

FINE 491A W 0.5
Senior General Seminar 2
A continuation of FINE 490A.

FILM STUDIES OFFERINGS

FINE 250 F 3L,1D 0.5
History of Film 1 (1905-1940)
History of world cinema in its silent and early sound era, covering the work of outstanding directors, national productions and movements, and their contribution to the film medium's development into a prominent art form of the 20th century. Film screenings.

FINE 251 W 3L,1D 0.5
History of Film 2 – After 1941
A continuation of FINE 250. From the beginnings of the modern sound cinema (Welles) to the contemporary period. Film screenings.

FINE 252 F 2C,1D 0.5
Film and the Quest for Meaning 1
An exploration of spiritual themes and issues in the cinema. An assessment of film's special characteristics as an art form capable of addressing the human quest for a significant existence. Emphasis upon the films of Ingmar Bergman.
Offered at Renison College
Cross-listed as RS 256

FINE 253 W 2C,1D 0.5
Film and the Quest for Meaning 2
A consideration of selected themes—death, evil, guilt, fate, alienation, courage, love, redemption—in the films of several of today's leading directors. Emphasis upon a variety of directors from divergent cultural backgrounds.
Offered at Renison College
Cross-listed as RS 267

FINE 255R 2C,1D 0.5
Film as Social Criticism
Cinema as “prophetic voice”, exploring the films of various directors as they pertain to selected themes which include technology and dehumanization, individual and collective goals, social realities and dreams, and the quest for individual and cultural identity.
Offered at Renison College

FINE 255W 0.5
Canadian Film
A study of Canadian film, from 1895 to the present, based on the screening and analysis of selected films.

FINE 256W 0.5
The Cinema of Science Fiction
A chronological survey of one of the most intriguing film genres. Discussion of its aesthetic, philosophical and cinematic aspects. Film screenings will present major international works in this genre (Godard, Kubrick, Lang, Marker, Siegel, Tarkovsky, Truffaut and others).

FINE 257W 0.5
Sound and Colour in Film
A study of the principles of sound recording for film and of the colour laboratory and its techniques. The students will produce a short colour/sound film.
Prerequisite: FINE 270W, any other film course or consent of instructor.
This is a WLU course for Film Studies Majors only. Admission by instructor's permission only.

FINE 260 F 2L,2D 0.5
French Film After 1945
A study of major achievements of the French cinema after World War II. Discussion and comparison of the two main creative impulses of the period: the Academic tradition of the 40's and 50's, and the rebellious nouvelle vague of the 60's. (Breton, Carné, Ophuls, Renoir, Chabrol, Godard, Malé, Truffaut, Resnais, and others.) Film screenings.

FINE 261 W 2L,2D 0.5
Central and East European Film
Examination of the development of the motion picture art in Central and Eastern Europe after World War II. Selected work of prominent directors of the Czech Republic, Hungary, Poland, the former USSR, and former Yugoslavia will be discussed (Chytilová, Forman, Jancsó, Makavejev, Tarkovsky, Wajda, and others).
Film screenings.

FINE 265 2L,2D 0.5
The Cinema of Science Fiction
A chronological survey of one of the most intriguing film genres. Discussion of its aesthetic, philosophical and cinematic aspects. Film screenings will present major international works in this genre (Godard, Kubrick, Lang, Marker, Siegel, Tarkovsky, Truffaut and others).
Film screenings.

FINE 271W 0.5
Sound and Colour in Film
A study of the principles of sound recording for film and of the colour laboratory and its techniques. The students will produce a short colour/sound film.
Prerequisite: FINE 270W, any other film course or consent of instructor.
This is a WLU course for Film Studies Majors only. Admission by instructor's permission only.

FINE 272W 0.5
French Film After 1945
A study of major achievements of the French cinema after World War II. Discussion and comparison of the two main creative impulses of the period: the Academic tradition of the 40's and 50's, and the rebellious nouvelle vague of the 60's. (Breton, Carné, Ophuls, Renoir, Chabrol, Godard, Malle, Truffaut, Resnais, and others.) Film screenings.

FINE 275W 0.5
German Film
A study of major works (English subtitles) of the German cinema, beginning with the "golden age" of the 1920s and emphasizing the New German Cinema created by directors such as Fassbinder, Wenders, Herzog, Straub, Schöndorf and others.
This is a WLU course for Film Studies Majors/Minors only.

FINE 275W 0.5
German Film
A study of major works (English subtitles) of the German cinema, beginning with the "golden age" of the 1920s and emphasizing the New German Cinema created by directors such as Fassbinder, Wenders, Herzog, Straub, Schöndorf and others.
This is a WLU course for Film Studies Majors/Minors only.

FINE 270W 0.5
The Film as a Modern Medium
A study of the technical problems of filmmaking, leading to the writing, production and editing of a silent film.
This is a WLU course for Film Studies Majors only. Admission by instructor's permission only.
FINE 359 3C 0.5
Film and Literature in Germany
This course introduces students to significant aspects of modern German culture through film, and links this study with that of literature. It involves viewing and analysing films and establishing a connection to related literary and cultural traditions.
Prereq: Open to all students above first year
Cross-listed as GER 300
Taught in English

FINE 360 2L,2D 0.5
Film and Television 1
Examination of principles of the audiovisual language and the main structural elements of the cinematic work. Discussion of the relationship between film, television and other arts/media. Film screenings.

FINE 361 2L,2D 0.5
Film and Television 2
Development of critical judgment and expression in the area of film and television. Investigation of the role of motion pictures and TV in society. Review of major theories (Eisenstein, Bazin, Metz, Kracauer, Esmlin). Film screenings.

FINE 380Z and 381Z
Film Studies Seminar
An introduction to key aspects of motion picture and TV production, film preservation and restoration with visits to studios, film archives, and museums. Screening of selected films and discussions focusing on material unavailable in Canada. Meetings with scholars/students. (Three weeks in Paris and London.)

FINE 390 F R 0.5
Selected Subjects in Fine Arts
Research and reading courses under the direction of individual instructors.
This course may be taken only as an elective after a student has completed 30 term courses and has taken all the courses available in the area related to the independent course.
Admission by consent of instructor

FINE 391 W R 0.5
Selected Subjects in Fine Arts
Research and reading courses under the direction of individual instructors.
This course may be taken only as an elective after a student has completed 30 term courses and has taken all the courses available in the area related to the independent course.
Admission by consent of instructor

FINE 470 F 0.5
Senior Seminar in Film Concepts 1
Film screenings.
Admission by consent of instructor

FINE 471 W 0.5
Senior Seminar in Film Concepts 2
Film screenings.
Admission by consent of instructor

FINE 490 F S, std, R 0.5
Senior Honours Presentation 1
Each student will work under the direction of a Fine Arts faculty member on an advanced research project, subject to the approval by the Fine Arts Department.
The work in this course will be evaluated by a committee of Fine Arts faculty members. Required of all Honours students in Film Studies Specialization.
Admission by permission only

FINE 490A F S, std, R 0.5
Senior General Seminar
As in FINE 390A, each student will work under the direction of a Fine Arts faculty member on an advanced research project. Required of all fourth-year general film studies majors.

FINE 491 W S, std, R 0.5
Senior Honours Presentation 2
A continuation of FINE 490. Required of all Honours students in Film Studies Specialization.
Admission by permission only

STUDIO OFFERINGS

Note
Students should expect material costs to range between $60 and $200 per studio course.

FINE 120 F 6std 0.5
Fundamentals of Visual Art 1
An introduction to the fundamental principles and concepts of visual art through a series of drawing exercises using a variety of materials.
Prereq: FINE 120

FINE 121 W 6std 0.5
Fundamentals of Visual Art 2
A continuation of FINE 120 with emphasis on colour and painting.
Prereq: FINE 120

FINE 220 F 6std 0.5
Fundamentals of Painting 1
An exploration of the problems and possibilities of painting as a vehicle for serious creative expression. The fundamentals of composition and painting technique will be presented through a series of studio projects. This course is required of all Fine Arts majors and enrolment may be limited. Non-majors require permission of the instructor.
Prereq: FINE 120/121

FINE 221 W 6std 0.5
Fundamentals of Painting 2
A continuation of FINE 220 with emphasis on the development of technical, intellectual and observational skills.
Prereq: FINE 220

FINE 222 F 6std 0.5
Fundamentals of Sculpture 1
An introduction to sculpture. Three-dimensional form will be explored with the emphasis on the handling of clay and wood as expressive media enhanced by surface treatment. This course is required of all Fine Arts majors and enrolment may be limited. Non-majors require permission of the instructor.
Prereq: FINE 120/121

FINE 223 W 6std 0.5
Fundamentals of Sculpture 2
A continuation of FINE 222 in which clay, wood and plaster will be used to express ideas three-dimensionally.
Prereq: FINE 120/121/222

FINE 223A 6std 0.5
Clay Studies
Using a variety of clay bodies and firing techniques, students will explore figurative and abstract sculptural concepts, to develop a working knowledge of clay as a sculptural medium.
Prereq: FINE 120/121

FINE 224 F 6std 0.5
Introduction to Drawing
Analytical and expressive drawing in a variety of media with emphasis on the development of technical, intellectual and observational skills. This course is required of all Fine Arts majors and enrolment may be limited. Non-majors require permission of the instructor.
Prereq: FINE 120/121
### Course Descriptions

#### Fine Arts

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Title</th>
<th>Credits</th>
<th>Pre requisites</th>
</tr>
</thead>
<tbody>
<tr>
<td>FINE 225</td>
<td>Introduction to Drawing 2</td>
<td>0.5</td>
<td>FINE 120/121</td>
</tr>
<tr>
<td>FINE 226A</td>
<td>Introduction to Printmaking</td>
<td>0.5</td>
<td>FINE 224 and 225</td>
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<tr>
<td>FINE 226B</td>
<td>Intermediate Printmaking</td>
<td>0.5</td>
<td>FINE 322</td>
</tr>
<tr>
<td>FINE 226D</td>
<td>Special Topics in Printmaking</td>
<td>0.5</td>
<td>FINE 220/221</td>
</tr>
<tr>
<td>FINE 226E</td>
<td>Applied Graphics</td>
<td>0.5</td>
<td>FINE 220/221</td>
</tr>
<tr>
<td>FINE 228H</td>
<td>Electronic Imaging 1</td>
<td>0.5</td>
<td>FINE 220/221</td>
</tr>
<tr>
<td>FINE 320</td>
<td>Advanced Painting 1</td>
<td>0.5</td>
<td>FINE 220/221</td>
</tr>
<tr>
<td>FINE 321</td>
<td>Advanced Painting 2</td>
<td>0.5</td>
<td>FINE 220/221</td>
</tr>
<tr>
<td>FINE 322</td>
<td>Advanced Sculpture 1</td>
<td>0.5</td>
<td>FINE 220/221</td>
</tr>
<tr>
<td>FINE 323</td>
<td>Advanced Sculpture 2</td>
<td>0.5</td>
<td>FINE 220/221</td>
</tr>
<tr>
<td>FINE 324</td>
<td>Advanced Drawing</td>
<td>0.5</td>
<td>FINE 220/221</td>
</tr>
<tr>
<td>FINE 325</td>
<td>Advanced Drawing 2</td>
<td>0.5</td>
<td>FINE 220/221</td>
</tr>
<tr>
<td>FINE 326A</td>
<td>Advanced Image-Making Through Printmaking Processes</td>
<td>0.5</td>
<td>FINE 220/221</td>
</tr>
<tr>
<td>FINE 392A-Z</td>
<td>Selected Subjects in Fine Arts</td>
<td>0.5</td>
<td>FINE 220/221</td>
</tr>
<tr>
<td>FINE 394A-D</td>
<td>Fine Arts Abroad</td>
<td>0.5</td>
<td>FINE 220/221</td>
</tr>
<tr>
<td>FINE 472</td>
<td>Senior Honours Seminar 1</td>
<td>0.5</td>
<td>FINE 220/221</td>
</tr>
</tbody>
</table>

**Fine Arts Program**

This program is designed for students interested in the visual arts, with a focus on creativity and expression. Students will explore various artistic disciplines, including drawing, painting, sculpture, and printmaking, with an emphasis on developing their individual expression. The curriculum is designed to provide a broad foundation in the visual arts, with opportunities for specialization in particular areas of interest. Students will have access to state-of-the-art facilities and will work with experienced faculty to enhance their skills and knowledge. The program is open to students who have completed at least two years of university study and are interested in pursuing a career in the visual arts or related fields. Admission is competitive and requires a strong academic record and portfolio of work.
FIN 473 W R/std 0.5
Senior Honours Seminar 2
A continuation of FIN 472.
Required of all Honours students in Studio Specialization
Admission by consent of Department

FIN 474 F R/std 0.5
Senior Seminar 3
Independent study/practice course under the direction of individual instructors.
This course may be taken only as an elective after a student has completed 30 term courses and has taken all the courses available in the area related to the independent course.
Prereq: Consent of instructor

FIN 475 W R/std 0.5
Senior Seminar 4
Independent study/practice course under the direction of individual instructors.
This course may be taken only as an elective after a student has completed 30 term courses and has taken all the courses available in the area related to the independent course.
Prereq: Consent of instructor

FIN 490 F 6std 0.5
Senior Honours Presentation 1
Each student will work under the direction of a Fine Arts faculty member on an advanced creative or research project. The work in this course will be evaluated by a committee of Fine Arts faculty members.
Admission is by portfolio review and consent of Department. In the Studio Specialization only, students must be taking FIN 472 concurrently.

FIN 491 W 6std 0.5
Senior Honours Presentation 2
Each student will work under the direction of a Fine Arts faculty member on an advanced creative or research project. The work in this course will be evaluated by a committee of Fine Arts faculty members.
Admission is by portfolio review and consent of Department. In the Studio Specialization only, students must be taking FIN 473 concurrently.

COURSES NOT OFFERED 1998-97
FINE 218A The Religious Art of India
FINE 220A Watercolour Painting
FINE 228C Printmaking (Screen)
FINE 227 Objective Drawing
FINE 228F Calligraphy
FINE 316 Canadian Native Art
FINE 329 Illustration

French Studies/
Études françaises

Undergraduate Officer
A.M. Miraglia, ML 334A, ext. 5201

Students should consult the Department of French Studies undergraduate brochure, available from the departmental secretary, before each trimester, to ensure that the courses they want are offered. Budget restrictions, enrolment and availability of faculty may cause some courses to be withdrawn.

LANGUAGE COURSES

Notes
1. The Department reserves the right to refuse admission to, and/or credit for, any of its language courses to a student who has, in the view of the Department, a level of competence unsuited to that course. Students from immersion programs may not enrol in FR 151 or FR 152.

2. Students with some elementary or secondary school French not exceeding Ontario Grade 10 French or equivalent should enrol in FR 151. Those with Ontario Grade 11 or Grade 12 French or equivalent should enrol in FR 152.

3. Students with Ontario Grade 13 or Ontario Academic Course French should enrol in FR 192A/B and/or FR 195A/196A.

4. Students may enrol in courses for which they have secondary school antirequisites only with the written permission of the Department of French Studies.

5. Linguistics, Language, Civilization, and Literature courses are listed separately below.

FR 151 F,W,S 3C,1L 0.5
Basic French 1
For students with some elementary or secondary school French not exceeding Year Two (Grade Ten in Ontario) or equivalent. Emphasizes comprehension, grammar and basic speaking skills.
Antireq: Ontario Grade 11 French or equivalent. See Notes above.

FR 152 F,W,S 3C,1L 0.5
Basic French 2
A continuation of the work done in FR 151.
Prereq: FR 151 or equivalent
Antireq: Ontario Grade 12 French or equivalent

FR 192A F,W 4C,1L 0.5
French Language 1: Module 1
An intensive French Language course. Emphasis will be placed on strengthening oral expression, comprehension of spoken French, reading and writing skills.
Prereq: Ontario Grade 13 or Ontario Academic Course French or equivalent.
See Notes above.

FR 192B F,W,S 4C,1L 0.5
French Language 1: Module 2
Continuation of FR 192A.
Prereq: FR 192A
Also offered at St. Jerome's College

FR 192C 0.5
French Language 2: Module 3
An intensive study of the language, with emphasis on improving skills in writing French.
Prereq: Ontario Grade 13 or OAC French or equivalent
Also offered at St. Jerome's College

FR 208D 3C 0.5
Spoken French Through Drama
A course which will use the rehearsal and performance of a play in French as a basis for intensive oral training. Students will participate in the preparation of the play, and also do a project related to the play.
Prereq: FR 250, 250A or consent of Department

FR 250A 3C 0.5
Advanced Spoken French 2
A course intended to develop the oral and aural skills. Small group work.
Prereq: FR 250

FR 251 3C 0.5
French Language 2: Module 1
Continued intensive study of written French, with emphasis on more difficult problems of the language. Taught in French.
Prereq: Two of FR 155, 192/192, 195A, 196A, 201 or the consent of Department
Antireq: FR 250

FR 252 3C 0.5
French Language 2: Module 2
Continued intensive study of written French, with emphasis on more difficult problems of the language. Taught in French.
Prereq: Two of FR 155, 192/192, 195A, 196A, 201 or consent of Department
Antireq: FR 250
Course Descriptions
French Studies/Études françaises

FR 255 3C, 1L 0.5
Business French
A French language course designed to enable the student to carry on standard business practices in spoken and written French.
Prepar: Two of FR 155, 192A/B, 195A, 196A or consent of Department

FR 300A F,W 3C 0.5
Advanced Spoken French 3
An advanced level course intended to continue intensive oral and aural skill development. Taught in French.
Prepar: FR 281, 282 or consent of Department

FR 351 3C 0.5
French Language 3: Module 1
Intensive development of writing skills through a study of stylistics and advanced composition. Taught in French.
Prepar: FR 251, 252 or consent of Department
Antireq: FR 300
Priority enrolment for French majors

FR 352 3C 0.5
French Language 3: Module 2
Intensive development of writing skills through a study of stylistics and advanced composition. Taught in French.
Prepar: FR 251, 252 or consent of Department
Antireq: FR 300
Priority enrolment for French majors

FR 400 F,W 4C 0.5
French Language 4A
Intensive development of advanced comparative stylistics, translation and composition skills. Taught in French.
Prepar: FR 351, 352 or consent of Department

FR 400A W,S 3C 0.5
Advanced Spoken French 4
Further advanced level work to continue intensive oral and aural skill development. Taught in French.
Prepar: FR 300A, 400 or 452 or consent of Department

FR 452 3C 0.5
French Language 4B
Intensive study of French composition, style and grammar. Taught in French.
Prepar: FR 351 and 362

LINGUISTICS COURSES

FR 203 3C, 1L 0.5
Introduction to Phonetics
Prepar: Two of FR 155, 192A/B, 195A, 196A or consent of Department

FR 202 3C 0.5
Introduction to Linguistics
Prepar: Two of FR 155, 192A/B, 195A, 196A or consent of Department

FR 302 3C, 1L 0.5
Introduction to Linguistics
Prepar: Two of FR 155, 192A/B, 195A, 196A or consent of Department

FR 403 3C 0.5
Topics in Linguistics
Prepar: FR 251 or 252 or consent of Department

FR 409 3C 0.5
Medieval French Language
Prepar: FR 251 or 252 or consent of Department

CIVILIZATION COURSES

FR 291 3C 0.5
French Civilization 1
Prepar: OAC or Grade 13 French or equivalent
Also offered at St. Jerome's College

FR 292 3C 0.5
French Civilization 2
Prepar: FR 291 is recommended
FR 291 and 292 are taught in English.
Open to Arts students in second year and higher, and to others in any year.
Students in a French Major, Honours, or Minor Program may take this course as a non-French elective.
This course may be used toward the All requirement.

FR 355 3C, 1L 0.5
Topical Studies
Prepar: FR 292

FR 473 3C 0.5
Aspects of Quebec
Prepar: FR 292

LITERATURE COURSES

FR 195A 3C 0.5
French Literature 1
Prepar: FR 200A/B or consent of Department

FR 195B 3C 0.5
French Literature 2
Prepar: FR 200A/B or consent of Department

FR 196A 3C 0.5
French Literature 3
Prepar: FR 200A/B or consent of Department

FR 196B 3C 0.5
French Literature 4
Prepar: FR 200A/B or consent of Department

FR 197A 3C 0.5
French Literature 5
Prepar: FR 200A/B or consent of Department

FR 197B 3C 0.5
French Literature 6
Prepar: FR 200A/B or consent of Department

FL 200A/B 3C 0.5
French Literature 7
Prepar: FR 200A/B or consent of Department

FL 200C 3C 0.5
French Literature 8
Prepar: FR 200A/B or consent of Department

FL 200D 3C 0.5
French Literature 9
Prepar: FR 200A/B or consent of Department

FL 200E 3C 0.5
French Literature 10
Prepar: FR 200A/B or consent of Department

FL 200F 3C 0.5
French Literature 11
Prepar: FR 200A/B or consent of Department

FL 200G 3C 0.5
French Literature 12
Prepar: FR 200A/B or consent of Department

FR 295A/B 3C 0.5
French Literature 13
Prepar: FR 200A/B or consent of Department

FR 295C/D 3C 0.5
French Literature 14
Prepar: FR 200A/B or consent of Department

FR 295E/F 3C 0.5
French Literature 15
Prepar: FR 200A/B or consent of Department

FR 295G/H 3C 0.5
French Literature 16
Prepar: FR 200A/B or consent of Department

FR 295I/J 3C 0.5
French Literature 17
Prepar: FR 200A/B or consent of Department

FR 295K/L 3C 0.5
French Literature 18
Prepar: FR 200A/B or consent of Department

FR 295M/N 3C 0.5
French Literature 19
Prepar: FR 200A/B or consent of Department

FR 295O/P 3C 0.5
French Literature 20
Prepar: FR 200A/B or consent of Department

FR 295Q/R 3C 0.5
French Literature 21
Prepar: FR 200A/B or consent of Department

FR 295S/T 3C 0.5
French Literature 22
Prepar: FR 200A/B or consent of Department

FR 295U/V 3C 0.5
French Literature 23
Prepar: FR 200A/B or consent of Department

FR 295W/X 3C 0.5
French Literature 24
Prepar: FR 200A/B or consent of Department

FR 295Y/Z 3C 0.5
French Literature 25
Prepar: FR 200A/B or consent of Department

FR 300A/B 3C 0.5
French Literature 26
Prepar: FR 200A/B or consent of Department

FR 300C/D 3C 0.5
French Literature 27
Prepar: FR 200A/B or consent of Department

FR 300E/F 3C 0.5
French Literature 28
Prepar: FR 200A/B or consent of Department

FR 300G/H 3C 0.5
French Literature 29
Prepar: FR 200A/B or consent of Department

FR 300I/J 3C 0.5
French Literature 30
Prepar: FR 200A/B or consent of Department

FR 300K/L 3C 0.5
French Literature 31
Prepar: FR 200A/B or consent of Department

FR 300M/N 3C 0.5
French Literature 32
Prepar: FR 200A/B or consent of Department

FR 300O/P 3C 0.5
French Literature 33
Prepar: FR 200A/B or consent of Department

FR 300Q/R 3C 0.5
French Literature 34
Prepar: FR 200A/B or consent of Department

FR 300S/T 3C 0.5
French Literature 35
Prepar: FR 200A/B or consent of Department

FR 300U/V 3C 0.5
French Literature 36
Prepar: FR 200A/B or consent of Department

FR 300W/X 3C 0.5
French Literature 37
Prepar: FR 200A/B or consent of Department

FR 300Y/Z 3C 0.5
French Literature 38
Prepar: FR 200A/B or consent of Department

FR 300A/B/C 3C 0.5
French Literature 39
Prepar: FR 200A/B or consent of Department

FR 300D/E 3C 0.5
French Literature 40
Prepar: FR 200A/B or consent of Department

FR 300F/G 3C 0.5
French Literature 41
Prepar: FR 200A/B or consent of Department

FR 300H/I 3C 0.5
French Literature 42
Prepar: FR 200A/B or consent of Department

FR 300J/K 3C 0.5
French Literature 43
Prepar: FR 200A/B or consent of Department

FR 300L/M 3C 0.5
French Literature 44
Prepar: FR 200A/B or consent of Department

FR 300N/O 3C 0.5
French Literature 45
Prepar: FR 200A/B or consent of Department

FR 300P/Q 3C 0.5
French Literature 46
Prepar: FR 200A/B or consent of Department

FR 300R/S 3C 0.5
French Literature 47
Prepar: FR 200A/B or consent of Department

FR 300T/U 3C 0.5
French Literature 48
Prepar: FR 200A/B or consent of Department

FR 300V/W 3C 0.5
French Literature 49
Prepar: FR 200A/B or consent of Department

FR 300X/Y 3C 0.5
French Literature 50
Prepar: FR 200A/B or consent of Department
Course Descriptions
French Studies/Études françaises

FR 196A 3C 0.5
French Studies 2
A survey of French civilization and literature from the 18th century to the present. Continued emphasis on language skills through dictées, composition and written assignments. Taught in French.
Prereq: FR 195A or 192A or consent of Department
Also offered at St. Jerome's College

FR 200A 3C 0.5
Introduction to French Literature 1
An overview of the major trends in the literature of France from the Middle Ages to the Revolution. A small number of authors will be selected for more detailed study. Taught in French.
Prereq: FR 195A and 196A or consent of Department

FR 200B 3C 0.5
Introduction to French Literature 2
An overview of the major trends in the literature of the French-speaking world (France and "la francophonie") between the Revolution and the present. A small number of authors will be selected for more detailed study. Taught in French.
Prereq: FR 195A and 196A or consent of Department

FR 271 0.5
French-Canadian Literature in Translation
The study of a selection of French-Canadian literary texts. Taught in English. This course cannot be counted towards a Major or Minor in French Studies. This course does not meet the All Requirement.

FR 283 3C 0.5
Modern Approaches to Reading
This course aims to help the student become a more active, perceptive, and critical reader. A number of modern concepts in the fields of language and of texts will be introduced. A major portion of the course will consist in the practical application of these concepts to various texts, chosen from outside as well as from within the traditional literary genres. Taught in French.
Prereq: FR 195A and 196A or consent of Department (Formerly FR 483)

FR 322 3C 0.5
17th-Century French Literature
A detailed study of selected aspects of 17th-century French literature. Taught in French.
Prereq: FR 200A/B or consent of Department (Formerly FR 232)

FR 323A/B 0.5/0.5
17th-Century French Literature
Offered at Nantes, France

FR 343 3C 0.5
18th-Century French Literature
A detailed study of one or more aspects of the Enlightenment. Taught in French.
Prereq: FR 200A/B or consent of Department
Also offered at St. Jerome's College

FR 343A/B 0.5/0.5
18th-Century French Literature
Offered at Nantes, France

FR 354 3C 0.5
19th-Century French Literature
A detailed study of selected aspects of 19th-century French literature. Taught in French.
Prereq: FR 200A/B or consent of Department
Antireq: FR 254

FR 354A/B 0.5/0.5
19th-Century French Literature
Offered at Nantes, France

FR 363 3C 0.5
20th-Century French Literature
A detailed study of selected aspects of 20th-century French literature. Taught in French.
Prereq: FR 200A/B or consent of Department

FR 363A/B 0.5/0.5
20th-Century French Literature
Offered at Nantes, France

FR 375 3C 0.5
Contemporary French-Canadian Novel
A study of selected texts by modern French-Canadian authors. Taught in French.
Prereq: FR 200A/B or consent of Department

FR 399A 0.5
Independent Cultural Study
An independent study course, in which the student chooses an area of French life on which to make a detailed study (topic must be approved by the Department). A written cultural studies report is submitted, on which the student is examined orally.

FR 410 3C 0.5
Medieval French Literature
An introduction to French literature of the Middle Ages through the study of representative texts, including excerpts from the epic, courtly and satirical works. Taught in French.
Prereq: FR 200A/B or consent of Department

FR 410A/B 0.5/0.5
Medieval French Literature
Offered at Nantes, France

FR 424 3C 0.5
16th-Century French Literature
A focused study of a particular theme of Renaissance (1500-1600) writing. Taught in French.
Prereq: FR 200A/B or consent of Department

FR 424A/B 0.5/0.5
16th-Century French Literature
Offered at Nantes, France

FR 471 3C 0.5
French-Canadian Literature
A detailed study of a selected genre or aspect of French-Canadian literature. Taught in French.
Prereq: FR 200A/B or consent of Department
(Formerly FR 371/372)

FR 471A/B 0.5/0.5
French-Canadian Literature
Offered at Nantes, France

FR 482 3C 0.5
Study of Individual Authors
Each year a different author is the subject of specialized study to permit an in-depth exploration of her/his literary qualities. Taught in French.
Prereq: FR 200A/B or consent of Department

FR 484 0.5
Children's Literature in French
This course deals with French and French-Canadian literature from the 17th century to the present. The focus will be on the short story and the novel, narrative techniques and the evolution of writing for young people.
Offered at St. Jerome's College (Formerly FR 497)

FR 485 3C 0.5
French Women Writers
A study of selected works by women writers in France from the Middle Ages to the 20th century. The course will focus on the literary features of these works and on their value as reflections of the position of women in French society throughout the period. Taught in French.
Prereq: FR 200A/B or consent of Department
(Formerly FR 391)
FR 487 3C 0.5
African and Caribbean French
Literature
A detailed survey of selected
Francophone writers from outside Europe
and Canada. Taught in French.
Prereq: FR 200A/B or consent of
Department

FR 490-498 0.5
Senior Tutorials
A small group of students follows a course
of study under the supervision of a faculty
member. For details, inquire of the
Department.
Prereq: FR 200A/B or consent of
Department

General Engineering

Associate Dean of Engineering
Undergraduate Studies
G.E. Schneider, CPH 1325K, ext. 4792

Director of Admissions
M.E. Jernigan, CPH 1325H, ext. 4712

Director of Exchange Programs
H.C. Ratz, CPH 1325B, ext. 4175

Director of First Year Engineering
G.D. Stubley, CPH 1325F, ext. 3754

Director of General Studies(Acting)
G.E. Schneider, CPH 1325K, ext. 4792

GEN E 010 F,W 1S 0.0
Co-operative Education Orientation
Given by the Department of Co-operative
Education and Career Services for stu-
dents in First Year Engineering. Its pur-
pose is to introduce students to the vari-
ous features of the Co-operative program
and engineering as a profession.

GEN E 119 F,W,S 2L 0.0
Problems Laboratory
Students may be assigned to a Problems
Laboratory by the Director of First-Year
Engineering according to their performance
during the term.

GEN E 020X-099X F,W,S 0.5
Courses taken at foreign universities by
University of Waterloo Chemical/Civil/
Geological/Electrical/Computer/Mechanical/
Systems Design Engineering students
while enrolled in an international exchange
program, and reserved for courses without
equivalents at the University of Waterloo.
Such courses are reported on the stu-
dent's transcript with their original titles in
English. The grades for these courses will
be either CR or NCR. The "X" in the above
notation denotes the University of Waterloo
department in which the student is regis-
tered. The specific cases are indicated in
the following:

GEN E 020X - 099C
International Exchange Program Courses
- Chemical Engineering

GEN E 020X - 099K
International Exchange Program Courses
- Civil and Geological Engineering

GEN E 020E - 099E
International Exchange Program Courses
- Electrical and Computer Engineering

GEN E 020M - 099M
International Exchange Program Courses
- Mechanical Engineering

GEN E 020D - 099D
International Exchange Program Courses
- Systems Design Engineering

GEN E 121 W,S 3C,2T 0.5
Digital Computation
Introduction to electronic digital comput-
ers, hardware and software organization;
basic features of FORTRAN, examples of
efficient numerical algorithms for basic
scientific computations.

GEN E 123 W,S 3C,1T,3L 1 0.5
Electrical Engineering
Introduction to electric and magnetic fields;
basic dc circuits; amplifiers and opera-
tional amplifiers; ac circuit components;
basic ac circuits; power circuits.
For Year One Chemical, Civil,
Environmental, Geological and
Mechanical Engineering students.
1Alternate Weeks

GEN E 183 F 1C,1T,1L 0.25
Introduction to Methods of Mechanical
Engineering
An Introduction to some of the basic meth-
ods and principles used by engineers,
including fundamentals of technical com-
munication, measurement, analysis, and
design. Some aspects of the engineering
profession, including standards, safety,
and intellectual property. Both written and
oral communication skills are emphasized.
Examples drawn from Mechanical
Engineering.

GEN E 165 F 1C,1T,1L 0.25
Introduction to Methods of Civil
Engineering
An Introduction to some of the basic meth-
ods and principles used by engineers,
including fundamentals of technical com-
munication, measurement, analysis, and
design. Some aspects of the engineering
profession, including standards, safety,
and intellectual property.
Examples drawn from Civil Engineering.

GEN E 167 F 1C,1T,1L 0.25
Introduction to Methods of Electrical
and Computer Engineering
An Introduction to some of the basic meth-
ods and principles used by engineers,
including fundamentals of technical com-
munication, measurement, analysis, and
design. Some aspects of the engineering
profession, including standards, safety,
and intellectual property.
Examples drawn from Electrical and
Computer Engineering.

GEN E 170 F 1C,3L 0.5
Engineering Graphics
An introduction to the fundamentals of
orthographic, isometric oblique and per-
spective projection, including computer-
aided projection and freehand sketching.
Basic descriptive geometry principles are
introduced to solve spatial problems
involving points, lines, planes, curved
surfaces, intersections and developments.

GEN E 301/302 W,S,F/W 4D 0.5
Special Directed Studies
This course is provided to allow enrich-
ment for students in Engineering who
have fulfilled the requirements of one or
more of the courses in the 3A or 3B term
by means of passing a course or courses
taken during one or more work terms.
The course comprises a special project
pursued under the direction of a faculty
member, normally in the department of
the student's program.
Prereq: Permission of the Associate
Chair of the Department in which the
student is registered

GEN E 303 W,S,F 3D 0.5
International Studies In Engineering
Engineering students register for this
course for credit towards the Designated
Faculty Option in International Studies in
Engineering, upon return from study or
work terms abroad. Credit will be
assessed on the basis of a written report
and individual interviews. The report may
include technical, non-technical, and pro-
fessional aspects of the foreign residence
period. The instructor for this course is the
Option Co-ordinator. Restricted to stu-
dents who Intend to complete the Option
in International Studies in Engineering
GEN E 315/415 W,S,F 3D 0.5
Special Directed Non-Technical Studies
This course is provided for students who, through academic studies during international exchange programs or other university-related scholarly activities, wish to request a course credit for this work. Students wishing to claim this credit must show evidence of university level academic activity not otherwise claimed for credit.
Prerequisites: Permission of the Associate Chair of the Department in which the student is registered

GEN E 395A-Z F 1.5
Engineering Study Abroad Program
Students studying abroad for academic transfer credits under an Engineering Exchange Program during a Fall term register at Waterloo under GEN E 395A-Z. The suffix is a letter indicating the country (and where necessary the fee status) of the exchange in a particular case.

GEN E 396A-S 1.5
Directed Studies for Visiting Exchange Students
This course is provided to allow enrichment for students in Engineering who have fulfilled the requirements of one or more of the courses in the 4A or 4B term by means of passing a course or courses taken during one or more work terms.
The course comprises a special project pursued under the direction of a faculty member, normally in the department of the student’s program.
Prerequisites: Permission of the Associate Chair of the Department in which the student is registered

GEN E 411 S,F 3C 0.5
Engineering Law
Restricted to fourth-year Chemical, Computer, Electrical and Systems Design Engineering Students

GEN E 412 W 3C 0.5
Ethics and The Engineering Profession
An introduction of philosophical analysis and theories of ethics to issues of moral conduct in the engineering profession. Discussions will include such matters as the social responsibilities of engineers, standards of product safety and liability, the assessment of acceptable risk, conflicts of interest and obligation, professional loyalty and whistle blowing, use and enforcement of professional codes of ethics, the “democratization” of the profession, and the moral implications of technology. Not open to First Year students.
Cross-listed as PHIL 315

GEN E 420 W 3C 0.5
Technical Entrepreneurship
An introduction of entrepreneurial thinking to the role of independent business, entrepreneurial behaviour, types of business and enterprises, business structure, sources of venture concepts and capital, company operation and control, and business start-up.
Prerequisite: A course in Entrepreneur Economics (or equivalent)
Restricted to fourth-year Engineering students

GEN E 501/502/503 F,W,S 1.5
Directed Studies for Visiting Exchange Students
An assignment of study or project work under the direction of a Faculty member. The specific project is established on the basis of a written proposal that is agreed to by the supervisors at both the host and home institutions. The academic level and the time commitment shall be specified in the proposal. Registration is restricted to international exchange students at Waterloo under an Exchange Agreement with the Faculty of Engineering.

Candidates for degrees at the University of Waterloo are not eligible; grading will be CR/NCR. A student must arrange with a Waterloo faculty member to serve as advisor prior to registering for this course. A student must arrange with a Waterloo faculty member to serve as advisor prior to registering for this course.

Geography

Undergraduate Officer
E. LeDrew, ES1 121, ext. 2783

Courses not offered in the current academic year are listed at the end of this section.

GEOG 101 F,W 3C 0.5
Geography and Human Habitat
An introduction to human geography through a survey of some of the concepts, methods, techniques and applications of geographic analysis to the human cultural environment. Directed towards people-land and location analysis themes.

GEOG 102 F,W 3C 0.5
Geography and Our Planetary Environment
Emphasis on the natural environment as an integrated system. Selected aspects of weather—climate, water, soils, biota, landforms along with flow of energy, water and matter and their effects on the subsystems of the natural environment.

GEOG 185 F 2C,2L 0.5
Introduction to Cartography and Remote Sensing
This course focuses on the compilation, analysis and cartographic display of spatially referenced data. The emphasis is on compiling data from a variety of sources such as ariphotos, satellite imagery and tabular datasets, on evaluating the quality of the data and on production of effective maps based on established principles of cartographic design.
Prerequisite: Geography students only

GEOG 201 F 2C,2L 0.5
Geomorphology and Soils
The roles of geomorphological and soil forming processes in creating and modifying landscapes. The utility of geomorphological information in our everyday lives.
Prerequisite: GEOG 102 or EARTH 121 or 126 or GEO E 126
GEOG 202 F 3C 0.5
Location of Economic Activity
The principles of economic location and the process of regional development are introduced and illustrated with case studies. Basic theories and tools are used to analyse the location structure of primary, secondary and tertiary activities.
Prereq: A first-year human geography course or equivalent

GEOG 202A W 3C 0.5
Globallisation, Restructuring and Sustainability
Corporate, radical and sustainable development theories are introduced and contrasted with the neo-classical approach to economic geography. The integrative (and disintegrated) nature of economic development is demonstrated at different scales of geographic analysis (local, regional, national and international).
Prereq: GEOG 202A

GEOG 204 W 3C 0.5
The Geography of Russia and Post-Soviet States
Introduction to the geography of the Post-Soviet States, with a focus on selected problems in urbanization, industrialization, resource use and regional economic development.

GEOG 205 F 2C,2L 0.5
Africa
The geography of modern Africa south of the Sahara in the context of changing attitudes to the continent on the part of "developed" countries. Attention will focus on problems of the physical, social and economic environments.

GEOG 208 W 2C,2L 0.5
Applied Climatology
World climate and weather patterns and their impact on humanity. Topics include atmospheric circulation, climate classifications, air pollution, urban climate, climate change and weather modification.
Prereq: GEOG 102

GEOG 221 W 3C 0.5
The United States
Focuses on population shifts, urban development, and regional economic development in the context of the nation and selected regions.

GEOG 223 F 2C,1C 0.5
The Geography of Indonesia
A survey of the geography of Indonesian economic, social and political development since independence. Government policies and programs to ensure national economic growth, foster an Indonesian national identity, and enhance the role of Indonesia amongst developing countries in general and in south-east Asia in particular will be discussed.

GEOG 229 W 3C 0.5
Political Geography
The principal concepts and theories of political geography will be applied to a study of geographical themes focusing on the making of the modern world in the twentieth century.
Prereq: GEOG 101

GEOG 255 F 2C,2L 0.5
Data Management and Analysis using Geographic Information Systems
Geographic information systems (GIS) are used as an organizing framework for discussion of data management in planning and geography. Topics include: data sources; methods of collection; database management; principles of geographic information systems; applications of geographic information systems in urban and regional analysis, monitoring and evaluation.
Prereq: ENV S 178 and GEOG 165
Antireq: PLAN 255
Lab fee $20

GEOG 300 S 2C,2L 0.5
Geomorphology and the Southern Ontario Environment
Study of the origin and evolution of landforms of Southern Ontario. Analysis of contemporary geomorphic processes. Study of human impact on geomorphological landscapes. The lectures will be supplemented by field trips and field work required for term projects.
Prereq: Third- and fourth-year students only with GEOG 201 or consent of instructor
Lab fee $20

GEOG 302 S 2C,2L 0.5
Geomorphological Processes
The impact of processes in landform development and modification. Methodologies for measuring landform changes over different time periods and under different climatic conditions. Processes discussed in detail will include two of the following: Glaciation and Deglaciation, Fluvial, Aeolian, Coastal and Human Activity.
Prereq: GEOG 201 or EARTH 121/122 or consent of instructor

GEOG 303 F 3C 0.5
Geographical Hydrology
Study of the land based hydrological cycle and water balance with a Canadian emphasis. Focus on precipitation, interception, infiltration, evaporation, slope and stream runoffs.
Prereq: GEOG 201 or one of 208 or 309
Lab fee $20

GEOG 305 W 2C,1T 0.5
Patterns and Processes of Biogeography
Geographic/spatial and temporal aspects of biogeography. Patterns of plant and animal distributions are discussed and the physical, historical, biological, and human processes involved in shaping these patterns.
Prereq: GEOG 201 and ENV S 200

GEOG 311 W 3C 0.5
Regional and Local Development
Economic development at regional and local scales. Emphasis on theoretical frameworks, empirical studies and planning. issues.
Prereq: GEOG 202A and 202B or consent of instructor

GEOG 318 S 0.5
Spatial Analysis
Advanced quantitative analysis and sampling in a spatial context. Selection of techniques from gravity models, linear programming, nearest neighbour analysis, Markov chain analysis, graph theory, simulations and trend surface analysis.
Prereq: ENV S 278 or consent of instructor
Cross-listed as PLAN 353

GEOG 322 F 3C 0.5
Geographical Study of Canada
Geographical Bases of Canada and Canadian issues. Selected problems relating to nationalism, resource development or theories of regionalism.

GEOG 323 F,S 3C 0.5
Perspective on International Tourism
The character, problems of, and prospects of tourism are examined through consideration of tourism in a variety of countries and regions, both developed and developing. Topics include the nature and significance of tourism; economic, environmental and social impacts of tourism and costs and benefits of tourism to destination areas.
Prereq: GEOG 202A, REC 230 or consent of instructor
GEOG 332 F 3C 0.5
Health, Environment and Development in the Third World
Geographic concepts and issues in studying health related environmental problems. Topics include: morbidity and mortality patterns, population at risk, malnutrition, poverty, access to modern health care, and alternative health care systems. Regional case studies from the developing countries.
Prereq: Second-year Third World Development course or consent of instructor
Estimated additional cost to student: $8

GEOG 333 W,S 3C 0.5
Recreation Geography
Implications of existing and potential recreation supplies and demands. Topics include recreational travel, site capability, economic and ecological impact models and behavioural aspects of amenity resources.
Prereq: GEOG 202A or REC 230
Cross-listed as REC 333
Students may receive credit for only one of GEOG 333 and REC 333

GEOG 349 W 3C 0.5
The City as a System
Theories, models and research procedures in the study of internal urban structure. Focuses on city-wide processes, urban land use, spatial economics, interaction systems, decision-making, urban growth, and the processes of development and redevelopment.
Prereq: GEOG 202A or consent of instructor
Field trip fee approx. $20

GEOG 350 F 3C 0.5
Regional Urban Systems
Theories, models and research procedures dealing with the growth and support of urban centres and city systems and their role in regional development.
Prereq: GEOG 202A or consent of instructor

GEOG 351 W 3C 0.5
Geography of Transportation
Examines transportation systems from both a theoretical and practical perspective. Focuses on principles and models of spatial interaction, the development and form of transportation networks, and related spatial, social and environmental impacts.
Prereq: GEOG 202A and ENV S 178 or consent of instructor

GEOG 355 W 2C,2L 0.5
Spatial Data and Spatial Data Bases
This course focuses on building a GIS data base. It addresses theoretical issues regarding data models and data structures used in GIS and considers the processing required to input data from a variety of sources, register map layers, transform co-ordinate systems, and edit and clean a multi-map-sheet, multi-theme data base.
Prereq: GEOG 255
Antireq: PLAN 355
Lab fee: estimated additional material cost $30

GEOG 356 F 3C 0.5
Resources Management
Reviews selected theories, methods, and terminology related to economic, behavioural, institutional and decision-making aspects of resources and environmental problems.
Prereq: ENV S 178 or consent of instructor
Field trip fee $15

GEOG 358 W 3C 0.5
Water Planning and Management: Strategies and Experiences
Benchmark theory and principles of comprehensive water planning and integrated river basin management. Selected international to local scale case studies.
Prereq: Third Year standing
Lab fee $15

GEOG 359 F 2.5
Waterloo in UK – Leeds
Description in Environmental Studies program section
Prereq: Completed first- and second-year Honours requirements
Cross-listed as ENV S 365Z

GEOG 360 Z W 2.5
Waterloo in UK – Leeds
As GEOG 365Z.
Cross-listed as ENV S 366Z

GEOG 367 W 3C 0.5
Conservation In Wildland and Resource Management
Consideration of the constraints and guidelines that an application of the principles of ecology place on the planning and management of resources within natural and semi-natural ecosystems. The theory of this subject will be discussed including principles of conservation biology, together with the management of wildlife, forestry, and parks.
Prereq: ENV S 200
Cross-listed as PLAN 340
Lab fee $20

GEOG 368 F 3C 0.5
Conservation/Resource Management of the Built Environment
Consideration of the constraints and guidelines that an application of the principles of ecology place on the planning and management of resources within urban spaces and the implications for urban design. The theory and history of this subject will be discussed together with urban ecomanagement, the management of waste, urban open space and parks, rehabilitated sites, and environmentally sensitive areas.
Prereq: ENV S 200
Cross-listed as PLAN 341
Lab fee $20

GEOG 372 F 2.5
Waterloo in Switzerland – Lausanne
Description in Environmental Studies program section

GEOG 373 W 2.5
Waterloo in Switzerland – Lausanne
Description in Environmental Studies program section

GEOG 375 S 0.5
Air Photo Interpretation
The principles of air photo interpretation utilizing specific criteria visible in the conventional air photo. Examples from local and foreign environments.
Prereq: GEOG 165, 275 and 201
Lab fee $20

GEOG 376 S 2C,3L 0.5
Environmental Remote Sensing
Analysis of non-photographic systems of remote sensing (e.g. radar, Landsat, SPOT). Study of remote sensing methods and data processing for analysis of physical and human environments.
Prereq: GEOG 165, 275
Lab fee $10-$15

GEOG 391 F,W fldlab 0.5
Field Research
One week field course in which a specific area will be analysed from a geographic point of view. Individual or group analysis of specific field problems.
Prereq: Third-year honours Geography students only
Estimated cost to student: $250
GEOG 393 F 3C 0.5
Professional and Scholarly Practice in Geography
This course explores the relationships between the academic content and methodologies of geography and the professional practice of the field. The course emphasizes issues involved in problem identification, research design, thesis proposal preparation, and the fundamentals of scholarly writing. The professional practice of the field examines such questions as ethics, the law and professional collaboration.
Prereq: Third- or fourth-year students only

GEOG 405 F 3S 0.5
Wetlands
Basic concepts on the distribution, hydrology, geochernistry, formation and ecology of wetlands with an emphasis on temperate and subarctic systems. The uses and management of wetlands are considered with the view of wetlands as functional ecosystems.
Prereq: An introductory course in physical geography, geomorphology, biology, ecology, or hydrology. Fourth-year Honours students only or permission of instructor
Field trip fee: $20
Cross-listed with Biology 453

GEOG 407 W 3S 0.5
Physical Hydrology
Advanced study of hydrological processes with an emphasis on snow and snowmelt; and on runoff modeling.
Prereq: GEOG 303
Fourth-year Honours students only or permission of instructor
Lab Fee $20

GEOG 411 W 3S 0.5
Geography of Industrial Restructuring
Emphasis on multinational corporations, institutions, technological change, and analysis of the restructuring of specific industries.
Prereq: GEOG 202A and 202B or consent of instructor
Fourth-year Honours students only or permission of instructor

GEOG 425 W 3S 0.5
Africa
Selected aspects of a major region with particular reference to problems of development. Normally the region will be East Africa. Selection of topics will be related to the interests of participants.
Prereq: GEOG 205
Fourth-year Honours students only or permission of instructor

GEOG 428 F 3S 0.5
Sustainable Development in the Third World
The potential for and constraints of achieving sustainable human resources development in the Third World are explored through case study analysis.
Prereq: Any second- or third-year Third World-related course
Fourth-year Honours students only or permission of instructor
Estimated additional cost to student $30

GEOG 430A/B/C S flab 0.5/1.0/1.5
Field Research in Regional Geography
430A (0.5 course credit) or 430B (1.0 course credit) or 430C (1.5 course credits)
A detailed analysis of a selected region with major emphasis upon a field examination of the region (several weeks duration). Offering dependent upon faculty availability and student enrolment.
Prereq: Fourth-year Honours students only or permission of instructor
In Spring 1997, Cities of Southern Ontario (0.5) and Geography of Britain (1.5) will be offered. For additional information on duration, itinerary and travel costs of each of these offerings, contact the Geography Undergraduate Advisor.

GEOG 450 W 3S 0.5
City and Regional Systems
A continuation of GEOG 349 and 350 with an emphasis on student projects.
Prereq: GEOG 349 and 350 or consent of instructor
Fourth-year Honours students only or permission of instructor

GEOG 455 F 3S 0.5
Applications of Geographic Information Systems in Geography
This course focuses on applications of GIS in Geography. Themes to be considered include: Integration of remote sensing and GIS, applications of terrain modelling, and applications of GIS in resource assessment and environmental management.
Prereq: GEOG 355 or PLAN 355
Fourth-year Honours students only or permission of instructor
Lab Fee; estimated additional material cost $30

GEOG 461 S 3S 0.5
Land Dereliction, Rehabilitation and the Design of "New Landscapes"
Course examines past and present reasons for physical and attitudinal dereliction in urban, rural and natural landscapes, programs for legislative rehabilitation are examined. Emphasis is on mining (aggregates and coal) and questions are raised about the objectives and design of new landscapes and development proposals.
Fourth-year Honours students only or permission of instructor

GEOG 471 S 3S 0.5
Advanced Remote Sensing
Principles of earth resource analysis using remotely sensed imagery and digital data acquired from both satellite and airborne platforms. Analysis procedures used in the extraction of resource information from digital data are examined.
Prereq: GEOG 376
Fourth-year Honours students only or permission of instructor

GEOG 474 A-Z F W S 3S 0.5
Special Topics in Geography
These courses allow for additions to the program on a short-term basis, and for the development of future permanent courses.
Prereq: Consent of instructor
Fourth-year Honours students only or permission of instructor

GEOG 475 A-Z F W S 3S 0.5
each
Independent Study of Selected Topics
Individual study of specific topics not covered in other courses. Students must not register for this course until a faculty member has agreed to supervise the study and the student has developed a brief outline to be filed with the Associate Chair, Undergraduate Studies.
Prereq: Fourth-year Honours students only or permission of instructor
The letter designation allows this course to be taken more than once for credit (limit 3)
Student must arrange with a faculty member to serve as advisor prior to registering for this course. Letter designation and Approval Form must be obtained from Susan Bartlett, Room 113.

GEOG 490 A-F W S 3S 0.5
Honours Thesis Preparation
Preparatory work and first draft of thesis.
Prereq: GEOG 393; only fourth-year Honours students
GEOG 490B F,W,S 3S 1.0
Honours Thesis Completion
Completion of thesis.
Prereq: GEOG 393 and 490A; only fourth-year Honours students

COURSES NOT OFFERED 1996-97
GEOG 120 The World Region
GEOG 206 The World Regions and World Issues
GEOG 207 Water Resources of Canada
GEOG 225 Urbanization in the Third World
GEOG 227 Regional Problems of Europe
GEOG 304 Field and Lab Techniques in Geomorphology
GEOG 309 Physical Climatology
GEOG 316 Multivariate Statistics
GEOG 320 Regional Geography
GEOG 326 Gender Roles and Development Alternatives in the Third World
GEOG 331 Special Topics in Cultural Geography
GEOG 340 Towns and Villages of Rural Canada
GEOG 341 Historical Geography of Canada
GEOG 353 Marketing Geography
GEOG 359 Geography of Energy
GEOG 401 Glacial Geomorphology and Some Contemporary Applications
GEOG 408 Atmospheric Resource Management
GEOG 409 Energy Balance Climatology
GEOG 412 Japan and the Pacific Rim
GEOG 421 Europe
GEOG 422 Canada
GEOG 459 Global Energy Systems
GEOG 470 Applied Air Photo Interpretation
GEOG 481 Frontiers in Geography

Course Descriptions
Geological Engineering
Undergraduate Officer
M. Dusseault, PHY-206A, ext. 4590
GEO E 126 S 2C,3L 0.5
Geological Engineering Concepts
An introduction to physical geology and earth processes. Geological time, introduction to earth, air and water processes including vulcanism, sedimentation, weathering, lithification, continental drift, radioactive dating, hydrogeology, pedology, resources, mass wasting, erosion. Antireq: EARTH 121/122
GEO E 400 F 1C,4T 0.5
Geological Engineering Thesis 1
GEO E 401 W 1C,4T 0.5
Geological Engineering Thesis 2
GEO E 400 and GEO E 401 serve the role of an undergraduate thesis. Specifically, the student is expected to work with a staff member in Civil Engineering, Earth Sciences, or other appropriate department in identifying and carrying out a suitable short design or research project. The final product will be presented in thesis form and carefully scrutinized by two independent referees chosen for their familiarity with the topic. The subject may be laboratory based, analytic, numerical, or field oriented. The thesis format must follow accepted engineering practice and be of professional quality. All other courses in the Geological Engineering program are listed under the course descriptions in Earth Sciences or Civil Engineering. A detailed booklet describing Geological Engineering is available in Room 2304, Engineering 2.

Geological Engineering
Undergraduate Officer
I. Szancyz, ML 217, ext. 3393

Germanic and Slavic Languages and Literatures
Undergraduate Officer

Note
Not all courses listed in this section are available. Please consult the latest Course Offerings List or the Department for current course information.

In choosing first-year courses, students should read carefully the course descriptions, consult the Department Undergraduate Officer, and check the Department's program section.

GER 101 F,W,S 4C 0.5
First Year German
For students with little or no knowledge of German. The basic elements of German grammar with emphasis on group and individual oral practice. Development of skills in listening/comprehension, speaking, reading and writing. Introduction to aspects of German culture and everyday life. Tapes and computer exercises accompany each chapter of the textbook. Students are encouraged to use them in the language laboratory and at home.

GER 101 is for students with little or no knowledge of German. There are no prerequisites.

GER 101 and 102 are not open to students with Ontario High School Grade 13 German, OAC, or equivalent.

GER 102 F,W,S 3C,1L 0.5
First Year German
As GER 101
Prereq: GER 101

GER 111/112 are beginners' courses for students with little or no knowledge of German. Not open to students who have credit for GER 101, 102, Grade 12 or equivalent.

GER 111 F,W,S 3C 0.5
First Year Scientific German
For students with little or no knowledge of German. The basic elements of German grammar and pronunciation with an emphasis on reading and translation of elementary scientific literature from various fields.
Course Descriptions
Germanic and Slavic

GER 112 F,W,S 3C 0.5
First Year Scientific German
As GER 111
Prereq: GER 111

GER 151A F 3C 0.5
German Conversation and Grammar Review
Conversation on topics of everyday life as well as on political, social, and cultural aspects of the German-speaking countries. Comprehensive grammar review, vocabulary building, pronunciation, and written practice.
Prereq: OAC or Grade 13 German or equivalent
(Formerly GER 251)

GER 152A W 3C 0.5
German Conversation and Composition
As GER 151A
Prereq: GER 151A, or equivalent
(Formerly GER 252)

GER 191 F 3C 0.5
Studies in German Literature with Language Practice
An introduction to German literature designed to accomplish the transition from language studies to reading and discussing literary texts. Grammar review, conversation practice, and the reading of selected works.
Prereq: OAC or Grade 13 German or equivalent
(Formerly GER 292)

GER 192 W 3C 0.5
Studies in German Literature with Language Practice
As GER 191
Prereq: GER 191, or permission of instructor
(Formerly GER 293)

GER 201 F,W,S 3C 0.5
Second-Year German
This course continues the work of GER 101/102, completing the first-year textbook. It offers practice in speaking, reading and writing, with vocabulary building, grammar, and exercises in comprehension.
Prereq: GER 102 or equivalent

GER 202 F,W 3C 0.5
Second-Year German
Strengthening of communicative skills, grammar review, vocabulary building, written practice, conversation on issues of contemporary life in German-speaking countries.
Prereq: GER 201, OAC in German, or equivalent

GER 251A F 3C 0.5
Intermediate Conversation and Composition
Conversation on modern topics. Exercises in advanced grammar, stylistics, and composition.
Prereq: GER 152A or equivalent
(Formerly GER 351)

GER 252A W 3C 0.5
Intermediate Conversation and Composition
As GER 251A
Prereq: GER 251A or equivalent
(Formerly GER 352)

GER 281A F 3C 0.5
Young Germany and Biedermeier
Reading, interpretation and critical analysis of prescribed prose, drama and poetry. (Kittler, Monke, Stifter, Schiller, etc.).
Prereq: GER 152A, 192 or equivalent
(Formerly GER 361)

GER 281B W 3C 0.5
Poetic Realism
Reading, interpretation and critical analysis of prescribed prose, drama and poetry (Sturm, Keller, Ludwig, Hebbel, Raabe, Fontane, etc.).
Prereq: GER 152A, 192 or equivalent
(Formerly GER 362)

GER 271 W 3C 0.5
German Thought and Culture
A survey of cultural currents to the 18th century. Lectures will focus on major developments in literature, philosophy, religion, art, architecture, and music as seen against the historical background of the German-speaking peoples.
Taught in English
Prereq: Second-year standing or higher
This course may be used toward the All requirement

GER 272 W 3C 0.5
German Thought and Culture
A survey of cultural events from the 18th century to the present. Lectures will focus on major developments in literature, philosophy, religion, art, architecture, and music as seen against the historical background of the German-speaking peoples.
Taught in English
Prereq: Second-year standing or higher
This course may be used toward the All requirement

GER 282 W 3C 0.5
Post-War Literature
Reading and interpretation of major works since 1945 in prose, drama and poetry. Main authors: Borchert, Böll, Frisch, Dürrenmatt, Grass, Eich, etc.
Prereq: GER 152A, 192 or equivalent

GER 291 F 3C 0.5
Survey of German Literature
Introduction to the major periods of German literature. Reading and interpretation of representative texts.
Prereq: GER 152A, 192, 202 or equivalent

GER 292 W 3C 0.5
Survey of German Literature
As GER 291
Prereq: GER 152A, 192, 202 or equivalent

GER 300-AZ F,W 3C 0.5
Film and Literature in Germany
This course introduces students to significant aspects of modern German culture through film, and links this study with that of literature. It involves viewing and analyzing films and establishing a connection to related literary and cultural traditions.
Taught in English
Prereq: Second-year standing or higher
Cross-listed as FINE 359

GER 311 F 3C 0.5
Theory of Translation
Theory, methodology, and techniques of translation. Patterns and problems in the translation of scholarly texts from the arts and sciences, with special emphasis on idiom and structure as compared with the target language.
Prereq: Second-year standing in German

GER 312 W 3C 0.5
Theory of Translation
As GER 311
Prereq: GER 311

GER 351A F 3C 0.5
Advanced Conversation, Composition and Stylistics
This course provides intensive practice in spoken and written German on the advanced level.
Prereq: GER 252A or equivalent
(Formerly GER 451)

GER 352A W 3C 0.5
Advanced Conversation, Composition and Stylistics
As GER 351A
Prereq: GER 351A or equivalent
(Formerly GER 452)
Course Descriptions

Germanic and Slavic

GER 383/384 0.5/0.5
Intermediate Conversation and Composition on Topics in German Literature
Conversation and composition on topics in German Literature with grammar review and study of German vocabulary and idiomatic expressions.

This course is taught in Mannheim in conjunction with the "Waterloo in Germany" program.

GER 355 F 3C 0.5
The Stages as Forum: German Drama in Translation
Major German dramas will be studied from various points of view, including historical importance, themes, and technique. The course includes theory and selected dramas of such playwrights as Lessing, Goethe, Schiller, Büchner, Brecht and Dürenmatt.

Taught in English.

Prereq: Second-year standing or above.

This course is complemented in the Winter term by RUSS 356.

Cross-listed as DRAMA 383 (formerly DRAMA 355)

GER 351 F 3C 0.5
Fascism in Germany: Holocaust and Resistance in Literature
This course will focus on the literary rendering, including film versions, of the Holocaust experience by authors from the German speaking countries, such as Jurek Becker, Paul Celan, Max Frisch, Edgar Hilsenrath, Peter Weiss and others. Also studied will be works dealing with anti-Nazi resistance by individuals and groups as described by Bert Brecht, Rolf Hochhuth and Anna Seghers.

This course is taught in English.

Open to all students

GER 391 F 3C 0.5
Masterpieces of German Literature in Translation
A study of significant prose and drama from 1770 to the present representing themes such as Revolution, Duty vs. Indecision, Flesh vs. Spirit, Modern Germany East and West. Works studied include Danton's Death (Brecht), Maria Stuart (Schiller), Demian (Hesse), Galileo (Brecht), and Cat and Mouse (Grass).

GER 392 W 3C 0.5
Waterloo in German Program
Description in Arts program section.

GER 3952 F 2.5
A study of the main thoughts, themes, and schools in German poetry from the beginning to Goethe.

Prereq: GER 152A, 192 or equivalent.

(Formerly GER 281)

GER 3952 W 2.5
Waterloo in German Program
As GER 3952

GER 421 F 3C 0.5
Introduction to German Linguistics
Study of the major linguistic structures of German, especially in contrast to the structures of English. Coverage of phonetics and phonology, morphology and lexicology, syntax and semantics, and differences between spoken and written German.

Prereq: GER 252A or equivalent

GER 422 W 3C 0.5
Introduction to German Linguistics
As GER 421

Prereq: GER 421

GER 441 F 3C 0.5
Humanism, Reformation and Baroque Reading, interpretation and critical analysis of prescribed texts (Erasmus, Luther, Sachs, Opitz, Gryphius, Grimmelshausen, etc.).

Prereq: Second-year standing in German

GER 442 W 3C 0.5
Enlightenment and Storm and Stress
Reading, interpretation, and critical analysis of prescribed texts (Lessing, Wieland, Klopstock, Lessing, etc.).

Prereq: Second-year standing in German

GER 461 F 3C 0.5
Introduction to the History of the German Language with Readings in Middle High German

Prereq: GER 152A, 192 or equivalent.

Offered in alternate years

GER 462 F 3C 0.5
Middle High German Literature
Reading and interpretation of samples from the major works of the MHG period, with emphasis on writers of the first "Blütezeit" in German literature (1170 to 1250); Early Minnesang, Walther von der Vogelweide, Nibelungenlied, Hartmann von Aue, Wolfram von Eschenbach, etc.

Prereq: GER 152A, 192 or equivalent.

Offered in alternate years

GER 471 F 3C 0.5
German Poetry
A study of the main thoughts, themes, forms and schools in German poetry from the beginning to Goethe.

Prereq: GER 152A, 192 or equivalent

GER 472 W 3C 0.5
German Poetry
A study of the main thoughts, themes, forms and schools in German poetry from German Romanticism to the present.

Prereq: GER 152A, 192 or equivalent

GER 495-498 F.W.S R 0.5 each
Reading Courses in Approved Topics

Prereq: Approval of the Department

DUTCH

DUTCH 101 F 3C 0.5
First Year Dutch

The basic elements of Dutch grammar with emphasis on oral practice and pronunciation. Introduction to aspects of Dutch culture.

Open to all students with little or no knowledge of Dutch.

DUTCH 102 W 3C 0.5
First Year Dutch

As DUTCH 101

Prereq: DUTCH 101 or equivalent
**Dutch**

**Dutch 201 F 3C 0.5**
Intermediate Dutch
This course will be conducted partly in Dutch and offers advanced study in grammar, composition, and conversation. Special emphasis will be given to comprehension and practice in the spoken language.
Prerequisite: DUTCH 102 or equivalent

**Dutch 202 W 3C 0.5**
Intermediate Dutch
As DUTCH 201
Prerequisite: DUTCH 201 or equivalent

**Russian**

**Note**
Not all courses listed in this section are available. Please consult the latest Course Offerings List or the Department for current course information.

**Russian Language Study in Moscow**
A "total immersion" Russian language course at the Pushkin Institute in Moscow, Russia. Daily instruction by Russian faculty at the elementary, intermediate, and advanced levels. Duration of program is normally four-six weeks, although longer periods in Russia are possible.
Prerequisite: At least one year of Russian language at the University level or equivalent
Credits: 1.5 for completion of
1. first-year Russian: 193, 194, 195 or equivalent
2. second-year Russian: 293, 294, 295 or equivalent
3. third-year Russian: 393, 394, 395 or equivalent
4. fourth-year Russian: 493, 494, 495
This program may be attended more than once. However, a maximum of 1.5 credits will normally be granted towards a degree.

**Russian 101 F 3C,1L 0.5**
First Year Russian
A study of Russian grammar and composition with emphasis on oral practice and pronunciation.
Language lab
Open to all university students with little or no knowledge of Russian
Prerequisite: RUSS 101 or equivalent

**Russian 102 W 3C,1L 0.5**
First Year Russian
As RUSS 101
Prerequisite: RUSS 101 or equivalent

**Russian 251 F 3C 0.5**
Conversation, Composition, Grammar and Phonetics
This course is basically a continuation of First-Year Russian. It provides intensive practice in spoken and written Russian. Vocabulary building, comprehension, pronunciation and intonation are stressed.
Prerequisite: RUSS 102

**Russian 252 W 3C 0.5**
Conversation, Composition, Grammar and Phonetics
As RUSS 251
Prerequisite: RUSS 251 or equivalent

**Russian 251 F 3C 0.5**
Introduction to Russian Literary Movements
Reading of representative works from Russian Classicism, Romanticism, 19th Century Realism, and various periods of 20th century Russian literature.
Prerequisite: RUSS 102 or equivalent

**Russian 252 W 3C 0.5**
Introduction to Russian Literary Movements
As RUSS 261
Prerequisite: RUSS 102 or equivalent

**Russian 271 F 3C 0.5**
Russian Thought and Culture
A survey of cultural history from the beginning to 1861. Lectures will focus on major developments in literature, philosophy, art, architecture, and music as seen against the background of Russia's historical past.
Discussion will be devoted primarily to works of Russian literature.
Taught in English
Open to all students
This course may be used toward the All requirement

**Russian 272 W 3C 0.5**
Russian Thought and Culture
A survey of cultural history from 1861 to the present. Lectures will focus on major developments in literature, philosophy, art, and music as seen against the background of Russia's historical past.
Discussion will be devoted primarily to works of Russian literature.
Taught in English
Open to all students
This course may be used toward the All requirement

**Russian 311 F 3C 0.5**
Theory of Translation
Theory, methodology, and techniques of translation. Patterns and problems in the translation of scholarly texts from the arts and sciences, with special emphasis on idiom and structure as compared with the target language.
Prerequisite: RUSS 102 or equivalent

**Russian 312 W 3C 0.5**
Theory of Translation
As RUSS 311
Prerequisite: RUSS 311

**Russian 341 F 3C 0.5**
Russian Drama
A study of the origins and development of Russian drama up to 1905. Reading and critical analysis of major works in various genres with emphasis on authors of the 19th century.
Taught in English
Extra work in Russian required of Russian majors only
Cross-listed as DRAMA 381 (formerly DRAMA 352)

**Russian 342 W 3C 0.5**
Russian Drama
As RUSS 341
Taught in English
Extra work in Russian required of Russian majors only
Cross-listed as DRAMA 382 (formerly DRAMA 353)

**Russian 351 F 3C 0.5**
Intermediate Conversation and Composition
In principle, this course is a continuation of RUSS 251/252. In terms of vocabulary building, apart from the spoken language, the comprehension of the literary language is especially stressed.
Prerequisite: RUSS 252 or equivalent

**Russian 352 W 3C 0.5**
Intermediate Conversation and Composition
As RUSS 351
Prerequisite: RUSS 351 or equivalent

**Russian 356 W 3C 0.5**
The Stage as Forum: Russian Drama in Translation
Major Russian dramas will be studied from various points of view including historical importance, themes, and technique.
The course includes theory and selected dramas of such playwrights as Gogol, Chekhov, Tolstoy, Gorky, Mayakovksy, and Pogodin.
Taught entirely in English
Fall term: See GER 355
Prerequisite: Second-year standing or above
Cross-listed as DRAMA 384 (formerly DRAMA 356)

**Russian 361 F 3C 0.5**
Russian Short Story
A study of the form and a detailed examination of Russian short stories by major representative writers.
Taught in English
Extra work in Russian required of Russian majors only
RUSS 362 W 3C 0.5
Russian Short Story
As RUSS 361

RUSS 371 F 3C 0.5
Masterpieces of Russian Literature and Opera
This course, designed for students of literature and music, offers an interdisciplinary approach to the relationships between literary and musical culture in Russia during the 19th century. Central to the course is the comparative study of masterpieces of Russian opera and the classics of literature which inspired their musical interpretations. Among the works discussed as literary text, libretto and music are: Glinka’s Russian and Ludmilla, Borodin’s Prince Igor, Mussorgsky’s Boris Godunov, Dargomyzhsky’s The Stone Guest, Tschaikovsky’s Eugene Onegin, and Rimsky-Korsakov’s Mozart and Salieri.

As RUSS 352 or equivalent

RUSS 381 F 3C 0.5
Great Russian Novels
Reading and interpretation of 19th century novels selected from the works of Gogol, Turgenev, Dostoevsky, and Tolstoy. Lectures on social and intellectual background.

Prereq: Open to all students. Additional requirements apply to students majoring in Russian and Music Programs. Cross-listed as MUSIC 365

RUSS 392 W 3C 0.5
Great Russian Novels
Reading and interpretation of 19th and 20th-century novels selected from the works of Gorky, Zamyatin, Pasternak, and Solzhenitsyn. Lectures on social and intellectual background.

Extra work in Russian required of Russian majors only

RUSS 411 3C 0.5
East Slavic Epic Tradition
A study of the origins and development of the Epic tradition in East Slavic Literature.

Extra work in Russian required of Russian majors only

RUSS 412 3C 0.5
Russian Epic Tradition
As RUSS 441
Taught in English
Extra work in Russian required of Russian majors only

RUSS 451 F 3C 0.5
Advanced Conversation, Grammar and Composition
This course is conducted in Russian and provides intensive practice in spoken and written Russian on the advanced level.

Prereq: RUSS 352 or equivalent

RUSS 452 W 3C 0.5
Advanced Conversation, Grammar and Composition
As RUSS 451
Prereq: RUSS 451 or equivalent

RUSS 453 F 3C 0.5
Twentieth-Century Russian Literature
Reading, interpretation, and critical analysis of selected fiction and drama (Andreev, Bunin, Gorky, Kataev, Sholokhov, A.N. Tolstoy).

Taught in English
Extra work in Russian required of Russian majors only

Prereq: Approval of the Department

RUSS 454 W 3C 0.5
Twentieth-Century Russian Literature
Reading, interpretation, and critical analysis of selected fiction and drama (Andreev, Bunin, Gorky, Kataev, Sholokhov, A.N. Tolstoy).

Extra work in Russian required of Russian majors only

Prereq: Approval of the Department

RUSS 498 W 3C 0.5
History of Russian Literature
This second part deals with Russian literature up to the present. Literary movements and major representative works not studied in other courses will be discussed.

Extra work in Russian required of Russian majors only

Prereq: Approval of the Department

UKRAINIAN

UKRAN 101 F 3C,1L 0.5
Beginners’ Ukrainian
For students with little or no prior knowledge of Ukrainian. The basic elements of Ukrainian grammar and composition with emphasis on oral practice and pronunciation. Introduction to aspects of Ukrainian culture.

Open to undergraduate students of all departments.

Recommended to graduate students of Russian as a second Slavic language.

By Distance Education only

Extra work in Russian required of Russian majors only

Extra work in Russian required of Russian majors only

Extra work in Russian required of Russian majors only

Extra work in Russian required of Russian majors only

Extra work in Russian required of Russian majors only

Extra work in Russian required of Russian majors only

Extra work in Russian required of Russian majors only

Extra work in Russian required of Russian majors only
**Course Descriptions**

**Germanic and Slavic**

**GERON 100** F 0.5  
Introduction to Gerontology  
This course will be of interest to those who want to obtain some basic knowledge about growing old and being old, and it can also serve as the first step towards a more specialized study of these phenomena.  
Prereq: students who have completed any of the following courses required for permission of instructor GERON 255/SCI 255, GERON 352/HLTH 352/KIN 352/SOC 352, GERON 217/PSYCH 217/HLTH 217, GERON 218/PSYCH 218/HLTH 218, GERON 400/HLTH 400.  
Cross-listed as HLTH 210, KIN 210  
Prereq: PSYCH 101  
Cross-listed as HLTH 217/PSYCH 217

**CROATIAN**

**CROAT 101** F 3C 0.5  
Introductory Croatian  
For students with little or no knowledge of Croatian. The basic elements of Croatian grammar with emphasis on oral practice and pronunciation, along with appropriate graded texts.  
Open to all students

**CROAT 102** W 3C 0.5  
Introductory Croatian  
As CROAT 101  
Prereq: CROAT 101 or equivalent

**CROAT 201** F 3C 0.5  
Intermediate Croatian  
This course is a continuation of first-year Croatian. It offers extensive practice in both the spoken and written language. Vocabulary building, comprehension and pronunciation are stressed.  
Prereq: CROAT 102 or equivalent

**CROAT 202** W 3C 0.5  
Intermediate Croatian  
As CROAT 201  
Prereq: CROAT 201 or equivalent

**CROAT 301** F 3C 0.5  
Advanced Croatian  
This course is conducted in Croatian and provides intensive practice in spoken and written Croatian on the advanced level. Conversation on modern topics will be stressed.  
Prereq: CROAT 202 or equivalent

**CROAT 302** W 3C 0.5  
Advanced Croatian  
As CROAT 301  
Prereq: CROAT 301 or equivalent

**CROAT 371** F 3C 0.5  
Croatian Culture and Literature  
This course presents the evolution of Croatian culture from the beginnings to the present. Particular emphasis is placed on developments in literature; however, other significant manifestations of Croatian civilization (art, architecture, music) are also examined. Integral to this course are the cultural aspects of Croatian settlements in Canada.  
Taught in English  
Open to all students

**CROAT 372** W 3C 0.5  
Croatian Culture and Literature  
As CROAT 371  
Taught in English  
Open to all students

**CROAT 395Z** F 2.5  
Waterloo in Zagreb Program  
Description in Arts program section.

**CROAT 396Z** W 2.5  
Waterloo in Zagreb Program  
As CROAT 395Z

**CROAT 498/497** 0.5/0.5  
Special Topics in Croatian Studies  
Prereq: Approval of the Department

**CROATIAN**

**CROAT 101** F 3C 0.5  
Introductory Croatian  
For students with little or no knowledge of Croatian. The basic elements of Croatian grammar with emphasis on oral practice and pronunciation, along with appropriate graded texts.  
Open to all students

**CROAT 102** W 3C 0.5  
Introductory Croatian  
As CROAT 101  
Prereq: CROAT 102 or equivalent

**CROAT 201** F 3C 0.5  
Intermediate Croatian  
This course is a continuation of first-year Croatian. It offers extensive practice in both the spoken and written language. Vocabulary building, comprehension and pronunciation are stressed.  
Prereq: CROAT 102 or equivalent

**CROAT 202** W 3C 0.5  
Intermediate Croatian  
As CROAT 201  
Prereq: CROAT 201 or equivalent

**CROAT 301** F 3C 0.5  
Advanced Croatian  
This course is conducted in Croatian and provides intensive practice in spoken and written Croatian on the advanced level. Conversation on modern topics will be stressed.  
Prereq: CROAT 202 or equivalent

**CROAT 302** W 3C 0.5  
Advanced Croatian  
As CROAT 301  
Prereq: CROAT 301 or equivalent

**CROAT 371** F 3C 0.5  
Croatian Culture and Literature  
This course presents the evolution of Croatian culture from the beginnings to the present. Particular emphasis is placed on developments in literature; however, other significant manifestations of Croatian civilization (art, architecture, music) are also examined. Integral to this course are the cultural aspects of Croatian settlements in Canada.  
Taught in English  
Open to all students

**CROAT 372** W 3C 0.5  
Croatian Culture and Literature  
As CROAT 371  
Taught in English  
Open to all students

**GERON 100** F 0.5  
Introduction to Gerontology  
This course represents a first introduction to the study of aging and as such will provide a survey of the major biological, psychological and social aspects of aging. It will be of interest to those who want to obtain some basic knowledge about growing old and being old, and it can also serve as the first step towards a more specialized study of these phenomena.  
Cross-listed as HLTH 150  
Articase: Students who have completed any of the following courses require prior permission of instructor GERON 255/SCI 255, GERON 352/HLTH 352/KIN 352/SOC 352, GERON 217/PSYCH 217/HLTH 217, GERON 218/PSYCH 218/HLTH 218, GERON 400/HLTH 400.  
Cross-listed as HLTH 210, KIN 210  
Prereq: PSYCH 101  
Cross-listed as HLTH 217/PSYCH 217

**GERON 210** W 3C 0.5  
Growth, Development and Aging  
The physiology of human growth, development and aging is examined, with special reference to the influence of diet, environment, exercise and disease on the normal processes.  
Prereq: BIOL 230, 273  
Cross-listed as HLTH 210, KIN 210

**GERON 217** 3C 0.5  
Aging and Basic Psychological Processes  
What processes change as adults age? Is the idea of age-related decline in functioning a myth? The course deals with processes such as memory, perception, intelligence, and problem-solving. It also outlines the problems in interpreting developmental research.  
Prereq: PSYCH 101  
Cross-listed as HLTH 217/PSYCH 217

**GERONOLGY**

Undergraduate Officer  
J. Husted, BMH 2316, ext. 5129

**GERON 100** F 0.5  
Introduction to Gerontology  
This course represents a first introduction to the study of aging and as such will provide a survey of the major biological, psychological and social aspects of aging. It will be of interest to those who want to obtain some basic knowledge about growing old and being old, and it can also serve as the first step towards a more specialized study of these phenomena.  
Cross-listed as HLTH 150  
Articase: Students who have completed any of the following courses require prior permission of instructor GERON 255/SCI 255, GERON 352/HLTH 352/KIN 352/SOC 352, GERON 217/PSYCH 217/HLTH 217, GERON 218/PSYCH 218/HLTH 218, GERON 400/HLTH 400.  
Cross-listed as HLTH 210, KIN 210  
Prereq: PSYCH 101  
Cross-listed as HLTH 217/PSYCH 217
GERON 216 W 3C 0.5
Aging, Dying and Death
An examination of the psychological aspects of aging and the traditional and recent literature relating to various views on the reality of death in human life. Therapy with dying individuals is reviewed and evaluated.
Prereq: PSYCH 101 or permission of instructor
Offered at St. Jerome's College
Cross-listed as HLTH 218/PSYCH 218

GERON 220 F 3C 0.5
Health and the Family
The course focuses on the family as the basic social unit responsible for the development and maintenance of the effective physical and mental health of its members. The interaction of biological, psychological, and socio-cultural factors will be considered as the family is examined using a lifespan approach.
Prereq: HLTH 101/102 or PSYCH 101 and recommended SOC 101
Cross-listed as HLTH 220

GERON 245 F 3C 0.5
The Canadian Health Care System
This course examines the Canadian health care system by considering organizational principles, health resources, service utilization, health care planning and health promotion strategies. There is a focus on societal and political issues which affect the health of the society through the delivery system.
Prereq: Health Studies or Gerontology students only or permission of instructor
Cross-listed as HLTH 245

GERON 255 W 0.5
The Biology of Aging
An introductory study of the biological processes of aging at the molecular, cellular and systemic levels. Topics include an examination of the theories of aging, methods used to study the aging process, the role of diseases and chronological changes in the organism during senescence.
Cross-listed as SCI 255

GERON 352 W 0.5
Sociology of Aging
An introduction to individual and population aging. Topics discussed include: aging from a historical and comparative perspective; aging in subcultures; aging and the social structure; aging and social processes; aging and the environment; work and retirement; and aging and leisure patterns.
Cross-listed as HLTH 352, KIN 352, SOC 352

GERON 400 W 0.5
Multidisciplinary Seminar on Aging
Faculty and students from various departments meet to discuss individual and population aging from a multidisciplinary perspective. Topics include the definition of aging, the demography of aging, evolutionary and genetic factors, aging as a social process, and human aging patterns.
Prereq: For admission to the course, a minimum of six courses applicable towards graduation with the Gerontology Diploma / Minor must be completed or be taken concurrently, including successful completion of an approved course in Statistics prior to registration. The signature of the Undergraduate Officer for Health Studies and Gerontology is also required for preregistration.
Cross-listed as HLTH 400

GERON 401A/B
Directed Studies in Special Topics
For the student who desires to pursue a particular topic in depth through independent research and/or extensive reading. A faculty member must approve the student's project prior to registration for this course. Open to exceptional students who have permission of the instructor and the Undergraduate Officer of the program.

GERON 402 2C 0.5
Epidemiology of Aging
Factors contributing to various disease processes, with special reference to quantitative evaluation of environmental factors relevant to human disease and aging. Before preregistering, students should enquire about the availability of this course offering.

Greek
For courses in Greek see Classical Studies.
Course Descriptions
Health Studies

HLTH 217 3C 0.5
Aging and Basic Psychological Processes
What processes change as adults age? Is the idea of age-related decline in functioning a myth? The course deals with processes such as memory, perception, intelligence, and problem-solving. It also outlines the problems in interpreting developmental research.
Prereq: PSYCH 101
Cross-listed as PSYCH 217/GERON 217

HLTH 218 W 3C 0.5
Aging, Dying and Death
An examination of the psychological aspects of aging and the traditional and recent literature relating to various views on the reality of death in human life. Therapy with dying individuals is reviewed and evaluated.
Prereq: PSYCH 101 or permission of instructor
Offered at St. Jerome’s College
Cross-listed as PSYCH 218/GERON 218

HLTH 220 F 3C 0.5
Health and the Family
The course focuses on the family as the basic social unit responsible for the development and maintenance of the effective physical and mental health of its members. The interaction of biological, psychological, and socio-cultural factors will be considered as the family is examined using a lifespan approach.
Prereq: HLTH 101/102 or PSYCH 101 and recommended SOC 101
Cross-listed as GERON 220

HLTH 245 F 3C 0.5
The Canadian Health Care System
This course examines the Canadian health care system by considering organizational principles, health resources, service utilization, health care planning and health promotion strategies. There is a focus on societal and political issues which affect the health of the society through the delivery system.
Prereq: Health Studies or Gerontology students only or permission of instructor
Cross-listed as GERON 245

HLTH 340 W 3C 0.5
Environmental Health
An introduction to the basic biological and toxicological processes that determine the effects of environmental pollutants on human health. Emphasis is placed on the mechanisms that give rise to chronic or delayed health effects, such as cancer, genetic mutations, and birth defects.
Prereq: BIOL 230 and 273; KIN 217 or equivalent; CHEM 116 or equivalent.

HLTH 341 F 3C 0.5
Disease Process
An introduction to the study of biological factors governing the occurrence of disease in humans, using selected diseases to illustrate disease mechanisms and identification of risk factors. The means by which disease is induced and the host response are emphasized. The role that behaviour has in modifying biological response to disease is also considered.
Prereq: BIOL 230, 273, KIN 217 or equivalent

HLTH 344 W 3C 0.5
Program Evaluation
A comprehensive and systematic introduction to the key concepts, methodologies, and issues related to program evaluation in general and their application to health programs in particular. Administrative and policy implications as well as the technical/methodological evaluation issues that face individuals involved in administering, planning, implementing, and evaluating health programs will be discussed.
Prereq: Basic courses in Statistics and in Research Design, Health Studies students only or permission of instructor

HLTH 346 W,S 3C 0.5
Nutrition
An elementary course in nutrition with special emphasis on diet for sport and certain physiological conditions.
Prereq: KIN 217 or Year Three or Four standing or permission of instructor
Cross-listed as KIN 346

HLTH 348 W,S 3C 0.5
Social Psychology of Health Behaviour
The study and application of basic social psychological processes in relation to selected health-related behaviours (e.g. family planning, overeating, smoking, non-medical drug use, cardiovascular risk factors, patient compliance, medical care utilization).
Prereq: PSYCH 101 or consent of instructor
Cross-listed as KIN 348

HLTH 349 F,S 3C 0.5
Principles of Behaviour Modification
An overview of behaviour modification principles and procedures. Basic principles of reinforcement, punishment, modelling and desensitization are examined as they relate to health behaviour.
Prereq: PSYCH 101 or consent of instructor
Cross-listed as KIN 349

HLTH 350 F 3C 0.5
Occupational Health
Methodological approaches to the detection, assessment and management of toxic hazards (especially carcinogens) in the workplace and external environment. The health effects of chemical toxicants on specific human organ systems (lungs, nervous system, immune system, etc.) are also examined.
Prereq: HLTH 340, or permission of instructor

HLTH 352 W 0.5
Sociology of Aging
An introduction to individual and population aging. Topics discussed include: aging from a historical and comparative perspective; aging in subcultures; aging and the social structure; aging and social processes; aging and the environment; work and retirement; and aging and leisure patterns.
Cross-listed as GERON 352, KIN 352, SOC 352

HLTH 400 W 0.5
Multidisciplinary Seminar on Aging
Faculty and students from various departments meet to discuss individual and population aging from a multidisciplinary perspective. Topics include the definition of aging, the demography of aging, evolutionary and genetic factors, aging as a social process, and human aging patterns.
Prereq: For admission to the course, a minimum of six courses applicable towards graduation with the Gerontology Diploma/Minor must be completed or be taken concurrently, including successful completion of an approved course in Statistics prior to registration. The signature of the Undergraduate Office for Health Studies and Gerontology is also required for preregistration.
Cross-listed as GERON 400

HLTH 407 W 3C 0.5
Physiology of Coronary Heart Disease
An examination of the pathology, risk factors and rehabilitation programs related to coronary heart disease. Major emphasis is placed on the cardio-respiratory implications of exercise in the rehabilitation process.
Cross-listed as KIN 407
Course Descriptions
Health Studies

HLTH 420 W 2C 0.5
Health, Environment, and Planning
A seminar course on the environment sources and causes of disease and illness, the concepts of health, e.g., medical, scientific, economic, political, etc., the health services and facilities and related technologies and the role and responsibilities of (urban and regional) planners in the creation of a more "healthful" environment.
Prereq: Third- and fourth-year students or consent of instructor
Cross-listed as PLAN 432
Estimated additional cost to student: $20

HLTH 432 F,W,S 1.0
Honours Thesis
An independent research project on an approved topic, supervised by a faculty member. Includes an approved proposal and completion of - introduction, review of literature, methods, data collection, data analysis and presentation of results in thesis form.
Recommended for students planning graduate studies.
Offering is contingent on the availability of resources.

HLTH 433 F 0.5
Advanced Research Methods
A course designed to familiarize students with the skills requisite for the formulation, execution and written presentation of an empirical research project. After a general discussion of the pertinent issues, students will be asked to analyze independently a data set related to a topic of interest to Health Studies students and to present this in the form of a research report.
Prereq: KIN 222, 330 and CS 316 Students must be enrolled in either fourth-year regular or SB Co-op of the Health Studies program.

HLTH 442 F 3C 0.5
Epidemiology of Chronic Disease
An introduction to the field of epidemiology. The primary objective is to provide an understanding of the fundamental concepts, principles and applications of chronic disease epidemiology. The course emphasizes understanding of epidemiologic methods and identification of risk factors.
Prereq: An introductory statistics course or consent of instructor

HLTH 443 W 3C 0.5
Behaviour and Chronic Disease
A critical analysis of behavioural dimensions of major current health problems. The role of behaviour as a determinant and complicator of disease is examined. Prospects for and principles of behaviour change in the prevention and management of disease are addressed.
Prereq: HLTH 344, 346, 349
Not offered in 1996/97, inquire with Undergraduate Officer about substitute courses.

HLTH 445 W 3C 0.5
Seminar in Health Promotion
A study of current issues pertaining to health promotion, health behaviour, or biomedical research. Topics may include pertinent research that is significant to the health of individuals, families and groups, or the community.
Prereq: Health Studies students only
Normally only fourth-year students will be admitted.

HLTH 472 F,W,S 0.5
Independent Study
For the student who desires to pursue a particular topic in depth through guided independent research and/or reading. A faculty member must approve a student's project prior to registration. May be repeated in subsequent terms. Depending on student demand and availability of teaching resources, special topics may be presented to small groups in a lecture format. Such topics have included Pharmacology, Behavioural Immunity, Nutrition, The Health Care System.
Prereq: Consult with the Department

History

Undergraduate Officer
K. Eagles, HH 116, ext. 3160

Courses not offered in the current academic year are listed at the end of this section.

HIST 100 F 0.5
History of Modern Europe 1600-1945
A thematic introduction to the rise and decline of European States, 1600-1946. Recommended for all first-year students considering History as a major.

HIST 101 F 0.5
Law and Society in the Middle Ages: 500-1000
A study of the laws and legal procedures of the Early Middle Ages. Anglo-Saxon and Germanic law will be examined along with legal procedures and institutions of that era.
Offered at St. Jerome's College (Formerly 102M)

HIST 102 W 0.5
The Origins of Wars in the Twentieth Century
An analysis of the diplomatic, political, economic, ideological, social and cultural explanations of the causes of the major wars of this century.
(Formerly 102C)

HIST 103 W 0.5
Canadian History
Selected major themes from pioneer life to Canadian involvement in 20th-century wars.
Offered at St. Jerome's College (Formerly 102E)

HIST 130 W,S 0.5
The Modern World in Historical Perspective
This course will introduce students to the history of the twentieth-century world, through an exploration of the changing nature of relationships between different parts of the globe.

HIST 200 W 0.5
History and Film
An introduction to issues in modern cultural history through the study of selected narratives and documentary films with supplementary reading, lectures and discussions.

HIST 204 W 0.5
Life on the Ontario Frontier
The course examines the cultural, moral, social and economic adaptations of European settlers to the Upper Canadian frontier environment.

HIST 210 F 0.5
History of Law
An historical introduction to law in the Ancient world, Babylonian, Assyrian, Hittite and Roman law and legal practices and concepts will be examined.
Offered at St. Jerome's College
HIST 212 F 0.5
British History Since 1603
A survey of the shaping of British society and the British experience from the time of Shakespeare to the present; constitutional conflict and compromise, rise and fall of empire, industrial and urban revolution, world wars and welfare state.
This course is primarily intended for non-history majors. History majors may wish to take one or more of HIST 305, 307 and 308.

HIST 213 W 0.5
Modern Western Popular Culture
This course examines historically the formation of a distinct modern western popular culture, looking primarily at Britain, France, Canada and the United States from around 1850 to the present and emphasizing such aspects as industrialism and leisure, the family and sexual attitudes, religion and popular belief, education and literacy, drinking habits, organized sport and mass entertainment.

HIST 214 F 0.5
Canadian Women in Historical Perspective: Forming Identities, 1800-1910
This course will examine Aboriginal women in the pre-contact period, the women of New France, the impact of industrialization on women's lives in British North America and the beginnings of the First women's movement. Emphasis will be given to the interrelationship between women and their society. The course will analyze their economic, legal and political status; the private lives of women; and the rise of women's activism.
Offered at Renison College
Antireq: HIST 215A

HIST 215 W 0.5
Canadian Women in Historical Perspective: Breaking Through, 1910-1990
This course will examine the history of women in Canada from the early 20th century to the present day. Emphasis will be given to the interrelationship between women and their society. Topics studied will include women's changing economic, social and political roles, education, sexuality, and the emergence of modern feminism.
Antireq: HIST 215B

HIST 218 F 0.5
German History 1740-1945
The development of Germany from the Austrian-Prussian rivalry of 1740 through to the end of World War II.
Offered at Conrad Grebel College

HIST 220 W 0.5
History of Modern Revolutions
An introduction to historical explanations of revolutions with special focus on social change and revolutionary theories. The French, Russian and Chinese revolutions will be used as case studies.
Offered at Conrad Grebel College

HIST 222 W 0.5
History of Modern Revolutions
An analysis of the changing social structure and the role of women in society and the work world. The course will cover the transition from feudalism to modern industrial society, including the rise and fall of New France, the creation of British North American societies in the Maritimes and Upper Canada and economic and political development.

HIST 224 F 0.5
Race Relations in Canada: An Historical Perspective
This course will examine Euro-Canadian attitudes and practices toward non-European minorities from pioneer times to the present, and will set racial policies in the context of the evolution of a Canadian national identity.

HIST 225 W 0.5
The Art and Craft of History
This course will provide a collegial learning setting within which students will be introduced to techniques of historical writing and research, and some examples of the best of recent historical scholarship.
Recommended for all Year Two History majors. Other students will need the written permission of the professors to take this course.

HIST 226 W 0.5
Canadian History: The Colonial Period
This course examines pre-Confederation Canadian history including the rise and fall of New France, the creation of British North American societies in the Maritimes and Upper Canada and economic and political development.
Also offered at St. Jerome's College

HIST 227 W 0.5
Canadian History: The National Period
This course examines Confederation, the rise of political parties, Canadian external relations, western discontent, the impact of both world wars and political and economic changes in Canada since 1945.
Also offered at St. Jerome's College

HIST 228 W 0.5
Oceanic History
This course is an introduction to the histories of Oceania, including the Pacific Islands, Australia, Southeast Asia and the Indian Ocean.

HIST 229 F 0.5
The History of South Asia
This course examines the history of South Asia from the 7th century to the present. It focuses on the development of the region's diverse cultures, focusing on the impact of cultural and political interactions with the Indian subcontinent and the wider world.

HIST 230 F 0.5
The History of Latin America
This course examines the history of Latin America from pre-Columbian times to the present. It covers the development of the region's societies, including indigenous civilizations, colonial rule, independence movements, and modern political and economic developments.

HIST 231 F 0.5
The History of Russia and Central Europe
This course examines the history of Russia and Central Europe from the 15th century to the present. It focuses on the development of these regions, including their political, social, and cultural transformations.

HIST 232 F 0.5
The History of Eastern Europe
This course examines the history of Eastern Europe from the 15th century to the present. It focuses on the development of these regions, including their political, social, and cultural transformations.

HIST 233 F 0.5
The History of the Middle East
This course examines the history of the Middle East from the 7th century to the present. It covers the development of the region's societies, including indigenous civilizations, colonial rule, independence movements, and modern political and economic developments.

HIST 234 F 0.5
The History of the Far East
This course examines the history of the Far East from the 15th century to the present. It focuses on the development of these regions, including their political, social, and cultural transformations.

HIST 235 F 0.5
History of Christianity
The development of Christianity in its Roman Catholic, Eastern Orthodox and Protestant traditions from the time of Christ to the present.
Offered at St. Jerome's College and Conrad Grebel College
Cross-listed as RS 230

HIST 236 W 0.5
History of the Modern World
This course examines the major developments in world history from the 15th century to the present. It covers political, social, and cultural transformations, including the rise and fall of colonial empires, the impact of world wars, and the development of modern societies.

HIST 237 W 0.5
The History of the People's Republic of China
This course examines the history of the People's Republic of China from its establishment in 1949 to the present. It covers the development of the region's societies, including political and social changes, economic development, and foreign relations.

HIST 238 W 0.5
The History of Modern France
This course examines the history of France from the 15th century to the present. It covers the development of the region's societies, including political and social changes, economic development, and foreign relations.

HIST 239 F 0.5
History of Modern China, 1911 to the Present
Some of the topics studied in this course include: the three stages of warlordism, the May Fourth Movement and the structure of society in the People's Republic of China.

HIST 240 W 0.5
20th-Century Japanese History
This course will examine the historical influences, both domestic and foreign, which led Japan to follow the course which has brought it to the present status of a powerful Asian nation.

HIST 241 F,W 0.5
Society and the Sexes in Early Modern Europe
This course will examine the changing importance of gender roles from the 15th to the 18th centuries. It will focus on topics such as sexuality, marriage, the family and the role of women in society and the work force.

HIST 242 F 0.5
Mennonite History: A Survey
This course covers Mennonite origins, teachings, migrations, settlement patterns, divisions, leaders, institutions, and religious and social practices, indeed all facets of Mennonite history in various national settings.
Offered at Conrad Grebel College

HIST 243 W 0.5
American History: 20th-Century
An analysis of two major themes: how America managed political reform and social change at home, and its emergence as a world power.
This period marked the emergence of women and the family. Trends. The expansion of Europe to the New World.

The course will focus on topics such as the social structure, daily life, the role of women and the family.

Europe in the Nineteenth and Twentieth Centuries
This period marked the emergence of modern-day Europe. The course will focus on the way in which European society, politics and culture changed and why. It will also examine the continent's descent into dictatorship and two world wars.

Europe Since 1945
Europe since the end of World War II. Focus will be on the Cold War, political and social movements.

Tudor and Stuart England
A history of England from 1485 to 1714 discussing topics including the Tudor and Stuart monarchs, the Reformation, the Civil War and Cromwellian era, and the rise of parliamentary institutions.

Britain Since 1867
A study of the British experience and of Britain's part in world history from the 1860s to the 1980s.

Race Relations in Modern History: Case Studies
A detailed analysis of topics in the history of race relations intended primarily for students who have completed HIST 221 or other background to the subject. Special attention will be paid to revolutionary developments since World War II, and to the emergence of modern human rights policies.

Origins of the Common Law
A study of the common law of England from its introduction in the 11th century to the 15th century. Original documents and court cases will be examined.

The History of France in the 19th Century
A study of French society and the four revolutions that influenced it with particular attention to social and institutional forces.

The Radical Reformation
A study of 16th century Anabaptism - a religious Reformation movement dissenting from both Protestantism and Roman Catholicism - its origins, its social, political, and theological content; and its relationship to such independent dissenters as Sebastian Franck.

British West Indian History
A survey history of the British Caribbean, including the development of Muscovite and Imperial Russia from pre-tsarist times to the beginning of the 20th century.

Russian History to 1900
The course will focus on selected themes in the development of Muscovite and Imperial Russia from pre-tsarist times to the beginning of the 20th century.

20th-Century Russia
The course will focus on selected themes in Russia's development in the 20th century including the Soviet period.

The History of Modern Germany: From the Weimar Republic to Reconstruction
A study of Germany from the rise of the Nazis through the War experience, the post-War settlement, the integration of the refugees, the division into East and West, and the economic miracle.

Canada: From Macdonald to Laurier
An analytical and historical examination of the development of the Canadian nation from Confederation to the First World War.

Canadian Social History: The Modern Experience
The social and cultural development of Canada from the First World War to the present day. Special emphasis will be given to the interaction of the state and the lives of Canadians.

Reformation History
A study of the major 16th-century reformers and their intellectual background in humanism and late medieval scholasticism. Special attention will be given to the Lutheran and Reformed traditions and their ideological, social, political expressions.

Directed Studies in Special Topics
Study in a limited field under tutorial guidance. A high standard of written work will be expected.

Directed Studies in Special Topics
Study in a limited field under tutorial guidance. A high standard of written work will be expected.

400 Level
Senior Seminars
Each term of a senior seminar counts 1.0 credit. Seminars with the suffix "A" are reading seminars designed to give students an extensive acquaintance with scholarship in a particular field of history. Seminars with the suffix "B" are research seminars in which students will engage in research on particular topics in that field. Students should preregister for senior seminars, and for HIST 491, Independent Study in Special Subjects.

400-level seminars are restricted to Honours History students in their 3B term or fourth year. (Honours History students include those in History/Applied Studies Co-op and Joint Honours programs.) No student may take more than two 400-level courses with the same professor.

Reformation
Offered at Conrad Grebel College

Course Descriptions

History
Course Descriptions
History - Interdisciplinary Social Science

Human Resources Management

Associate Professor, Program Director
S.W. Kardasz, HH 240, ext. 2584

HRM 200 F S 2L 0.5
Basic Human Resources Management
Examines the major area of Human Resources Administration including recruiting, salary administration, labour relations, benefit administration, employee relations, labour law, and organizational behaviour. Reviews the role of Human Resources Administration in organizations and the manner in which Human Resources executives contribute to the well being of a total enterprise.
Prereq: Enrolment in an Honours or four-year General Major Program

HRM 300 W 3S 0.5
Concepts and Issues in Human Resources Management
Course is taught using case method and experiential learning. Students participate in interviews, negotiate a collective agreement, decide an arbitration case, develop performance reviews, determine corporate human relations policies, develop a salary and benefit program, and pursue special projects in their area of special interest.
Prereq: HRM 200 and intention to complete a Human Resources Management Minor

IS 101B,C,D,E F,W,S 1S 1.0 to 2.5
Each half credit will involve regular meetings with a designated faculty member and at least seven hours a week of independent research on a topic of particular interest to the student and faculty member.
Prereq: IS 101A and/or consent of instructor

IS 102A,B,C,D,E F,W,S 1S 0.5 to 2.5
Introductory Independent Research
Continued
Criteria as above.
Prereq: IS 101 and/or consent of instructor

IS 301A,B,C,D,E F,W,S 1S 0.5 to 2.5
Advanced Independent Research
Each half credit will involve regular meetings with a designated faculty member and at least seven hours a week of independent research on a topic of particular interest to the student and faculty member.
Prereq: IS 101 or 102 or evidence of ability to undertake advanced individual research and consent of instructor

IS 302A,B,C,D,E F,W,S 1S 0.5 to 2.5
Advanced Independent Research
Continued
Criteria as above.
Prereq: IS 301 and/or consent of instructor

Interdisciplinary Social Science
For courses in Interdisciplinary Social Science see Social Development Studies.
Italian

Undergraduate Officer
G. Niccoli, St. Jerome's College, 88-4111, ext. 235

Courses not offered in the current academic year are listed at the end of this section.

THE FOLLOWING COURSES ARE ADMINISTERED BY ST. JEROME'S COLLEGE.

ITAL 101 F W 3C,1L 0.5
Introduction to Italian Language 1
An intensive study of the fundamentals of grammar and conversation. The language laboratory will be used.

ITAL 102 W 3C,1L 0.5
Introduction to Italian Language 2
A continuation of ITAL 101, with more emphasis on conversation and everyday uses of language.
Prereq: ITAL 101 or consent of instructor

ITAL 201 F 3C,1T 0.5
Intermediate Italian 1
An introduction to the study of the fundamentals of grammar and conversation. This course offers extensive practice in idiomatic spoken and written language.
Prereq: ITAL 101/102 or consent of instructor

ITAL 202 W 3C,1T 0.5
Intermediate Italian 2
Prereq: ITAL 201 or consent of instructor

ITAL 251 F 3C 0.5
Italian Conversation and Composition 1
This course offers extensive practice in idiomatic spoken and written language.
Prereq: ITAL 201/202 or consent of instructor (replaces former prerequisite
ITAL 191/192)

ITAL 252 W 3C 0.5
Italian Conversation and Composition 2
A continuation of ITAL 251 with more emphasis on composition based on articles from present-day newspapers and magazines.
Prereq: ITAL 251 or consent of instructor

ITAL 291 F 3C 0.5
Italian Culture and Civilization 1
A survey of developments in Italian culture - history, literature and the arts - up to and including the Renaissance.
Prereq: Second-year standing
Taught in English
This course may be used toward the All requirement.

ITAL 292 W 3C 0.5
Italian Culture and Civilization 2
A survey of developments in Italian culture - history, literature, painting, and music - in the post-Renaissance period, with emphasis on modern Italy.
Prereq: Second-year standing
Taught in English
This course may be used toward the All requirement.

ITAL 391 F 2S 0.5
The Modern Italian Novel
A brief study of the development of the Italian novel since Manzoni with concentration on the novels just before and after World War II.
Prereq: ITAL 201/202 or consent of instructor (replaces former prereq ITAL 191/192)

ITAL 392 F R 0.5
Special Topics/Directed Readings
Prereq: Consent of instructor

ITAL 396 F R 0.5
Special Topics/Directed Readings Winter term of ITAL 396.

COURSES NOT OFFERED 1996-97
ITAL 311 Medieval Italian Literature
ITAL 312 Renaissance Italian Literature
ITAL 392 Modern Italian Poetry

Kinesiology

Undergraduate Officer
I.D. Williams, BMH 3024, ext. 2825

KIN 102 F 3C,1T 0.5
Biophysical Basis of Kinesiology
Human physical movement is discussed from mechanical, anatomical and physiological viewpoints. The course provides a general orientation to the study of Kinesiology.

KIN 103 F 3C,1T 0.5
The Social Sciences Basis of Kinesiology
An introduction to the study of human physical activity from psychological, sociological, anthropological and historical perspectives.

KIN 200 F 3C,2L 0.5
Human Anatomy: Limbs and Trunk
Functionally-oriented regional anatomy of the limbs and trunk using pre-dissected cadavers. A brief introduction to neuroanatomy is included. No Year One students are admitted.

KIN 201 W 3C,2L 0.5
Human Anatomy: Central Nervous System, Head and Neck
Functionally-oriented anatomy of the brain, spinal cord, cranial nerves and sensory receptors, using pre-dissected cadavers included is an introduction to the histology and embryology of the nervous system.
Prereq: KIN 200 or consent of instructor

KIN 210 W 3C 0.5
Growth and Development, and Aging
The physiology of human growth, development and aging is examined with special reference to the influence of diet, environment, exercise and disease on the normal processes.
Prereq: KIN 200, BIOL 230 and 273
Cross-listed as Geron 210, HLTH 210

KIN 217 F 3C 0.5
Human Biochemistry
An elementary course in human biochemistry including the metabolism and function of proteins, carbohydrates, lipids, and hormones. Emphasis is placed on the application of biochemical principles to human movement.
Prereq: CHEM 116 or equivalent

Japanese

For courses in Japanese see East Asian Studies.
### Course Descriptions

**Kinesiology**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Title</th>
<th>Credits</th>
<th>Prerequisites</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>KIN 222</td>
<td>Statistical Techniques Applied to Kinesiology</td>
<td>0.5</td>
<td></td>
<td>An introduction to descriptive and inferential statistics and the interpretation of data. A major consideration of the course is the use of statistics in the solution of problems in Kinesiology and Health Studies. Prereq: KIN and Health Studies students only</td>
</tr>
<tr>
<td>KIN 242</td>
<td>Introduction to Movement Disorders</td>
<td>0.5</td>
<td></td>
<td>An introduction to selected movement disorders and their implications for physical activity. The movement disorders examined include those which accompany neuromuscular and perceptual-motor impairment, mental retardation, cardiovascular and respiratory disease. Prereq: KIN 102 and 113</td>
</tr>
<tr>
<td>KIN 250</td>
<td>Sociology of Physical Activity</td>
<td>0.5</td>
<td></td>
<td>An introduction to the sociology of physical activity. The course examines physical activity with respect to settings such as the workplace, educational and health systems, exercise, and sport. Particular attention is directed to a consideration of the social significance of physical activity and the social influences and constraints upon access and participation. Prereq: KIN 103 and SOC 101</td>
</tr>
<tr>
<td>KIN 255</td>
<td>Introduction to Psychomotor Behaviour</td>
<td>0.5</td>
<td></td>
<td>An information processing approach is used to introduce the principles of learning and performing fine and gross motor skills. In addition, social psychological variables are studied as they relate to the facilitation or decrement in learning and performance. Prereq: KIN 103 and PSYCH 101</td>
</tr>
<tr>
<td>KIN 264</td>
<td>Developmental Aspects of Movement</td>
<td>2C.1T</td>
<td></td>
<td>A study integrating the theoretical and applied aspects of motor and perceptual-motor development in children and adolescents. Tutorials will examine children in an applied setting. Prereq: Year-Two or Year-Three standing only Antireq: DANCE 264 Cross-listed as DANCE 264</td>
</tr>
<tr>
<td>KIN 300</td>
<td>Physiology of Physical Activity</td>
<td>0.5</td>
<td></td>
<td>A study of the effects of physical activity on the muscular, circulatory and respiratory systems and the mechanisms through which the body adapts to activity and environment. Prereq: BIOL 230 and 273</td>
</tr>
<tr>
<td>KIN 321</td>
<td>Biomechanics of Human Movement</td>
<td>0.5</td>
<td></td>
<td>An examination of the effects of physical activity and sport systems and the mechanisms through which the body adapts to activity and environment. Prereq: KIN 222</td>
</tr>
<tr>
<td>KIN 330</td>
<td>Research Design</td>
<td>0.5</td>
<td></td>
<td>An introduction to the basic principles of scientific inquiry in Kinesiology. A systematic treatment of the logic and practice of methods and techniques employed in research related to physical activity with an examination of design, sampling, data gathering and analysis. Prereq: KIN 222</td>
</tr>
<tr>
<td>KIN 335</td>
<td>Evaluation of Human Motor Performance</td>
<td>0.5</td>
<td></td>
<td>The nature and methodology of assessment is reviewed from theoretical and empirical perspectives. Taxonomies of motor performance are examined and principles developed for the measurement of specific constructs in field and laboratory situations. Prereq: KIN 222</td>
</tr>
<tr>
<td>KIN 340</td>
<td>Injuries in Work and Sport</td>
<td>0.5</td>
<td></td>
<td>An introductory course to the area of sports medicine in which injuries encountered in sport and in the workplace are examined. Materials covered include the mechanisms of injury, tissue biomechanics, pathology, assessment, treatment and prevention of acute and chronic trauma. The laboratory component provides hands-on experience with the management of simulated injuries. Prereq: KIN 200, third- and fourth-year Kinesiology students</td>
</tr>
<tr>
<td>KIN 341</td>
<td>Selected Topics in Sport and Work Injuries</td>
<td>0.5</td>
<td></td>
<td>This course covers the mechanisms, pathology, management and prevention of catastrophic injuries encountered in sport and work. Topics include trauma to the head, face, vertebral column, and knee, thermal injury, legal liability and others as requested by the students. Prereq: KIN 340</td>
</tr>
<tr>
<td>KIN 345</td>
<td>Principles of Behaviour Modification</td>
<td>0.5</td>
<td></td>
<td>A course providing a general overview of behaviour modification principles and procedures. Basic principles of reinforcement, punishment, modelling and desensitization are examined as they relate to health behaviour. Prereq: PSYCH 101 or consent of instructor Cross-listed as HLTH 348</td>
</tr>
<tr>
<td>KIN 352</td>
<td>Sociology of Aging</td>
<td>0.5</td>
<td></td>
<td>An introduction to individual and population aging. Topics discussed include: aging from an historical and comparative perspective; aging in subcultures; aging and the social structure; aging and social processes; aging and the environment; work and retirement; and aging and leisure patterns. Prereq: SOC 101 and one other SOC course Cross-listed as GERON 352, HLTH 352, SOC 352</td>
</tr>
<tr>
<td>KIN 354</td>
<td>Social Psychology and Physical Activity</td>
<td>0.5</td>
<td></td>
<td>An examination of sport and other forms of physical activity as social situations. Topics such as social facilitation, modelling, person perception, expectancies, group structure, unity, motivation, leadership, conformity, and intergroup relations are introduced in relation to motor performance. Prereq: PSYCH 101</td>
</tr>
</tbody>
</table>
KIN 356 F 3C 0.5
Information Processing in Human Perceptual Motor Performance
An information processing model of perceptual-motor behaviour is presented. Human performance theory is used to study processes mediating input and output information. Specifically, the subprocesses of storage of information in memory, perception, retrieval of information from memory and execution of movement are examined.
Prereq: KIN 222, 255

KIN 357 W 3C 0.5
Motor Learning
A course focused on the bases and applications of theories of motor learning. Included are selected psychological and neurophysiological processes as they relate to these theories.
Prereq: KIN 222, 255

KIN 401 W,S 3C,3L 0.5
Physiological Adaptations to Physical Activity
An analysis of the physiologic adaptations that occur in response to protracted physical activity and the influence of such adaptations on the response to work in a variety of environmental conditions. Special emphasis is given to the changes occurring in skeletal and cardiac muscles and the neuroendocrine mechanisms involved.
Prereq: KIN 300 and 217

KIN 402 F 3C 0.5
Hydrospace, Altitude and Aerospace Physiology
An examination of human cardiorespiratory responses at rest and during work to selected stresses of hyperbaric and hypobaric environments.
Prereq: KIN 300

KIN 405 W 3C,2L 0.5
Exercise Management
An examination of the rationale and procedures used in the development of exercise programs for normally healthy individuals.
Prereq: KIN 300 and 321

KIN 407 W 3C 0.5
The Physiology of Coronary Heart Disease
An examination of the pathology, risk factors and rehabilitation programs related to coronary heart disease. Major emphasis is placed on the cardiorespiratory implications of exercise in the rehabilitation process.
Prereq: KIN 300 or equivalent
Cross-listed as HLTH 407

KIN 416 F 3C 0.5
Neuromuscular Integration
An examination of the neural processes involved in the maintenance of posture and the control of movement.
Prereq: KIN 201 or PSYCH 261 or consent of instructor

KIN 420 W 3C 0.5
Occupational Biomechanics
A course designed to provide the student with knowledge to reduce the risk of injury and increase worker productivity. Issues include identification of injury risk factors, understanding injury mechanism, quantitative assessment of injury risk and intervention strategies to reduce the risk of injury. Specific examples include the use of computerized models and EMG methods to analyze low back loading, optimizing tool design and workspace layout and the examination of related issues such as office seating and vibration.
Prereq: KIN 321 or consent of instructor

KIN 422 F 3C,2L 0.5
Human Gait, Posture, and Balance: Pathological and Aging Considerations
This course will provide a detailed understanding of the kinematics, kinetics, and neural control of standing posture, stepping, walking, and running under normal and perturbed conditions. Measurement techniques, processing data, and the interpretation of total body and limb synergies will be emphasized from a biomechanical and neural control perspective. The problems of the elderly and the assessment of those with pathologies will be emphasized.
Prereq: KIN 425, 416, or permission of instructor

KIN 425 W 3C,2L 0.5
Advanced Biomechanics of Human Movement
The quantitative measurement and analysis of the movement of the human musculo skeletal system. Multisegment dynamic movements will be studied using computer programs, with emphasis on kinematics, kinetics and energetics, as well as the use of EMG in the assessment of the control of the movement. Examples are presented from pathological, normal and athletic movement.
Prereq: KIN 321

KIN 426 F 3C,2L 0.5
Biophysical Signal Processing and Control Systems
Basic electricity and electronics required for the understanding of bioelectric recording and electrophysiology. Application of signal processing to biophysical signals encountered in kinesiology. Mathematical modelling of passive and active systems and the control systems (cardiac, respiratory, neuromuscular) associated with human movement.
Prereq: KIN 321, 300 or consent of instructor

KIN 431 F,W,S 0.5
Research Proposal
An independent paper in the form of a research proposal on an approved topic. The topic may include survey, field, laboratory, theoretical, or applied research, program evaluation, mathematical modelling, fitness appraisal, etc. The format is to be determined with the supervisor and may be in chapters or in journal style.
Prereq: Fourth year Honours Kinesiology

KIN 432 F,W,S 0.5
Research Project
An independent research project on an approved topic, supervised by a faculty member. This is the completion of the research proposed in KIN 431. The format is to be determined with the supervisor and may be in chapters or in journal style.
Prereq: KIN 431

KIN 432 A Biomechanics
KIN 432 B Biochemistry
KIN 432 C Work Physiology
KIN 432 D Psycho Motor Behaviour
KIN 432 E Sociology of Physical Activity
KIN 432 F Psychology of Human Movement
KIN 432 G Sports Medicine
KIN 432 H Occupational Health
KIN 432 I Anatomy

KIN 431 A Rehabilitation
KIN 431 B Biomechanics
KIN 431 C Work Physiology
KIN 431 D Psycho Motor Behaviour
KIN 431 E Sociology of Physical Activity
KIN 431 F Psychology of Human Movement
KIN 431 G Sports Medicine
KIN 431 H Occupational Health
KIN 431 I Anatomy

KIN 431 T Ergonomics
KIN 431 Q Gerontology
KIN 431 P Nutrition
KIN 431 M Anatomy
KIN 431 L Occupational Health
KIN 431 K Sports Medicine
KIN 431 J Psychobiology
KIN 431 I Anatomy
KIN 431 H Occupational Health
KIN 431 G Sports Medicine
KIN 431 F Psychology of Human Movement
KIN 431 E Sociology of Physical Activity
KIN 431 D Psycho Motor Behaviour
KIN 431 C Work Physiology
KIN 431 B Biochemistry
KIN 431 A Biomechanics

KIN 432 F,W,S 0.5
Research Project
An independent research project on an approved topic, supervised by a faculty member. This is the completion of the research proposed in KIN 431. The format is to be determined with the supervisor and may be in chapters or in journal style.
Prereq: KIN 431

KIN 432 A Biomechanics
KIN 432 B Biochemistry
KIN 432 C Work Physiology
KIN 432 D Psycho Motor Behaviour
KIN 432 E Sociology of Physical Activity
KIN 432 F Psychology of Human Movement
KIN 432 G Sports Medicine
KIN 432 H Occupational Health
KIN 432 I Anatomy
An examination of current major issues and trends in Kinesiology. Students select areas of major interest from a series of faculty-initiated topics.

**KIN 470** F, W, S 3C 0.5
**Seminar in Kinesiology**
An examination of current major issues and trends in Kinesiology.

**KIN 470E** W, S 3C 0.5
**Seminar in Integrative Ergonomics**
An examination of current major issues and trends in Ergonomics.

**KIN 472** F, W, S 0.5
**Directed Study in Special Topics**
For the student who desires to pursue a particular topic in depth through guided independent research and/or reading. A faculty member must approve a student's project prior to registration. May be repeated in subsequent terms.

**KIN 472A/B** Biomechanics
**KIN 472C/D** Work Physiology
**KIN 472E/F** Psycho-Motor Behaviour
**KIN 472H** Habilitation
**KIN 472I** Internship
**KIN 472K** Sports Medicine
**KIN 472L** Occupational Health
**KIN 472M** Teaching
**KIN 472N** Coaching
**KIN 472O** Anatomy
**KIN 472P/Q** Social Sciences: Psychology
**KIN 472R** Rehabilitation
**KIN 472S/T** Social Sciences: Sociology

**KIN 491** F, W 5T 0.5
**Clinical Kinesiology -- Sports Injuries Assessment**
Practical experience in the examination, diagnosis, and treatment of sports injuries under the supervision of a physician. Case presentations are discussed in a group setting.

**Prereq:** KIN students only. Must have consent of instructor, athletic injury experience and preferably at least A- in KIN 200 and 340.

**KIN 492A/B** F, W 2P, 2T 0.25/0.25
**Clinical Kinesiology -- Cardiac Rehabilitation Practicum**
Practical experience with cardiac patients in a rehabilitation setting; major emphasis is placed on the cardio-respiratory implications of exercise and behaviour modification.

**Prereq:** KIN 300, 407, 349, and experience with high risk patients, plus consent of instructor.

Courses may be taken concurrently.

**KIN 493** W 5P, 3T 0.5
**Clinical Kinesiology: Movement Assessment Practicum**
Practical experience in movement assessment of persons from various special populations such as the normal elderly and those with neurological, degenerative or developmental disorders. Motor functions involving gait, posture and balance or upper limb movements will typically be examined in these assessments.

**Prereq:** Normally the minimum requirement will be a 75% average overall and in the prerequisite courses which include KIN 242, 416, 422, 456. As well, the student will need to have the equivalent of eight months of full-time work experience with people from special populations and the consent of course co-ordinator.

**KIN 494** W 3C 0.5
**Integrative Ergonomics Practicum**
A presentation must be made by each 4B student explaining qualitative and qualitative methods used, interpretation of data where applicable, explanation of interventions employed, together with an overview of components of interest to those in ergonomics. Credit requires both the off-campus practicum experiences and attendance at the seminar component over six academic terms where all students are expected to participate in debate of ergonomic issues. Occasional guest ergonomists address the group. Graded credit/non-credit.

**Prereq:** 4B Ergonomics Option students only.
Korean

For courses in Korean see East Asian Studies.

Latin

For courses in Latin see Classical Studies.

Management Sciences

Undergraduate Officer
F. Safayeni, CPH 4303, ext. 2226

Courses not offered in the current academic year are listed at the end of this section.

M SCI 211 F, S 3C, 1T 0.5
Organizational Behaviour
Introduction to the concepts of learning, person perception, attitudes and motivation in an organization. Consideration of communication, roles, norms and decision making within a group. Discussion of power, control, leadership and management in light of the above concepts.
Prereq: PSYCH 333 or 338

M SCI 251 F, W 3C 0.5
Probability and Statistics

M SCI 281 W, S 3C, 1T 0.5
Managerial and Engineering Economics
This course is designed to satisfy Engineering Economics requirements of the Canadian Accreditation Board. Price and output decisions. Choosing among alternative inputs and production processes. Evaluating alternative investments, equipment service life, and new products.
Open to Engineering students only

Course Descriptions

Korean -
Mathematics

M SCI 311 F, W 3C 0.5
Organizational Design and Technology
The focus of this course is on the procedures and variables involved in the design and redesign of organizations. Issues such as departmentation, differentiation, integration, internal politics, innovation, authority and control are discussed in the context of the underlying technology of the organization. Emphasis will be placed on how one designs both the technical and the organizational systems to ensure their compatibility, noting the effects that one has on the other.

M SCI 331 F, W, S 3C 0.5
Operations Research 1

M SCI 431 W 3C 0.5
Operations Research 2
Classification of stochastic processes. Recurrent events including birth and death processes, and branching processes. Waiting line models and applications. Markov processes and decision problems. Applications include inventory control, reliability, equipment replacement, maintenance, design of service facilities, etc.
Prereq: M SCI 251 or equivalent and M SCI 331

M SCI 432 F, W, S 3C 0.5
Introduction to Production Management
Introduction to a number of problem areas in the management of production/industrial engineering. Topics chosen from production planning and inventory control, planning/control of large projects, quality control, reliability/maintenance, facilities layout, job design, production standards and work measurement.
Prereq: M SCI 251 or equivalent

M SCI 441 W 3C 0.5
Management of Information Systems
Structures, functions and processes of development of computer hardware, software and databases for the management of information. Concepts of information, humans as information processors, information management concepts, introduction to information systems analysis.
Prereq: CS SCI 300

M SCI 442 W 3C, 1T 0.5
Impact of Information Systems on Organizations and Society
This course is designed to familiarize the student with issues related to the impact of computer-based technologies on individual jobs, organizations, and broader societal level. Particular emphasis will be placed on critical examination of various issues including privacy, security, ethical concern and professional responsibilities.
Open only to Engineering students with a third- or fourth-year standing.

M SCI 462 F 3C, 1T 0.5
Public Cost-Benefit Analysis for Engineers
Cost-benefit analysis is a widely used approach for evaluating the economic desirability of various government projects and policies. It is required by most governments for the assessment of, among other things, public engineering projects and environmental policies. This course will introduce and critically evaluate this methodology, with examples from various branches of engineering, including some examples that address environmental issues. Related approaches will also be discussed.
Prereq: M SCI 261 or equivalent
Coreq: M SCI 261

COURSES NOT OFFERED 1996-97
M SCI 452 Decision Making Under Uncertainty

Mathematics

Undergraduate Office
MC 5115, ext. 3905

Courses not offered in the current academic year are listed at the end of this section.

Note
(See also Actuarial Science, Applied Mathematics, Combinatorics and Optimization, Computer Science, Mathematics Electives, Pure Mathematics, Statistics.)

MATH 010 F, W, S 0.0
Non-Credit Year One Testing Slot
All students enrolled in one or more of MATH 135, 136, 137, 138, 145, 146, 147, 148, and CS 120, 130, 134 are automatically enrolled in a non-credit lab that is scheduled one evening each week from 7:00 to 9:00 p.m. This time slot appears as MATH 010 entry on student timetables and is reserved for mid-term tests in the above courses. This time slot is used only on those evenings when mid-term tests are scheduled.
MATH 020 F,W,S 0.0
Non-Credit Year Two Testing Slot
All students enrolled in any second-year mathematics course offered by the Faculty of Mathematics, with the exception of various service courses designed for students in other faculties, are automatically enrolled in a non-credit lab that is scheduled from 4:30 to 6:30 p.m. Tuesday and Thursday each week. This time slot is used only on those days when mid-term tests are scheduled.

MATH 103 F 3C,1T 0.5
Introductory Algebra For Arts and Social Science
An introduction to applications of algebra in business, the behavioural sciences, and the social sciences. Topics will be chosen from set theory, permutations and combinations, binomial theorem, probability theory, systems of linear equations, vectors and matrices, mathematical induction.
Prereq: Grade 12 Mathematics or equivalent
Not open to students in the Faculties of Engineering, Mathematics or Science, or to other students who have credit in any one of OAC Algebra, OAC Finite Mathematics, or the equivalent.

MATH 104 W 3C,1T 0.5
Introductory Calculus For Arts and Social Science
An introduction to applications of calculus in business, the behavioural sciences, and the social sciences. The models studied will involve polynomial, rational, exponential and logarithmic functions. The major concepts introduced to solve problems are rates of change, optimization, growth and decay, and integration.
Prereq: Grade 12 Mathematics or equivalent
Not open to students in the Faculties of Engineering, Mathematics or Science, or to other students who have credit in OAC Calculus, OAC Finite Mathematics, or the equivalent.

MATH 107 F,W,S 3C,2T 0.5
Calculus 1
Prereq: OAC Calculus
Antireq: MATH 117, 127, 137, 147
Not open to Honours Mathematics students.

MATH 108 F,W,S 3C,2T 0.5
Calculus 2
Prereq: MATH 107 or equivalent
Antireq: MATH 118, 128, 138, 148
Not open to Honours Mathematics students.

MATH 117 F 3C,2L 0.5
Calculus 1 For Engineering
Prereq: OAC Calculus
Antireq: MATH 107, 117, 137, 147
Not open to students in the Faculty of Mathematics.

MATH 118 W,S 3C,2L 0.5
Calculus 2 For Engineering
Prereq: MATH 107 or equivalent
Antireq: MATH 108, 128, 138, 148
Not open to students in the Faculty of Mathematics.

MATH 125 F,W,S 3C,1T 0.5
Applied Linear Algebra 1
Prereq: One of OAC Algebra, OAC Finite Mathematics, MATH 103
Antireq: MATH 115, 136, 146
Not open to Honours Mathematics students.

MATH 126 F,W,S 3C 0.5
Applied Linear Algebra 2
Prereq: MATH 125, or equivalent
Antireq: MATH 235, 245
Not open to Honours Mathematics students.

MATH 127 F 3C,2T 0.5
Calculus 1 For Honours Physics and Chemistry
Prereq: OAC Calculus
Antireq: MATH 107, 108, 117, 137, 147
Not open to students in the Faculty of Mathematics.
MATH 128  F,W  3C,2T  0.5
Calculus 2 For Honours Physics and Chemistry
Prereq: MATH 127, or equivalent
Antireq: MATH 108, 118, 138, 148
Not open to students in the Faculty of Mathematics.

MATH 135  F,W  3C,1T  0.5
Algebra For Honours Mathematics
A study of the basic algebraic systems of mathematics: the integers, the integers modulo n, the rational numbers, the real numbers, the complex numbers and polynomials.
Prereq: OAC Algebra or equivalent
Antireq: MATH 145
Also offered at St. Jerome's College in the Winter term.

MATH 136  F,W,S  3C,1T  0.5
Linear Algebra 1 For Honours Mathematics
Prereq: MATH 135
Antireq: MATH 115, 125, 146
Also offered at St. Jerome's College in the Winter term.

MATH 137  F,W,S  3C,2T  0.5
Calculus 1 For Honours Mathematics
Prereq: OAC Calculus
Antireq: MATH 107, 117, 127, 147
Also offered at St. Jerome's College in the Fall term.

MATH 138  F,W,S  3C,1T  0.5
Calculus 2 For Honours Mathematics
Prereq: MATH 137
Antireq: MATH 108, 118, 128, 148
Also offered at St. Jerome's College in the Winter term.

MATH 145  F  3C,1T  0.5
Algebra (Advanced Level)
MATH 145 is an advanced-level version of MATH 135.
Prereq: OAC Algebra (or equivalent).
The students admitted are selected by the Faculty of Mathematics.
Antireq: MATH 135

MATH 146  W,S  3C,1T  0.5
Linear Algebra 1 (Advanced level)
MATH 146 is an advanced-level version of MATH 136.
Prereq: MATH 145 or consent of instructor
Antireq: MATH 115, 125, 136

MATH 147  F  3C,1T  0.5
Calculus 1 (Advanced Level)
MATH 147 is an advanced-level version of MATH 137.
Prereq: OAC Calculus (or equivalent).
The students admitted are selected by the Faculty of Mathematics.
Antireq: MATH 107, 117, 127, 137

MATH 148  W,S  3C,1T  0.5
Calculus 2 (Advanced Level)
MATH 148 is an advanced-level version of MATH 138.
Prereq: MATH 147 or consent of instructor
Antireq: MATH 108, 118, 128, 138

MATH 211  F,S  3C,1T  0.5
Advanced Calculus 2 For Electrical Engineers
Prereq: MATH 211
Antireq: AM 231, MATH 217, 227P
Cross-listed as E&CE 206
Not open to students in the Faculty of Mathematics.

MATH 217  F,W  3C  0.5
Calculus 3 for Chemical Engineering Optimization problems including the method of Lagrange multipliers. Double and triple integrals, including transformations and change of variable. Vector fields, divergence and curl. Vector integral calculus, including Green's theorem, the divergence theorem and Stokes' theorem. Applications in engineering are emphasized.
Prereq: MATH 118
Antireq: AM 231, MATH 212, 227P, 237, 247
(Formerly MATH 210)
Not open to students in the Faculty of Mathematics.

MATH 218  F,W,S  3C  0.5
Differential Equations For Engineers
First order equations, second order linear equations with constant coefficients, series solutions, the Laplace transform method, systems of linear differential equations. Applications in engineering are emphasized.
Prereq: MATH 118 or SY DE 112
Antireq: AM 250, MATH 229
Cross-listed as SY DE 211
(Formerly MATH 218)
Not open to students in the Faculty of Mathematics.

MATH 227P  F  3C,1T  0.5
Calculus 3 for Honours Physics
Prereq: MATH 128
Antireq: MATH 212, 217, 237, 247, AM 231
Not open to students registered in the Faculty of Mathematics.
Course Descriptions
Mathematics - Mechanical Engineering

Mathematics Electives

Undergraduate Office
MC 5115, ext. 3905

Introductory Note
MTHEL courses are not restricted to students in the Faculty of Mathematics. When taken by Mathematics students, MTHEL courses count as non-mathematics courses.

MTHEL 100 F,S 2C 0.5
Commercial and Business Law for Mathematicians Students

Antireq: ACC 231

MTHEL 102 W,S 3C 0.5
Uses and Abuses of Statistics
This course provides an appreciation of how to use statistical arguments correctly in a wide variety of applications. Topics include descriptive statistics, sample surveys, experimental design, index numbers, regression models.

Prereq: MATH 116 or consent of instructor

MTHEL 206A F,S 2C 0.5
Introduction to Mathematics Education
Current trends in education, professional practices and administration, the role of the department head, lesson planning, techniques of teaching, evaluation of students, special students, extracurricular activities, the relationship between elementary and secondary school mathematics, audio-visual materials.

Prereq: Consent of instructor
This course is open only to students in the Co-op Math/Teaching Option.

MTHEL 305A F 3C 0.5
General Life Insurance 1
Types of Life Insurance contracts and their uses, basis of risk measurements, modified valuation methods, non-forfeiture values, dividend formulas, selection of risks, substandard risks, and principles of reinsurance.

Prereq: MATH 227 Calculus 3

Mechanical Engineering

Undergraduate Officer
G. Davidson, E2 2330, ext. 3340

Notes
1. General prerequisite: Registration in the Mechanical Engineering Department or permission of course instructor is required.
2. The Department reserves the right to cancel any 400-500 level elective courses if teaching resources become unavailable.

M E 120 W,S 2C,17.3L 0.5
Scientific Principles of Mechanical Engineering

Prereq: PHYS 115, MATH 117

M E 200A/200B F,W,S,F 2C 0.0
Seminar
Discussion of Structure of Mechanical Engineering curriculum, operation of Department, Faculty, University, technical societies.

M E 301 F,W 3C,17 0.5
Advanced Calculus
Calculus of multivariate functions; partial differentiation, total derivatives, chain rule, transformation of variables. Applications include geometrical problems, error estimation, maxima and minima, and Taylor series. Multiple integration in standard coordinate systems, Jacobians. Properties of geometric and dynamical systems.

Prereq: MATH 227 Calculus 3

COURSES NOT OFFERED 1996-97
MATH 111A Algebra
MATH 227 Calculus 3
Course Descriptions
Mechanical Engineering

ME 202 F,W 3C,1T 0.5
Statistics for Engineers
Prereq: MATH 117
Antireq: M SCI 251

ME 203 F,S 3C,1T 0.5
Ordinary Differential Equations
Solutions of nth order homogeneous and non-homogeneous linear equations with constant and variable coefficients. Systems of linear equations. Non-linear equations. Appropriate techniques such as variable transformation, theory of Laplace transforms, and Frobenius series. Applications include simple dynamical systems and principles of mass, momentum and heat conservation.
Prereq: ME 201

ME 212 F,W 3C,1T 0.5
Dynamics
Prereq: PHYS 115, MATH 118

ME 215 F,S 3C,3L 0.5
Structure and Properties of Materials
Prereq: CH E 102

ME 219 F,W 3C,1T 0.5
Mechanics of Deformable Solids 1
Concept of equilibrium, force analysis of structures and structural components, equilibrium of deformable bodies, stress and strain concepts, stress-strain relationships, stress analysis of prismatic members in axial, shearing, torsional and flexural deformations, shear force and bending moment diagrams.
Prereq: PHYS 115

ME 220 F,S 3C,1T 0.5
Mechanics of Deformable Solids 2
A general treatment of the behaviour of structural components from the study of stress and strain in solids. Topics include superposition, energy theorems, theories of failure, elastic and inelastic analysis of symmetrical bending, torsion of circular members, columns and stability, and virtual work.
Prereq: ME 219

ME 250 F,S 3C,1T 0.5
Thermodynamics 1
Prereq: ME 201
Antireq: E&CE 309 and SY DE 381

ME 282 F,S 3C,1T,3L 0.5
Introduction to Microprocessors and Digital Logic
Number systems, codes and coding, mini-monitorization techniques applied to design of logic systems. Component specifications. Discussion of microprocessors, memory and I/O logic elements. Microcomputer structure and operation, I/O modes and interfacing. Machine language and Assembler programming. Design and application of digital systems for data collection and control of pneumatic hydraulic and machine systems. Laboratory work includes the use of microcomputers.
Prereq: GEN E 123

ME 289 F,W 3C,2T,3L 1.0
Electromechanical Devices and Power Processing
Prereq: GEN E 123
1Alternate weeks

ME 300A, 300B W,S,F,W 2C 0.0
Seminar
Technical specialties in Mechanical Engineering, discussion of options, curriculum, seminars and technical topics in the various options.
Prereq: ME 215

ME 304 W,S 3C,1T 0.5
Numerical Analysis
A survey of numerical procedures with emphasis upon computer implementation. In particular, the following topics are covered: Interpolation, curve fitting, solution of non-linear equations, numerical integration, numerical solution of ordinary differential equations, matrix algebra and solution of systems of linear equations, and problems in the solution of partial differential equations.
Prereq: ME 201, 203

ME 321 W,S 3C,1T 0.5
Partial Differential Equations
Prereq: ME 201, 203

ME 322 F,W 3C,1T 0.5
Kinematics and Dynamics of Machines
Prereq: ME 201, 212

ME 322 F,W 3C,1T 0.5
Mechanical Design 1
Analysis and synthesis of machine elements. Factors affecting working stresses, fatigue, creep and impact considerations. Design of shafting, springs, screws, clutches, brakes and gears.
Prereq: ME 220, 321

ME 330 W,S 3C,2L 0.5
Control of Properties of Materials
Prereq: ME 215
Course Descriptions
Mechanical Engineering

M E 340 F,W 3C,1T,3L 0.5
Manufacturing Processes
The principles of manufacturing unit processes including casting, forming, machining and joining. Interactions between design, materials (metals, polymers, ceramics) and processes. Advantages and limitations, relative cost, and production rates of competitive processes.
Prereq: M E 210, 330
Cross-listed as SY DE 364

M E 351 W,S 3C,1T,1L 0.5
Fluid Mechanics 1
Physical properties of fluids and fundamental concepts in fluid mechanics. Hydrodynamics. Conservation laws for mass, momentum and energy. Flow similarity and dimensional analysis as applied to engineering problems in fluid mechanics. Laminar and turbulent flow. Engineering applications such as flow measurement, flow in pipes and fluid forces on moving bodies. Introduction to compressible flow.
Prereq: M E 250

M E 353 F,W 3C,1T,1L 0.5
Heat Transfer 1
Introduction to heat transfer mechanisms. The formulation and solution of steady and transient heat conduction. Radiant heat transfer including exchange laws and view factors. Introductory convective heat transfer.
Prereq: M E 250, 351

M E 354 W,S 3C,1T 0.5
Thermodynamics 2
Emphasis on applications of thermodynamics to flow processes, real fluids, evaluation of state functions of real fluids. Non-reacting mixtures, reacting mixtures, equilibrium considerations.
Prereq: M E 250

M E 360 F,W 3C,1T,2L 0.5
Introduction to Control Systems
Prereq: M E 203, 321

M E 362 F,W 3C,1T,2L 0.5
Fluid Mechanics 2
Basic equations of two-dimensional flow, potential flow, exact viscous solutions. Introduction to lubrication, boundary layers, and introduction to turbulence. Turbomachinery fundamentals and applications. Selected advanced topics.
Prereq: M E 351

M E 400A/400B S,F/W 2C 0.0
Seminar
Research frontiers in Mechanical Engineering. Specific discussion of research done at Waterloo, seminars by members of research groups.

M E 401* F,S 3C 0.5
Law for the Professional Engineer
The Canadian Legal System, Forms of Business Organizations, Tort Law, the role of the professional; Contract Law, the Elements of a Contract, Statute of Frauds, Misrepresentation, Duress and Undue Influence, Mistake, Contract Interpretation, Discharge of Contract, Breach of Contract and fundamental breach; Agreements between the client and Engineer; General Law, the Mechanics’ Lien Act, comparative discussion of the Professional Engineers Act as it relates to the earlier statute, Intellectual Property and Industrial Property. It is intended to prepare the student for the examination in law which must be written by the Engineer for the Association of Professional Engineers of the Province of Ontario. This course is restricted to senior Mechanical Engineering students. *Course will be graded on a CR/NCR basis. A written final examination is mandatory

M E 423 F,S 3C,1T 0.5
Mechanical Design 2
A continuation of the M E 322 course in analysis and synthesis of machinery, including advanced analysis of machine elements such as clutches, brakes, couplings, journal bearings and gears. Advanced machine design concepts such as reliability, optimization and techniques for stimulating innovative design. A synthesis project involving the machine elements studied is usually included.
Prereq: M E 322

M E 432 W 3C,1L 0.5
Deformation and Fracture of Engineering Materials
Macroscopic aspects of deformation and fracture as measured by standard engineering testing in tension and compression. Microscopic aspects of plastic flow; the role of dislocations. Strengthening methods in engineering materials (strain hardening, solid solution, precipitation, dispersion and grain size strengthening). Static, dynamic and fatigue fracture of various engineering materials both metals and non-metals including composite materials. High temperature behavior including creep, superplasticity and superplastic forming and diffusion bonding of structural parts. Application of the working knowledge to various case studies of a real-life behavior of materials in service.
Prereq: M E 330

M E 435 F,S 3C,1L 0.5
Industrial Metallurgy
This course is intended for those students interested in acquiring a working knowledge of metallurgy. It will cover: Metals and alloy systems, iron-carbon alloys, heat treatment and the function of alloying elements in steel, corrosion and scale resistant alloys, copper and nickel base alloys, light metals and their alloys; casting, hot and cold working of metals; soldering, brazing and welding; corrosion and oxidation; metal failure analysis.
Prereq: M E 330

M E 447 F,S 3C,3L 0.5
Advanced Manufacturing Technologies
Prereq: M E 262

M E 452 W 3C 0.5
Energy Transfer in Buildings
Thermodynamic properties of moist air; psychrometric charts; humidity measurements; direct water contact processes; heating and cooling of moist air by extended surface coils; solar radiation; heating and cooling loads on buildings; effects of the thermal environment; air conditioning and calculations.
Prereq: M E 353, 354
Selected topics in heat transfer fundamentals and applications. Topics to be covered include the fundamentals of convection with analytical solutions to simple laminar flow problems and approximate solutions to turbulent flow problems based on analogies between momentum and heat transfer. Also covered is radiant exchange in grey enclosures and in black enclosures containing emitting-absorbing gases. The remaining topics will be chosen from design of heat exchangers; condensation heat transfer; boiling heat transfer; and the treatment of problems in heat conduction.

Prereq: M E 353, 362

M E 548 F,S 3C 0.5
Energy Conversion
Review of reserves and consumption trends of Canada's and the world's energy resources. Design of fossil-fuel central power plants, including boiler efficiency calculations and advanced steam and binary cycles. Review of atomic physics including fission and fusion energy. Design of nuclear fission power plants including design of reactor core for critical conditions, fuel cycles and radiation hazards. Design considerations for solar energy conversion devices including: availability of solar energy, solar-thermal converters, thermal storage and photovoltaics. Principles of fuel cells and some aspects of their design. Other topics as appropriate.

Prereq: M E 353, 354

M E 549 F,S 3C 0.5
Dynamics of the Atmospheric Boundary Layer
For those students interested in working on engineering problems that involve the flow of air in the lower kilometer of the atmosphere. Topics to be studied include: composition of the atmosphere, surface wind variation, vertical variation of temperature, pressure, and moisture, basic moisture thermodynamics, fluid mechanics on rotating earth, physics of atmospheric turbulence, atmospheric stability, vertical variation of wind, inversion layer dynamics, introduction to atmospheric diffusion processes.

Prereq: M E 250, 351

M E 482 F,W,S 9L 0.5
Mechanical Engineering Projects
Engineering assignments requiring the student to demonstrate initiative and assume responsibility. Student activity is guided and coordinated by a faculty supervisor. In selecting projects, particular account is taken of the student's field of specialization. Projects, in general, may involve technical disciplines beyond the strictly mechanical engineering field.

Prereq: ME 421

M E 524 W 3C,1T 0.5
Advanced Dynamics
This course is a continuation of M E 212 and M E 321. Basic kinematic and dynamic concepts are extended. The emphasis is on vector methods, general kinematic relationships, planar and three-dimensional motion, gyroscopic effects, variational mechanics, Lagrange's equation and Hamilton's equations. Computer simulation of non-linear systems is discussed and a project involving computer simulation is usually assigned.

Prereq: M E 321

M E 525 F,S 3C,1L 0.5
Mechanical Vibrations In Machines
Fundamentals of mechanical vibration, transient and forced vibrations, vibration of mechanical systems with one-, two- and multi-degrees of freedom, vibration measurement and isolation, continuous system, modal analysis.

Prereq: M E 212, 305

M E 527 W 3C 0.5
Mechanics of Deformable Solids 3

Prereq: M E 220

M E 531 W 3C 0.5
Microstructural Changes In Engineering Alloys
Phase and microstructural changes which occur in alloys are discussed, including the reasons why they occur and their engineering relevance. Examples are metal-gas reactions, diffusion, hydrogen embrittlement, surfaces, interfaces and temper embrittlement, phase diagrams, nucleation in solids and liquids, solidification, recrystallization and solid state phase transformations. Applications to metallurgical practices are stressed, such as carburizing, oxidation, precipitation hardening, heat treating, casting, welding and corrosion.

Prereq: M E 330

M E 533 W 3C,1L 0.5
Composite Materials
Fibres, particulates and matrices. Consideration of the interface between the matrix and the fibre or particulate. Geometrical arrangements of fibres within laminates and their influences on elastic and strength properties. Strength of laminates and short fibre composite materials. Consideration when designing with composite materials. Fatigue, notch sensitivity and environmental deterioration.

Prereq: M E 330, 340

M E 534 F,S 3C 0.5
Non-metallic Materials

Prereq: M E 330

M E 541 W 3C,1L 0.5
Deformation Processes

Prereq: M E 340

M E 542 W 3C 0.5
Machine Tool Analysis

Prereq: M E 340, 360

M E 543 W 3C,2L 0.5
Metal Casting Processes
The principles of static and continuous casting processes including sand, investment, die and various continuous casting techniques. Review of heat transfer, fluid flow and solidification theory as it applies to casting. Gating, runner, sprue and riser design in static castings. Origin of various casting defects including hot tears, distortion, solidification shrinkage and residual stresses.

Prereq: M E 330
Course Descriptions
Mechanical Engineering

ME 544 F,W 3C,1L 0.5
Welding
Features and advantages of the various welding processes. Welding arc characteristics. Temperature distributions around welds. Metalurgy of the weld metal and heat affected zone in various alloys, including carbon and stainless steels, and aluminum alloys. Origin of various weld defects and methods of detecting them. Static and dynamic design of welded joints. Residual stresses, distortion and fracture of welds.
Prereq: M E 220, 330

ME 546 W 3C 0.5
Theory of Solid Modelling
This course examines various aspects of Geometric Modelling. It includes Theory of Solid Modelling, Parametric Design and Feature Based Design Methodology. Topics covered include: Decomposition Models, Constructive Solid Geometry, Half-Space Models and Boundary Models. Student projects provide hands-on experience in developing solid modelling techniques.
Prereq: M E 447

ME 547 W 3C,2L 0.5
Robot Manipulators: Kinematics, Dynamics, Control
This course is designed to provide a background in the area of industrial robotic manipulators. The kinematics, dynamics, and control of robots is considered with emphasis on the mechanical aspects of the topic. Topics covered include: homogeneous transformations, forward and inverse kinematics, Lagrange's equations of motion, Newton's equations of motion, linear feedback control (PID controllers), and introduction to non-linear controllers.
Prereq: M E 212, 360, 447

ME 548 F,S 3C,3L 0.5
Numerical Control of Machine Tools 1
Prereq: M E 262, 360

ME 557 W 3C 0.5
Combustion 1
Combustion thermodynamics; Introduction to chemical kinetics of combustion; Combustion properties of fuels; Flammability of combustible mixtures. Flame propagation mechanisms, premixed and diffusional; Stability of flames; Introduction to combustion aerodynamics, jet flames; Atomization; Droplet and spray combustion; Elementary ignition concepts and theory. Basic detonation theory.
Prereq: M E 353, 362

ME 559 F,S 3C 0.5
Finite Element Methods
A course presenting the fundamental ideas involved in conventional finite element analysis in Mechanical Engineering. Domain discretization, Interpolation and shape functions, element derivation and types, element stiffness or property equations, assembly procedure, boundary conditions, solution methods for the algebraic system equation, applications in heat transfer, fluid flow, and stress analysis. Student will, throughout the course, write and test their own finite element code through individual subroutine construction as the course progresses.
Prereq: M E 220, 305

ME 561 F,S 3C, 0.5
Fluid Power Control Systems
Prereq: M E 351, 360

ME 563 W 3C 0.5
Turbomachines
Prereq: M E 362

ME 564 W 3C 0.5
Aerodynamics
An introductory course in aerodynamics for engineers. Kinematics and dynamics of inviscid flow; airfoil dynamics including thin airfoil theory, finite wings, panel methods and airfoil parameters. Boundary layer theory and boundary layer control as applied in aerodynamics. Introduction to high speed aerodynamics. Introduction to dynamics of flight including stability and control.
Prereq: M E 362

ME 565 W 3C 0.5
Gas Dynamics
Basic laws of compressible fluid flow. Wave propagation in compressible fluids, isentropic flow of a perfect gas, normal and oblique shock waves. Prandtl-Meyer flow. Flow in ducts and over bodies, flow with friction (Fanno) and heat transfer (Rayleigh), imperfect gas effects, measurement of compressible flows, use of formulae, charts and tables, introduction to the method of characteristics.
Prereq: M E 260, 351

ME 566 F,S 3C 0.5
Fluid Mechanics 3
Special topics in advanced fluid mechanics which may include: potential flow, thin airfoil theory, viscous flow, Reynolds stress, intensity and scale of turbulence. The "law of the wall", logarithmic velocity profile and velocity defect laws, effects of roughness. Pressure loss in pipes and conduits. Jets and wakes. Flow in diffusers and contractions, and experimental measurement techniques.
Prereq: M E 362

ME 568 W 3C 0.5
Noise Analysis and Control
Prereq: M E 305, 360
Course Descriptions
Mechanical Engineering - Music

M E 569 F,S 3C 0.5
Fluid Mechanics-Design Topics
A study of the design aspects of fluid mechanics. Unsteady flow, pipe and duct systems, two and three dimensional flow techniques, practical calculation of boundary layers, separation, base pressures, jets, wakes and shear layers, diffusers and flow distribution devices, flow control, two phase flow, instrumentation, wind tunnel modelling, wind loading. The course will be oriented to practical design techniques for flow systems, reactors, air pollution control equipment, etc.
Prereq: M E 362

M E 571 W 3C 0.5
Air Pollution 1
Nature and sources of air pollution, chemical and biological aspects, effects on health and environment. Physical aspects of the atmosphere, thermodynamics, vertical variation of wind and temperature, stability, convection, atmospheric turbulence, diffusion equations, plumes, thermal, jets in stratified flow, radioactive plumes, particle dispersion instrumentation (micrometeorological), air pollution control techniques and equipment monitoring instrumentation.
Prereq: M E 362

M E 580 W 3C 0.5
Basic Tribology
The science and technology of interacting surfaces in relative motion or friction, lubrication and wear. Emphasis on mechanical aspects of tribology. Main topics are fluid film lubrication, surface contact mechanics, contact of rough surfaces and application of fundamentals.
Prereq: M E 219, 381

M E 595-599 3C 0.5
Special Topics in Mechanical Engineering
Various courses dealing with selected topics at the undergraduate level in automation and control, solid mechanics and machine design, materials engineering and processing, fluid mechanics, and thermal engineering. Courses offered when resources permit.

Middle East Studies

Undergraduate Officer
L.A. Curchin, ML 238, ext. 6883

Note
Middle East Studies courses and approved courses are listed in "Interdisciplinary Programs"

MES 107A 2C,2T 0.5
Introductory Standard Arabic
An introduction to reading and writing standard (classical) Arabic, the language used in literature, newspapers and the Quran. Fundamentals of grammar, vocabulary and pronunciation. By the end of the course, students will be able to read and translate at an introductory level.
Not open to native speakers of Arabic.
Cross-listed as RS 107A

MES 200 W 3C 0.5
Introduction to the Middle East
An interdisciplinary introduction to the Middle East, its geography, history, culture, religious and political diversity.

MES 300A-D
Special Topics on the Middle East

MES 302A-D F,W,S 0.5
Directed Studies on the Middle East
This is an independent, directed studies project on a Middle East topic. Students select an appropriate advisor, agree on a topic, obtain approval from the MES Director of the Option, and work with the advisor.
Prereq: MES 200, plus either two courses from the Middle East Content Courses or consent of instructor

MES 350A-D
Study-Travel Seminar in the Middle East
Cross-listed as RS 369A-F

Fine and Performing Arts

The University offers courses in Dance, Drama, Fine Arts, and Music.
For program information, please see the Faculty of Applied Health Sciences and the Faculty of Arts.

Music

Undergraduate Officer
C.A. Weaver, Conrad Grebel College, Room 155, 885-0220, ext. 245

Courses not offered in the current academic year are listed at the end of this section.

Note
Students should consult their faculty advisor regarding how term courses with credit weights other than 0.5 are counted for degree credit in their program.

MUSIC 100 F,W,S 3C 0.5
Introduction to Music
The techniques, terminology, forms and styles of Western music through lectures and listening, as exemplified by great works from all eras of music history.

MUSIC 111 F,W,S 3C,1L 0.5
Fundamentals of Music Theory
An introduction to the primary skills of music practice emphasizing the reading and writing of musical notation. Students will learn elementary keyboard, listening, and sight-singing skills. For students with minimal musical background. Does not fulfill Music major or minor requirements.

MUSIC 116 F,W,S 2L 0.25
Music Ensemble
The study of selected music literature through rehearsals and performance in one of the Music Department’s ensembles: University Choir, Chapel Choir, Chamber Choir, Chamber Ensembles, Stage Band. Regular attendance at rehearsals and performances is required. Offered on a credit/fail basis.
For musical reasons, admission to any particular ensemble is at the discretion of the director.
(Formerly MUSIC 101)
**Course Descriptions**

**Music**

**MUSIC 117** F,W,S 2L 0.25
Music Ensemble
See MUSIC 115 for course description.
(Formerly MUSIC 102)

**MUSIC 140** F,S 3C 0.5
Popular Music and Culture
An examination of the styles, forms and development of 20th-century popular music. The social, commercial and technological aspects of popular music are considered.
(Formerly MUSIC 125)

**MUSIC 216** F,W,S 2L 0.25
Music Ensemble
See MUSIC 115 for course description.
(Formerly MUSIC 201)

**MUSIC 217** F,W,S 2L 0.25
Music Ensemble
See MUSIC 116 for course description.
(Formerly MUSIC 202)

**MUSIC 222** F 3C 0.5
Conducting 1
A study of conducting techniques appropriate for song leading, choral rehearsal and public performance. The course will include score analysis and rehearsal procedures for music from a wide variety of historical styles.
Prereq: MUSIC 100 and 270 or consent of instructor
(Formerly MUSIC 372)

**MUSIC 226** F,W, std 0.5
Music Studio
Individual instruction in Voice, Piano, Organ, Classical Guitar and orchestral instruments. This course is available only to Music majors and minors.
Prereq: Royal Conservatory Grade 8 level and audition with Music Faculty Studio Fee
(Formerly MUSIC 266)

**MUSIC 227** F,W,S std 0.5
Music Studio
See MUSIC 226 for course description.
Prereq: MUSIC 226 and consent of Music Faculty Studio Fee
(Formerly MUSIC 267)

**MUSIC 231** W 3C 0.5
Psychology of Music
The study of music from a behavioural science perspective. Topics include auditory and musical perception, music cognition, musical aptitudes and abilities, learning and pedagogy, creativity and aesthetic experience, emotive human responses and the social psychology of music activities.
Prereq: MUSIC 100 and PSYCH 101 or consent of instructor

**MUSIC 240** W 3C 0.5
Introduction to Jazz
A survey of the development of jazz schools and individual styles as well as a study of melodic, harmonic and rhythmic improvisation. Styles will be demonstrated through recordings and live performance.

**MUSIC 245** F 3C 0.5
World Music
A survey of traditional music outside of North America, including Africa, South America, the Far East, the South Pacific, the mid-East and Europe, with special emphasis on the role of music within the culture.

**MUSIC 246** W 3C 0.5
Baroque and Classical Music
The study of music of the Baroque and Classical eras from 1600 to 1800. A survey of major genres by Monteverdi, Schütz, Purcell, Bach, Handel, Haydn, Mozart and others.
Prereq: MUSIC 100 or consent of instructor

**MUSIC 255** F 3C 0.5
Music of the Romantic Period
The study of the music of the 19th century by means of lectures, seminars, reading and listening to recordings and live performances. Representative composers include Beethoven, Schubert, Chopin, Tchaikovsky, Verdi, and Wagner.
Prereq: MUSIC 100 or consent of instructor

**MUSIC 256** F 3C 0.5
Music of the 20th Century
The study of the various genres of music of the 20th century in the context of the various artistic, political and social movements. The course will include seminars, lectures, listening, and analysis.
Prereq: MUSIC 100 or consent of instructor

**MUSIC 257** F,W,S std 0.5
The Symphony
A survey of the great symphonies from Haydn to Stravinsky, through lectures and listening. A portion of the course will be devoted to works being performed by the Kitchener-Waterloo Symphony Orchestra during the term.
Prereq: None, but MUSIC 100 is recommended. The ability to read music notation is not required.
(Formerly MUSIC 200)

**MUSIC 270** F,W,S 3C,1L 0.5
Music Theory 1
The study of basic melodic, harmonic and voice leading concepts including an introduction to figured bass and functional harmony. Ear-training, sight-singing and keyboard lab sessions will be integrated with written and analytical work.
Prereq: A basic knowledge of scales, triads, and music notation or MUSIC 111
(Formerly MUSIC 250)

**MUSIC 271** W 3C,1L 0.5
Music Theory 2
The study of harmony, counterpoint and form of 18th- and early 19th-century music. Sight-singing, ear-training and keyboard lab sessions will be integrated with written and analytical work.
Prereq: MUSIC 270 or consent of instructor
(Formerly MUSIC 251)

**MUSIC 316** F,W,S 2L 0.25
Music Ensemble
See MUSIC 116 for course description.
(Formerly MUSIC 301)

**MUSIC 317** F,W,S 2L 0.25
Music Ensemble
See MUSIC 116 for course description.
(Formerly MUSIC 302)

**MUSIC 322** W 3C 0.5
Conducting 2
Continuation of MUSIC 222.
Prereq: As in MUSIC 222

**MUSIC 328** F,W,S std 0.5
Music Studio
See MUSIC 226 for course description.
Prereq: MUSIC 227 and consent of Music Faculty
Studio Fee
(Formerly MUSIC 366)

**MUSIC 331** F,W,S std 0.5
Music Studio
See MUSIC 226 for course description.
Prereq: MUSIC 326 and consent of Music Faculty
Studio Fee
(Formerly MUSIC 367)

**MUSIC 355A/355B** 0.5/0.5
Music and Culture in Vienna
A Spring seminar to be taught in Vienna and environs. The course includes daily lectures and attendance of music performances during the Vienna Music Festival, as well as tours of places relating to the culture of Vienna.
Prereq: MUSIC 100 or consent of instructor
MUSIC 355B offered Spring 1997
MUSIC 355A offered Spring 1996
MUSIC 356 W 3C 0.5
Canadian Music
An historical study of the development of music in Canada from colonial times to the present, with particular emphasis on the composers and music of the 20th century.
Prereq: MUSIC 100 or consent of instructor

MUSIC 362 F 3C 0.5
Piano Literature
A study of the music written for solo piano from the 17th century to the present.
Prereq: MUSIC 100 or consent of instructor

MUSIC 364 F 3C 0.5
Music and Worship
The development of Christian worship and its music in historical, theological and aesthetic perspective. The nature and function of chant, psalmody and other service music, both choral and instrumental.
(Formerly MUSIC 360)

MUSIC 365 F 3C 0.5
Masterpieces of Russian Literature and Opera
This course, designed for students of literature and music, offers an interdisciplinary approach to the relationships between literary and musical culture in Russia during the 19th century. Central to the course is the comparative study of masterpieces of Russian opera and the classics of literature which inspired their musical interpretations. Among the works discussed as literary text, libretto and music are: Glinka's Ruslan and Ludmila, Borodin's Prince Igor, Mussorgsky's Boris Godunov, Dargomyzhsky's The Stone Guest, Tchaikovsky's Eugene Onegin, and Rimsky-Korsakov's Mozart and Salieri.
This course is taught via the Waterloo-Guelph Education Link System.
Prereq: MUSIC 100
Cross-listed as RUSS 371

MUSIC 370 F 3C,1L 0.5
Music Theory 3 (19th Century)
The study of chromatic harmony as well as melodic and formal aspects of 19th-century music. Ear-training, sight-singing and keyboard lab sessions will be integrated with written and analytical work.
Prereq: MUSIC 271 or consent of instructor

MUSIC 380 F,W 0.5
Directed Study in Music
Prereq: Advanced standing in music and consent of instructor

MUSIC 390 F,W 0.5
Special Topics in Music
Study of a limited field under tutorial guidance.
Prereq: MUSIC 100 and consent of instructor

MUSIC 426 F,W,S std 0.5
Music Studio
See MUSIC 226 for course description.
Prereq: MUSIC 327 and consent of Music Faculty
Studio Fee
(Formerly MUSIC 468)

MUSIC 427 F,W,S std 0.5
Music Studio
A continuation of Music Studio. A recital is required.
Prereq: MUSIC 426 and consent of Music Faculty
Studio Fee
(Formerly MUSIC 467)

MUSIC 490A/B F,W,S 0.5/0.5
Senior Honours Seminar
A research seminar required of all honors students. The topics will vary from year to year depending on the interests of the students and instructor(s).

COURSES NOT OFFERED 1996-97
MUSIC 253 Medieval and Renaissance Music
MUSIC 275 Computer Applications in Music
MUSIC 290 Special Topics
MUSIC 332 Musical Aesthetics and Criticism
MUSIC 334 Women and Music
MUSIC 381 Art Song
MUSIC 383 Christian Hymnody
MUSIC 371 Theory 4
MUSIC 375 Electroacoustics Music
MUSIC 376 Composition Seminar
MUSIC 391 Special Topics in Music 2

Native Studies

For the course in Native Studies see Anthropology.

Optometry

Undergraduate Officer
L. Sorbara, OPT 248, ext. 3085
B.E. Robinson, OPT 240A, ext. 2057

Note
Students in other disciplines may register for Optometry courses only upon the approval of the Associate Dean of Science for Optometry

OPTOM 100 F 2C 0.5
History and Orientation
A brief history of the profession and the development of visual science; a consideration of legal and organizational development of optometry; the role of professional associations. The role and scope of optometry and its relationship to other professions and the community.

OPTOM 104 F 3C,3L 0.5
Anatomy of the Eye 1
The gross, microscopic and ultra structure of ocular tissues. The embryology and comparative anatomy of the eye will be emphasized. The relationship of the eye to the vascular supply of the head and the nervous system will be studied. This course is credited only upon completion of OPTOM 114.

OPTOM 105 F 3C,1T 0.5
General Pathology 1
Basic disease processes, including inflammation, degeneration, neoplasia; pathogenic microbiology and related diseases; immunity and hypersensitivity; disease caused by physical agents; diseases of the organ systems.

OPTOM 106 F 3C,3L,2T 0.5
Geometrical Optics
Prereq: PHYS 121/121L, 122/122L, MATH 107/108

OPTOM 109 F 3C,3L 0.5
Visual Perception 1: Perception of Light
Sensory processes involved in visual perception. Topics include spectral sensitivity, light and dark adaptation, temporal and spatial resolution, and principles of photometry.
Course Descriptions
Optometry

OPTOM 111 W 3C,3L 0.5
Fundamentals of Visual Optics
Prereq: OPTOM 106

OPTOM 114 W 3C,2L 0.5
Anatomy of the Eye 2
A continuation of OPTOM 104
Prereq: OPTOM 104

OPTOM 115 W 4C,1T 0.5
General Pathology 2
A continuation of 105.
Prereq: OPTOM 105

OPTOM 149 W 3C 0.5
Public Health Optometry
Introduction to the foundation and basic sciences of public health optometry with an emphasis on the epidemiology of vision problems.

OPTOM 218 F 3C,4L 0.5
Optical Optics 1
Prereq: PHYS 246, OPTOM 106

OPTOM 241 F 3C,3L 0.5
Ocular Motility
Ocular motility; kinematics of eye movements, muscle actions, measurements of eye movements, types of eye movements, innervational systems subservicing eye movements, clinical applications.
Prereq: OPTOM 111

OPTOM 242 F 3C,3L 0.5
Clinical Techniques 1
Lectures and laboratories on clinical techniques for examination of the optical properties and tissues of the eye.
Prereq: OPTOM 111

OPTOM 244 W 3C,2L 0.5
Neurophysiology of Vision
The neural processing of colour, brightness, movement and form by the retina, lateral geniculate, cortex, superior colliculus and other brain centres. Neural mechanisms underlying binocular depth perception, the accommodative response and eye movement.
Prereq: OPTOM 104/114

OPTOM 245 F 3C,2L 0.5
Ocular Pathology 1
Etiology, signs, symptoms, diagnosis, management, and epidemiology of diseases of the ocular adnexa and anterior segment of the eye; ocular emergencies; primary health care responsibilities.
Prereq: OPTOM 105/115

OPTOM 246 W 3C,4L 0.5
Ophthalmic Optics 2
Prereq: OPTOM 106/216

OPTOM 251 W 3C,3L 0.5
Visual Perception 2: Monocular and Binocular Visual Processes
Prereq: OPTOM 109, 241

OPTOM 252 W 3C,3L 0.5
Clinical Techniques 2
Clinical techniques for the examination of the binocular relations of the nonstrabismic patient, with particular emphasis on the study of the relationship between accommodation and convergence. Techniques of phorometry, prism vergence, and monocular and binocular cross cylinder tests.
Prereq: OPTOM 241/242

OPTOM 254 F 2C,2L 0.5
Physiology of the Eye
The physiology of the smooth muscles of the eye, the extraciliary striate muscles, the lacrimal apparatus, the cornea, the iris, the lens, the ciliary body and the vitreous body, Production and drainage of aqueous and related influences on intraocular pressure. The vascular supply of the eye.
Prereq: OPTOM 104/114

OPTOM 256 W 3C,2L 0.5
Ocular Pathology 2
Etiology, signs, symptoms, diagnosis, management, and epidemiology of diseases of the posterior segment of the eye; higher visual and oculomotor systems; multisystem diseases.
Prereq: OPTOM 245

OPTOM 264 F 3C 0.5
Pharmacology 1: Medications and the Eye
Coverage of the principles of pharmacology (pharmaceuticals, pharmacokinetics, and pharmaco-dynamics), drug classification and mechanism of action. Medication use by the population; coverage of medications used to manage most major diseases and consideration of the effects of these medications on the eye and vision.

OPTOM 342 W 3C,2L 0.5
Case Analysis and Optometric Therapies
Clinical application of the visual sciences: Methods of analysing clinical data, emphasizing differential diagnosis, scientific control of the psycho-physical measurements, effective record keeping, recommended optometric therapies and prognosis.
Prereq: OPTOM 352

OPTOM 346A F 2C,2L 0.5
Ophthalmic Optics 3
Spectacle frame materials. Fitting and adjusting techniques. Selection of lens design. Lenses for high myopia.
Dispensing of eye protectors. Optics of low vision aids. Patient counselling and management of dispensing problems.
Laboratories provide experience in practical aspects of ophthalmic dispensing.
Prereq: OPTOM 216, 246

OPTOM 346B W 2L 0.0
Ophthalmic Optics 3
Continuation of 346A. Laboratories provide experience in practical aspects of ophthalmic dispensing.
Prereq: OPTOM 216, 246

OPTOM 347 F 3C,3L 0.5
Contact Lenses 1
Prereq: OPTOM 246, 252, 254
Course Descriptions

Optometry

OPTOM 340 A/B S, W 1C, 0.5 each
Clinical 1.0 each

Optometry Clinic Students are assigned to various areas within the clinic where, under direct clinical faculty supervision, they participate in the provision of optometric services to clinic patients. In addition to primary care, they are exposed to the provision of contact lens, ocular health and optical services.

Prereq: Successful completion of Year Two

OPTOM 350 W 4C 0.5

OPTOM 351 F 2C, 2L 0.5
Visual Perception 3: Colour Vision An introduction to colour perception, colourimetry and colour discrimination. Characteristics of congenital and acquired colour vision deficiencies, colour vision test design and patient management.

Prereq: OPTOM 109

OPTOM 352 F 3C, 3L 0.5
Clinical Techniques 3: Strabismus and Aniseikonia Detection and evaluation of sensory and motor characteristics of vision in aniseikonic, strabismic and non-strabismic patients. Classifications, diagnoses, prognoses, and modes of therapy for aniseikonic, non-strabismic, and strabismic patients.

Prereq: OPTOM 242, 251, 252

OPTOM 353 W 2C 0.5
Professional Ethics and Optometric Communication A survey of alternative philosophical perspectives involved in resolution of sample ethical and moral issues confronting optometrists. Awareness of the explicit and implicit contents of written and vocal communications. An exploration of optometric communication issues related to letter and report writing, patient counselling, patient referral, fee presentation, and complaint management.

OPTOM 354 F 3C 0.5
Pharmacology 2: Ocular Diagnostics and Therapy Principles of ophthalmic pharmaceutical preparation and pharmacokinetics. Selection and use of all ophthalmic diagnostic pharmaceutical agents (DPA's), including dyes, stains, topical ocular anesthetics, mydriatics, cycloplegics, miotics; palliative therapeutic agents (artificial tears, etc.) and ophthalmic therapeutic pharmaceutical agents (TPA's). Coverage will include product details and recommended guidelines for their use and follow-up procedures.

Prereq: OPTOM 245, 255, 264

OPTOM 357 W 3C 0.5
Contact Lenses 2 Detection and management of chronic and acute complications induced by contact lenses. Contact lens management options for special conditions such as dry eye, aphakia and keratoconus (and other corneal irregularities). Disposable lenses and replacement regimens. Extended wear options. Alternative management of refractive errors such as orthokeratology and refractive surgery. Contact lenses and presbyopia.

Prereq: OPTOM 245, 347, 364

OPTOM 358 W 3C, 3L 0.5
Gerontology and Low Vision An introduction to the epidemiology of aging and the clinical effects of aging on the visual system. The optometric assessment and management of the aging patient. An introduction to low vision care with emphasis on assessment and management of visual impairment and disability, including optical and non-optical therapies. The epidemiology of vision impairment, multidisciplinary management, and associated rehabilitative services will be discussed.

Prereq: OPTOM 242, 252, 346

OPTOM 372 W 3C 0.5
Pediatric Optometry and Learning Disabilities Consideration of the development of the optical and sensory-motor functions of the visual system provides the basis upon which this course examines the clinical testing and treatment procedures for infants and young children. The aspects of vision problems related to learning difficulty including tests and measurements taken by optometrists. The role of the optometrist in conjunction with the parents, teachers, and psychologists in assisting children to achieve is discussed.

Prereq: OPTOM 242, 252

OPTOM 374 W 2C 0.5
Ocular Pathology 3 Genetic contributions to systemic and ocular disease. A review of molecular and clinical genetics with special reference to the eye, including carrier detection. Inherited conditions of particular interest, e.g. colour vision anomalies, albinism, maculopathies, refractive errors, retinoblastoma.

Prereq: OPTOM 245, 255

OPTOM 412 S, F, W 0.75
Case Analysis 2 Building on analytical principles developed in OPTOM 342, this course involves case-based presentations in a grand rounds format. Each student chooses a case from his/her previous clinical experience. The student presents the case and answers questions related to it and the patient's condition(s). Faculty discussants will direct the students in assessing the basic and clinical science features of the cases. Cases may be chosen from any aspect of optometric practice.

Prereq: All third-year Optometry courses

OPTOM 441 S, F, W 3L 0.5
Optometry Research Proposal An independent paper in the form of literature review on the student's area of interest, experimental design proposition, and preliminary data. Before registering in the course the student and the designated supervisor must submit to the coordinator a research proposal for the student's research area. The format of the paper is to be determined with the supervisor and may be in chapters, in journal style, or in an oral presentation, during the registered term, at seminar sessions (OPTOM 609/ OPTOM 629).

An elective (approved by the undergraduate officer) may be chosen as an alternative to OPTOM 441.

OPTOM 451 S, F, W 3L 0.5
Optometry Research Project An independent research project on an approved topic, supervised by a faculty member. This is the completion of the research proposal in OPTOM 441 and it is recommended that the format of the report, to be determined with the supervisor, follow the format selected for OPTOM 441.

Prereq: OPTOM 441 (77% minimum mark)
Peace and Conflict Studies

Undergraduate Officer
T.R. Yoder Neufeld, Conrad Gebrel College, 885-0220

ACTION COURSES

PACS 201 F 2C,1D 0.5
Roots of Conflict and Violence
An examination of the influential theories of the nature and roots of human conflict on both the interpersonal and intergroup level. Contributions of the behavioural and social sciences, as well as the humanities, will be explored.

PACS 202 W 2C,1D 0.5
Conflict Resolution
An examination of the resolution of conflict, ranging from interpersonal to broader social and international conflicts. Students are introduced to negotiation, mediation, and nonviolent resistance, and are encouraged to develop their own theoretical understandings that aid in addressing conflict.

PACS 301A-F 3S 0.5
Special Topics in Peace and Conflict Studies 1
A seminar course investigating special issues related to peace and conflict. Content may vary from year to year. Topics may include, for example, "Liberation and Nonviolence in Latin America," "Justice in Third World Development," "Violence, Non-Violence and War."

PACS 302A-F 3S 0.5
Special Topics in Peace and Conflict Studies 2
Same as 301 above. Topics may include, for example, "Community Conflict Resolution," "Quest for Peace in Literature and Film," "Creative Conflict Resolution in the Schools," or "Global Development Education."

PACS 399A/B F,W,T 0.5/0.5
Senior Honours Essay Seminar
Each Honours student will work on a research paper and will meet regularly with other students working on similar projects to discuss and evaluate their own work.

A letter grade for PACS 399A will be submitted only after completion of PACS 399B

INTERDISCIPLINARY PACS COURSES

PACS 390A/B F,W,S 0.5/0.5
Field Studies in Peace and Conflict
An independent study course requiring reading, research and a paper on issues related to the application of peace and conflict studies theory within a field setting, either in Canada or abroad.

PACS 398/399 F,W,S R 0.5/0.5
Directed Readings in Peace and Conflict Studies
Students may arrange independent studies in the area of peace and conflict studies on problems of special interest. Students may also register under these numbers in order to repeat PACS 391 and/or 392.

COURSES NOT OFFERED 1996-97
PACS 271 Introduction to Peace Research 1
PACS 272 Introduction to Peace Research 2
PACS 350 Canada and the Nuclear Crisis

Personality and Religion (Studies in)

Undergraduate Officer
J. Gollnick, 885-1460

Note
SIPAR core courses use the perspective of the psychology of religion to provide insight into the relationship between personality and religion. Students are strongly encouraged to complement their SIPAR studies with courses in the humanities and social sciences in order to gain a variety of views on what it means to be human.

SIPAR 250
Special Topics
Periodically the program will offer courses on special topics of interest to SIPAR students. These will be announced along with descriptive information prior to the time of offering.
Outstanding works from the ancient and classical views, consideration is given to the theories of Sigmund Freud, Carl Jung, William James, and Abraham Maslow.

SIPAR 378 Aging as Spiritual Journey
The following existential issues related to the aging process are examined from the perspective of the psychology of religion: identity, belief, actualization, existential anxiety, conversion, individuation and spirituality.

SIPAR 380 W 0.5
Carl Jung’s Theory of Religion
Jung’s analysis of the development of the personality through its life cycle, and of the central place which religion holds within the process of maturation. This includes a study of the unconscious, the collective unconscious, dreams, myths, symbols and archetypes; and the implications of Jung’s theories for religious thought and therapy.

**Course Descriptions**

**Philosophy**

**Undergraduate Officer**
W.R. Abbott, HH 326, ext. 2660

**Courses not offered in the current academic year are listed at the end of this section.**

**Notes**
1. Students must consult the Department before preregistering in upper-year courses. Final details of the courses which will actually be offered in the next academic year, including special subject courses, are available at preregistration time.
2. Any two term courses in philosophy can be used to satisfy the Group A(i) requirements.
3. Courses suffixed with “J” are administered by St. Jerome’s College.

**PHIL 100 F,W,S 3C 0.5**
Introduction to Philosophy
What can we know? What is real? Are moral choices and politics based on reason? Are human beings really just machines? Does God exist? The goal of the course is to promote critical reasoning about those issues which touch your beliefs and lives.

**PHIL 100F F,W 3C 0.5**
Introduction to Philosophy
A broad selection of the main problems in philosophy will be considered. For example: How can we know whether anything is right or wrong? How can we know about things we cannot directly observe? Can we know whether there is a God? Is mind in any sense distinct from matter?

**PHIL 102A 3C 0.5**
Introduction: Knowledge and Reality
Discussion of the nature of reality. Rival theories concerning mind, matter, freedom, the existence of God, and the place of experience and reason in human knowledge are considered.

**PHIL 102B 3C 0.5**
Introduction to Social and Political Philosophy
An introduction to basic concepts and principles via readings in classical and contemporary social and political philosophy. Concentration is on the justification of the State, with specific attention to socialism, capitalism, and democracy. Does society create problems which political institutions are necessary for solving?

**PHIL 102C 3C 0.5**
Philosophy of Life
“Who am I?” “What can I hope for after death?” “How can I tell what to do?” “What can I know?” are questions that have led many to philosophy. This course will examine what lifestyles and attitudes major philosophers, stoics, skeptics, pleasure-seekers, mystics, pragmatists, etc. have promoted, and why.

**PHIL 120J F 3C 0.5**
Philosophy of Life and Death
A study of what some of the great philosophers have said about the meaning of life and death and the transition from life to death. Students are urged to raise questions and help direct discussion.

**PHIL 130J W 3C 0.5**
Philosophy of Discontent
A study of what some of the great philosophers have said about the causes of discontent. Social disobedience and the extent to which ethical principles can be altered to accommodate changing conditions are possible topics for discussion.

**PHIL 140 F,W,S 3C 0.5**
Introduction to Formal Logic
Elementary sentence and predicate logic. Translation from English into formalism, decision methods and deductions. This course is a preparation for courses in the foundations of mathematics, scientific methods, and more advanced logic courses.

**PHIL 145 F,W,S 3C 0.5**
Critical Thinking
An analysis of basic types of reasoning, structure of arguments, critical assessment of information, common fallacies, problems of clarity and meaning. Also offered at St. Jerome’s College.

**PHIL 200A/B**
Great Works of Western Philosophy
An examination of some of the greatest writings in Western Philosophy. Students will be encouraged to come to a critical appreciation of such masterworks as Plato’s Republic, Descartes’ Discourse on Method, Hobbes’ Leviathan, Hume’s Enquiry, Kant’s Prolegomena, Nietzsche’s Zarathustra, and an outstanding work in contemporary philosophy.

**PHIL 200A F,S 3C 0.5**
Great Works of Western Philosophy: Part 1
Outstanding works from the ancient and medieval periods.
PHIL 200 B W 3C 0.5
Great Works of Western Philosophy: Part 2
Outstanding works from the early modern and contemporary periods.
Either PHIL 200A or 200B may be taken separately.

PHIL 200 J F 3C 0.5
Intentional Logic
An introduction to the understanding of how words are used, the formation of propositions, the construction of arguments and the examination of fallacies to help the student argue with order, facility and without error.

PHIL 201 3C 0.5
Love
A philosophical analysis of different forms and functions of love. Among the topics to be considered: love and sexuality, religious love, love and knowledge. Classical and contemporary sources will be treated.

PHIL 202 3C 0.5
Gender Issues
Issues arising in our lives as gendered human beings: oppression, language, looks, the work place, sports, love, relationships, bonds, sex, AIDS, rape, sexual harassment, prostitution, pornography, contraception, abortion, reproduction, raising children, youth and aging.

PHIL 204 J W 3C 0.5
Philosophy and Culture
An analysis of the philosophical assumptions of Western popular culture as reflected in various mass media and in current models of production and consumption.

PHIL 205 J F 3C 0.5
Philosophy of Nature
An examination of ancient and modern accounts of the natural world. Problems include whether matter alone can account for change, whether there is more than one cause, whether nature operates by purpose or chance.

PHIL 207 3C 0.5
Science, Technology, and Society
Alternative philosophical perspectives on problems raised by scientific and technological developments including moral issues (e.g. privacy and datagathering, "clean" vs. "dirty" energy). Also an examination of the nature and scope of scientific and technical knowledge as it bears on the responsibilities of scientists and engineers.

PHIL 208 3C 0.5
Philosophy Through Science Fiction
An exploration of issues in philosophy via science fiction. The stories provide thought experiments like those used by the great philosophers in considering knowledge, mind-brain identity, space, time, causality, ethics, and politics (among others).

PHIL 209 3C 0.5
Philosophy in Literature
Philosophical themes (such as alienation, freedom and responsibility) will be explored through appropriate literary works (for example, works by Aeschylus, Dostoevsky, Kafka, and Twain).

PHIL 210 J F 3C 0.5
Philosophy of Human Nature
What is a human being? What is the place of humans among other creatures? Are human beings accidents of evolution? What are the major theories of human nature? How are love and sex aspects of human life?

PHIL 211 F,W,S 3C 0.5
Professional and Business Ethics
Study of ethical and moral issues that typically arise in professional and business activity. What responsibilities to society at large do people in such business and professional activities as teaching, engineering, planning, architecture and accounting have? How far should professional autonomy extend?

PHIL 215 W 3C 0.5
Rational Behaviour and Decision-Making
An elementary introduction to the subject of 'rational' behaviour and decision-making for individuals and groups. Emphasis is on the definition and measurement of utility functions and various criteria employed in models of decision-making. This course is intended to help those whose work will involve them in making decisions in either the public or private sectors.

PHIL 218 J W 3C 0.5
Ethical Theory
The search to establish a basis for ethics grounded in the dignity of the human person. Consideration will be given to various ethical theories as well as to the ethical conflicts arising between the notions of 'the person' and 'the individual' as defined in contemporary culture.

PHIL 219 J F 3C 0.5
Practical Ethics
This course will discuss the applications of general ethics to more specific areas of human endeavour. Among the topics discussed will be abortion, contraception, sex, obscenity, violence, drugs, egoism, dishonesty, and various forms of human exploitation.

PHIL 220 F 3C 0.5
Moral Issues
The aim of this course is to improve the student's understanding of ethical ideas and principles by careful discussion of selected concrete moral issues, such as abortion, euthanasia, capital punishment, and violence. Choice of Issues is partly determined by student interest.

PHIL 221 F 3C 0.5
Ethics I
This course is intended to be both a history of and an introduction to moral philosophy. Views on the foundations of ethics of the great philosophers from classical antiquity to about 1900 are systematically examined. Writers studied include: Plato, Aristotle, Aquinas, Kant, Mill and Nietzsche.

PHIL 222 3C 0.5
Environmental Ethics
Philosophical perspectives on current environmental concerns: pollution, use of scarce resources, relations to animals and future generations, the significance of biodiversity and wilderness areas, bioethics and other approaches to environmental problems.

PHIL 226 G W 3C 0.5
Ethics and the Life Sciences
An investigation of some critical ethical issues in human research and therapy. Includes discussions of the right to life and the right to die, behaviour control (e.g. psychosurgery, behaviour modification and psychotherapy), human experimentation (including "informed consent" and fetal research) and genetic engineering.

PHIL 230 J W 3C 0.5
God and Philosophy
An investigation of several aspects concerning the meaning and existence of God. Is God-talk possible? Can faith and reason be reconciled? Is religious experience a meaningful argument? A wide range of different views will be considered.
Course Descriptions

Philosophy

PHIL 236 3C 0.5
Religious and Paranormal Experience
A critical examination of reports of extraordinary experiences such as telepathy, clairvoyance, psychokinesis, mysticism, prophecy, and miracle-working will lead to philosophical discussion of rationality, causation, free will, survival of death, and other topics.

PHIL 237 3C 0.5
Introduction to the Philosophy of Religion
A critical discussion of basic religious concepts. Among the topics covered will be faith, miracles, religious experience, immortality, and arguments for the existence of God.

PHIL 241 3C 0.5
Intermediate Logic
Axiom systems of logic are developed and compared with natural deduction procedures. Then certain properties of these logical systems, such as consistency, completeness and compactness, will be investigated. Prerequisite: PHIL 140 or consent of instructor

PHIL 242 3C 0.5
Extensions and Applications of Elementary Logic
The classical logic introduced in PHIL 140 will be extended to form systems of modal logic, including logics of obligation, belief and knowledge, necessity, and temporal order. Essentialism, future contingencies, proofs for the existence of God will be discussed. Prerequisite: PHIL 140 or consent of instructor

PHIL 243 3C 0.5
Creative Thinking, Problem Solving and Decision Making
Problem solving, including Assessment of Risk, Uncertainty and Value form one part of the course. Other subjects include Individual and Group Process for Finding and Weighing Alternatives, Organization of Data, its Presentation and Analysis. Antirequisite: ACC 143, 443 (formerly PHIL 443)

PHIL 245 3C 0.5
Critical Thinking 2
An analysis of more complex types of reasoning, including statistical reasoning, decision strategies, and reasoning involving causes and correlations. Emphasis is placed on the analysis of concrete examples. Prerequisite: PHIL 145 or 140 recommended

PHIL 256 3C 0.5
Philosophy of Mind
This course will discuss fundamental questions concerning the nature of mind, including the relation between mind and body, the plausibility of common sense views of the mind, and knowledge of other minds.

PHIL 256 3C 0.5
Introduction to Cognitive Science
Cognitive science is the interdisciplinary study of mind and intelligence. This course will draw on philosophy, psychology, artificial intelligence, linguistics, neuroscience, and anthropology to address central questions about the nature of thinking. Topics discussed will include mental representation, computational models of mind, and consciousness. Cross-listed as PSYCH 1256

PHIL 258 3C 0.5
Introduction to the Philosophy of Science
A discussion of the fundamental concepts on which science is based. Consideration is given to such topics as scientific theories, the nature of law-likeness, the grounds for scientific confirmation, and the debate between rationalism and empiricism in science.

PHIL 265 3C 0.5
The Existentialist Experience
An introduction to the existentialist view of humans using both literary and philosophical texts from such authors as Kierkegaard, Unamuno, Nietzsche, Ortega y Gasset, Camus, Sartre, Heidegger and others.

PHIL 280 3C 0.5
Sources of 20th-Century Thought
An examination of major writings that have shaped present-day consciousness. Works by such thinkers as Marx, Darwin, Freud, Nietzsche and Mill will be included.

PHIL 311 3C 0.5
Philosophy of Education 1
A philosophical analysis of classical and contemporary theories of education, with a view to formulating a clear workable concept of education, its aims and methods. Prerequisite: At least second-year standing or consent of instructor

PHIL 312 W 3C 0.5
Philosophy of Education 2
An introduction to current work in the field. Issues to be considered may include: the desirability and content of a core curriculum, methods of moral development, the problem of indoctrination, gender and education, computers and education, and peace education.

PHIL 315 3C 0.5
Ethics and the Engineering Profession
An analysis from the standpoint of philosophical ethics of moral issues arising in professional engineering practice. Issues include the social responsibility of engineers, conflict of interest and obligation, morally acceptable levels of risk, and moral implications of technology.

PHIL 316J W 3C 0.5
Philosophy and the Family
A philosophical examination of the family: its foundation, its purpose, its importance in personal growth and its relation to political community. Prerequisite: One previous course in moral philosophy or consent of instructor

PHIL 322 W 3C 0.5
Contemporary Ethical Theory
Continues the history and discussion of ethics begun in PHIL 221 with writings from 1900 to the present. Theories such as intuitionism, emotivism, utilitarianism, and relativism are examined via the writings of such people as Moore, Hare and Warnock. Prerequisite: PHIL 221 recommended

PHIL 327A W 3C 0.5
Philosophy of Law: Part 1
Basic themes in the philosophy of law. Issues include the nature of law and its relation to morality and politics, legal reasoning, the justification of punishment, and theories of rights, responsibility and liability.

PHIL 327B W 3C 0.5
Philosophy of Law: Part 2
An examination of areas within the law in which philosophical problems and methods are featured prominently, with special focus on the Canadian constitution and legal process, and such issues as the conflict between collective and individual rights. Prerequisite: PHIL 327A or consent of instructor
PHIL 329 3C 0.5
War, Peace and Justice
An intensive study of the moral issues involved in war and armed revolution. Critical evaluation of "just war" theories and international rules of warfare is pursued as well as the moral arguments for and against pacifism and conscientious objection.
  Prereq: PHIL 102B or 322 or consent of instructor
Offered at Conrad Grebel College

PHIL 331 3C 0.5
Aesthetics
Philosophical consideration of works of art and the problems of beauty using selected readings to enable the student to recognize and formulate her/his own views in a philosophic manner.
  Prereq: Two term courses in Philosophy or consent of instructor

PHIL 350 3C 0.5
Epistemology 1
An examination of such problems as meaning criteria, primary data, and the importance of certainty to knowledge.
  Prereq: Two term courses in philosophy

PHIL 351 3C 0.5
Epistemology 2
An examination of the problem of defining knowledge, of naturalized epistemology, and of such problems as a priori knowledge and the existence of other minds.
  Prereq: Two term courses in philosophy

PHIL 359 3C 0.5
Philosophy of the Formal Sciences
A study of philosophical problems concerning mathematics. Topics discussed include formalism, intuitionism, logicism, the mathematical paradoxes, and other topics in foundations and metamathematics.
  Prereq: At least second-year standing or consent of instructor

PHIL 382 3C 0.5
Philosophy of the Social Sciences
Problems about the fundamental methods and aims of the social sciences generally, and problems specific to Psychology, Sociology, Political Science, etc., and their relations to one another will be considered.
  Cross-listed as SOC 371

PHIL 378 3C 0.5
American Philosophy
A survey of the leading ideas of classical American philosophers, including Peirce, James, Royce, Santayana, Dewey and Mead. Attention will be paid to certain common themes, such as the pragmatic theory of truth, and the concept of democratic community. An effort will also be made to determine what makes these views distinctively American.
  Prereq: One term course in Philosophy or consent of instructor

PHIL 380 F 3C 0.5
History of Ancient Philosophy 1
From the beginnings to Plato.
  Prereq: One term course in Philosophy or consent of instructor
  Cross-listed as CLAS 361

PHIL 381 W 3C 0.5
History of Ancient Philosophy 2
From Aristotle to the close of classical antiquity.
  Prereq: One term course in Philosophy or consent of instructor
  Cross-listed as CLAS 362

PHIL 382 3C 0.5
Medieval Philosophy 1
The early period to the 13th century. Among those considered will be: Augustine, Boethius, Anselm and Abelard.
  Prereq: One term course in Philosophy or consent of instructor

PHIL 383 3C 0.5
Medieval Philosophy 2
The later period from the 13th century. Among those considered will be: Bonaventure, Aquinas, Scotus, and Ockham.
  Prereq: One term course in Philosophy or consent of instructor

PHIL 384 F 3C 0.5
History of Modern Philosophy 1
Earlier period beginning with Descartes.
  Prereq: One term course in Philosophy or consent of instructor

PHIL 385 W 3C 0.5
History of Modern Philosophy 2
Later period including Hume and Kant.
  Prereq: One term course in Philosophy or consent of instructor

PHIL 386 3C 0.5
19th-Century Philosophy
The 19th-century philosophers covered may include Hegel, Mill, Schopenhauer, James and Kierkegaard.
  Prereq: One term course in Philosophy or consent of instructor

PHIL 387 3C 0.5
20th-Century Philosophy
A study of major themes of 20th-century philosophy through representative works of Russell, Moore, Carnap, Wittgenstein, Husserl and others.
  Prereq: One term course in Philosophy or consent of instructor

PHIL 402 3C 0.5
Modern Feminism
A critical examination of contemporary feminist thought in philosophy, focusing on topics of current concern to feminist writers and to the class.
  Prereq: Consent of instructor

PHIL 418J W 3C 0.5
Ethics and Society
This course examines the nature and purpose of community living as well as such traditionally controversial issues as private and public morality, the individual good and the common good, personal freedom and group responsibility.

PHIL 420/421 3C 0.5/0.5
Studies in Ethics
Special topics in ethics, as announced by the Department.
  Prereq: At least one term course in ethics

PHIL 422 3C 0.5
Political Philosophy 1
Philosophical analysis of central concepts in political theory and its relation to moral and metaphysical problems of various periods.
  Prereq: At least one term course in ethics

PHIL 423 3C 0.5
Political Philosophy 2
A detailed discussion of contemporary theories.
  Prereq: At least one term course in ethics

PHIL 435/436 3C 0.5/0.5
Studies in Philosophy of Religion
A study of a particular philosopher or problem, as announced by the Department.
  Prereq: Consent of instructor
PHIL 440A/B
Logical Theory
A rigorous and general development of the propositional and predicate calculus within
which alternative calculi are examined. Study of such concepts as completeness,
consistency, extensionality, and modality from both formal and philosophical points
of view. Intended primarily for those interested in philosophical issues connected
with logic.
Prereq: At least one term course in
formal logic, or consent of instructor

PHIL 440A 3C 0.5
Logical Theory
The first part of PHIL 440.

PHIL 440B 3C 0.5
Logical Theory
The second part of PHIL 440.

PHIL 441/442 3C 0.5/0.5
Studies In Logic
Special topics in logic, as announced by
the Department.
Prereq: At least one of: PHIL 241, 242,
440A, 440B, PMATH 430A

PHIL 450J F 3C 0.5
Being and Existence
A discussion of the notions of reality,
being, essence, existence, analogy, etc.
The techniques of linguistic analysis will
be employed. Also, the very possibility of
any kind of metaphysics will be discussed.
Prereq: Third-year standing or consent
of instructor

PHIL 455 3C 0.5
Metaphysics 1: Ontology
Studies in the nature of being, with special
emphasis on material objects and their
properties, and on causation.
Prereq: Consent of instructor

PHIL 456 3C 0.5
Metaphysics 2: Cosmology
Metaphysical problems in the areas of
space, time and motion.
Prereq: Consent of instructor

PHIL 463 3C 0.5
Philosophy of Language
Issues in the philosophy of language, such
as synonymy, propositions, meaning,
semantics, reference.
Prereq: At least two term courses in
philosophy or consent of instructor

PHIL 465 3C 0.5
Existential Philosophy
An in depth study of the thoughts of a
major figure such as Kierkegaard,
Unamuno, Nietzsche, Heidegger, Sartre,
Camus, Marcel, Jaspers, Ortega y Gasset.
Prereq: Consent of instructor

PHIL 470 3C 0.5
Phenomenology
A critical examination of the issues and
methods of phenomenology, including the
attempts to understand the uses and rami-
fications of phenomenological methods
through the working out of particular analy-
ses. The basic writings of phenomenolo-
gists such as Husserl and Merleau-Ponty
will be used.
Prereq: Two term courses in Philosophy
or consent of instructor

PHIL 471-484 3C 0.5
Special Subjects
One or more term courses will be offered
at different times, as announced by the
Department.
Prereq: Consent of instructor

PHIL 498A-N F,W,S R 0.5
Directed Reading in Special Areas
Prereq: Consent of instructor

PHYS 101 F 3C,lT 0.5
Physics 1
An introduction to physics for students
intending to concentrate their further
studies in biology, dentistry, medicine and
paramedicine; includes particle kinematics
and dynamics, energy and momentum
conservation, rotational mechanics,
properties of liquids, temperature and
heat.
Coreq: for Science students
PHYS 111L
Antireq: PHYS 121, PHYS 115

PHYS 111L F 3L 0.25
Physics 1 Laboratory
For students taking PHYS 111.
Lab alternate weeks

Courses not offered in the current
academic year are listed at the end of
this section.

Note
Prerequisites are given as a guide to
the student and may be waived with the
consent of instructor.

PHYS 001 0.0
Pre-University Physics
This course covers the topics in Ontario
Grades 11 to 13 essential for first year uni-
versity physics. The course includes
mechanics, gravitation, vibrations and
waves, heat, electricity, light and optics.
Successful completion of this course fulfills
the University admission requirements
where high school Physics is necessary.
No University Credit
Offered by Distance Education only

PHYS 111 F 3C,1T 0.5
Physics 1
An introduction to physics for students
intending to concentrate their further
studies in biology, dentistry, medicine and
paramedicine; includes particle kinematics
and dynamics, energy and momentum
conservation, rotational mechanics,
properties of liquids, temperature and
heat.
Coreq: for Science students
PHYS 111L
Antireq: PHYS 121, PHYS 115

PHYS 111L F 3L 0.25
Physics 1 Laboratory
For students taking PHYS 111.
Lab alternate weeks
Course Descriptions
Physics

PHYS 112 W,S 3C,1T 0.5
Mechanics
A continuation of PHYS 111; includes simple harmonic motion, electrostatic force and potential, electric current and power, DC circuits, magnetic field and induction, wave motion, sound, light, optics and nuclear physics.
Prereq: PHYS 111 or PHYS 121
Coreq: (for Science students) PHYS 121L
Antireq: PHYS 122, PHYS 125

PHYS 112L W,S 3L 0.25
Physics 2 Laboratory
For students taking PHYS 112.
Lab alternate weeks

PHYS 115 F 3C,2T 0.5
Mechanics
For students in Year One Engineering
Prereq: PHYS 111, PHYS 121

PHYS 121 F 3C,1T 0.5
Mechanics, Wave Motion and Heat 1
An introductory course in physics for students intending to concentrate their future studies in the physical sciences, optometry or mathematics; includes particle kinematics and dynamics, forces in nature, work and energy, conservation of energy and linear momentum, rotational kinematics and dynamics, and conservation of angular momentum.
Prereq: OAC Calculus and at least one other OAC math.
OAC Physics recommended.
Coreq: (for Science students) PHYS 121L
Antireq: PHYS 111, PHYS 115

PHYS 121L F 3L 0.25
Mechanics, Wave Motion and Heat 1 Laboratory
For students taking PHYS 121.
Lab alternate weeks

PHYS 122 W,S 3C,1T 0.5
Mechanics, Wave Motion and Heat 2
This course is a continuation of PHYS 121; includes oscillating systems, wave motion, gravitation, fluid mechanics, heat and thermodynamics.
Prereq: PHYS 121
Coreq: (for Science students) PHYS 122L
Antireq: PHYS 112, PHYS 125

PHYS 122L W,S 3L 0.25
Mechanics, Wave Motion and Heat 2 Laboratory
For students taking PHYS 122.
Lab alternate weeks

PHYS 125 W,S 3C,2T 0.5
Physics for Engineers
Oscillations; simple harmonic motion. Wave motion, travelling and standing waves; transverse and longitudinal waves, including sound. Geometrical optics; refraction and reflection. Physical optics; interference and diffraction. Quantum physics; quantization of radiation; hydrogen atom.
Prereq: PHYS 115
Antireq: PHYS 112, PHYS 122

PHYS 222 F 3C 0.5
Electricity and Magnetism 1
Coulomb's law, electric field, Gauss' law, potential, capacitance, properties of dielectrics, current, resistance, electromagnetic force, D.C. circuits and instruments.
Prereq: First year physics and calculus
Coreq: (for Science students) PHYS 222L
Not for students in the Honours Physics Program

PHYS 222L F 3L 0.25
Electricity and Magnetism 1 Laboratory
For students taking PHYS 222.
Lab alternate weeks

PHYS 223 W 3C 0.5
Electricity and Magnetism 2
Electric fields, induced electromotive forces, magnetic properties of matter, alternating currents, electromagnetic waves.
Prereq: PHYS 222
Antireq: PHYS 253
Not for students in the Honours Physics Program

PHYS 226 F 2C,1T 0.5
Geometrical Optics
Fermat's principle, reflection and refraction at plane and spherical surfaces, thin and thick lenses, optical instruments such as magnifiers, microscopes, telescopes, spectrometers, normal magnification.
Prereq: First year physics and calculus
Coreq: (for Science students) PHYS 226L
Not for students in the Honours Physics Program

PHYS 226L F 3L 0.25
Geometrical Optics Laboratory
For students taking PHYS 226.
Lab alternate weeks

PHYS 234 W,S 3C 0.5
Quantum Physics 1
Special theory of relativity. Background of quantum physics. Quantization, waves and particles. The Schrodinger equation. Significance of the wave function. Bound states in potential wells. Travelling waves and transmission through barriers in one dimension.
Prereq: First year physics and calculus, MATH 228
Antireq: CHEM 256, PHYS 326

PHYS 239 F 3C 0.5
Digital Computation
Introduction to computer applications in physics. Numerical solution of problems in classical mechanics. Storage, analysis, and display of experimental data. Graphical techniques for constructing field plots. Extension of the numerical techniques to other areas in physics.
Prereq: CS 102 or equivalent programming experience.
For Physics Majors

PHYS 246 W 3C,1T 0.5
Physical Optics
Prereq: First year physics and calculus
Coreq: (for Science students) PHYS 246L

PHYS 246L W 3L 0.25
Physical Optics Laboratory
For students taking PHYS 246.
Lab alternate weeks

PHYS 252 F 3C 0.5
Electricity and Magnetism 1
Coulomb's law, electric fields, Gauss' law, potential, capacitance, properties of dielectrics, current, resistance, electromagnetic force, D.C. circuits, A.C. circuits, instrumentation.
Prereq: First year physics and calculus
Coreq: (for Science students) PHYS 252L

PHYS 252L F 3L 0.25
Electricity and Magnetism Laboratory
For students taking PHYS 252.
Lab alternate weeks

PHYS 253 W 3C 0.5
Electricity and Magnetism 2
Electric fields, induced electromotive forces, magnetic properties of matter, alternating currents, electromagnetic waves.
Prereq: PHYS 222
Antireq: PHYS 253
Not for students in the Honours Physics Program

PHYS 259 W,S 3C 0.5
Electrical and Electronic Engineering
For students intending to concentrate their future studies in electrical and electronic engineering.
Prereq: PHYS 246
Antireq: PHYS 222, PHYS 254

PHYS 259L W,S 3L 0.25
Electrical and Electronic Engineering Laboratory
For students taking PHYS 259.
Lab alternate weeks

PHYS 262 W 3C 0.5
Introduction to Computational Physics
Introduction to computer applications in physics. Numerical solution of problems in classical mechanics. Storage, analysis, and display of experimental data. Graphical techniques for constructing field plots. Extension of the numerical techniques to other areas in physics.
Prereq: CS 102 or equivalent programming experience.
For Physics Majors

PHYS 266 F 3C 0.5
Quantum Mechanics
Special theory of relativity. Background of quantum physics. Quantization, waves and particles. The Schrodinger equation. Significance of the wave function. Bound states in potential wells. Travelling waves and transmission through barriers in one dimension.
Prereq: First year physics and calculus, MATH 228
Antireq: CHEM 256, PHYS 326

PHYS 266L F 3L 0.25
Quantum Mechanics Laboratory
For students taking PHYS 266.
Lab alternate weeks

PHYS 270 F 3C 0.5
Introduction to Computer Applications in Physics
Introduction to computer applications in physics. Numerical solution of problems in classical mechanics. Storage, analysis, and display of experimental data. Graphical techniques for constructing field plots. Extension of the numerical techniques to other areas in physics.
Prereq: CS 102 or equivalent programming experience.
For Physics Majors
Course Descriptions

Physics

PHYS 253 W,S 3C 0.5
Electricity and Magnetism 2
Magnetic fields, Ampere's law, induced
electromotive forces, magnetic devices,
magnetic properties of materials, induc-
tance, introduction to Maxwell's equations
and electromagnetic waves.
Prereq: PHYS 252, MATH 227P, 228
Coreq: (for Science students)
PHYS 253L
Antireq: PHYS 223

PHYS 253L W,S 3L 0.25
Electrostatics, magnetic fields, potential,
energy, field and line integral, magnetic
fields, Ampere's law, induced
electromotive forces, magnetic devices,
magnetic properties of materials, induc-
tance, introduction to Maxwell's equations
and electromagnetic waves.
Prereq: PHYS 252, MATH 227P, 228
Coreq: (for Science students)
PHYS 253L
Antireq: PHYS 223

PHYS 258 F 3C 0.5
Geometrical and Physical Optics
Electromagnetic waves and the nature of
Physical Optics: interference, Fraunhofer
and Fresnel diffraction, polarization.
Optional instruments.
Prereq: First year physics and calculus
Coreq: (for Science students)
PHYS 258L

PHYS 258L F 3L 0.25
Optics Laboratory
For students taking PHYS 258.
Lab alternate weeks

PHYS 259 W,S 3C 0.5
Crystallography and X-Ray Diffraction
Space lattices, symmetry, crystal geometry
and structure, stereographic projections.
X-ray production, theory of X-ray diffra-
tion and X-ray methods, crystal structure
determination, the reciprocal lattice.
Optional topics such as crystal formation,
crystal defects, electron and neutron
diffraction.
Prereq: First year physics and calculus
Coreq: (for Science students)
PHYS 259L
Strongly recommended for students
planning to take PHYS 435 (Solid State
Physics). May be taken in either second
or third year

PHYS 259L W,S 3L 0.25
Crystallography and X-Ray Diffraction
Laboratory
For students taking PHYS 259
Lab alternate weeks

PHYS 263 W,S 3C 0.5
Classical Mechanics
Newtonian dynamics of particles and sys-
tems of particles: resisted motion, gravita-
tion, central-force motion, non-inertial
frames, oscillations, normal modes.
Prereq: First year physics and calculus,
MATH 228

PHYS 275 F 3C 0.5
Astrophysics 1 - The Solar System
The Planets, Newtonian gravity and celest-
ial mechanics, the formation of stars and
planets, meteorites, asteroids, comets,
planetary interiors, planetary surfaces,
planetary atmospheres, the origin of life.
Students with a weak background in
Mathematics or Physics are advised to
take SCI 238 first

PHYS 328 F 3C 0.5
Modern Physics
Special theory of relativity, quantization of
electromagnetic radiation, wave properties
of particles, the hydrogen atom.
Prereq: PHYS 234
Coreq: PHYS 315
Not for students in the Honours Physics
program

PHYS 334 F,S 3C 0.5
Quantum Physics 2
Postulates of quantum mechanics.
Angular momentum. The hydrogen atom.
Time independent perturbation theory.
Applications in atomic physics.
Prereq: PHYS 234, MATH 227P

PHYS 350 F,S 3C 0.5
Introduction to Mathematical Physics
Partial differential equations of math-
ematical physics. Separation of variables.
Prereq: PHYS 234, MATH 227P

PHYS 352 F 3C 0.5
Analogue Electronics
p and n materials, pn diodes, junction and
FET transistors. Transistor amplifiers and
their equivalent circuits. Operational ampli-
diers. Oscillators and power supplies.
Computer simulation of devices and cir-
cuits.
Prereq: Introductory DC and AC circuit
theory
Coreq: PHYS 352L

PHYS 352L F,S 3L 0.25
Analogue Electronics Laboratory
For students taking PHYS 352
Lab alternate weeks

PHYS 353 W 3C 0.5
Digital Electronics
Logic gates, flip-flops and shift registers.
Binary numbers and Boolean algebra.
An introduction to microprocessors is
discussed based on the 6800. This will
include arithmetic logic units, parallel
input/output ports, assembly language and
a number of examples.
Coreq: PHYS 353L
Antireq: CS 351, EACE 223

PHYS 353L W 3L 0.25
Digital Electronics Laboratory
For students taking PHYS 353
Lab alternate weeks

PHYS 355 W 3C 0.5
Nuclear Physics
Description of nuclear forces. Nuclear
models and structure. Stability and decay
modes. Nuclear reactions, fission and fusion.
Instruments of nuclear physics.
Introduction to elementary particle physics.
Prereq: PHYS 328 or 334

PHYS 358 F,S 3C 0.5
Thermodynamics
Concepts of temperature and thermody-
namic equilibrium. Work, internal energy
and heat; first law, with examples.
Engines, refrigerators, the concepts of
reversibility and absolute temperature.
Entropy and the second law. Maxwell's
equations and their applications. Joule-
Kelvin effect and phase transitions.
Third Law and other applications of
thermodynamics.
Prereq: PHYS 225
Coreq: PHYS 355

PHYS 359 W 3C 0.5
Statistical Mechanics
Statistical Mechanics vs Thermodynamics.
Probability theory. Microcanonical and
canonical ensembles. Entropy. General
formulation of Statistical Thermodynamics.
Fermi-Dirac, Bose-Einstein and Boltzmann
Statistics. Quantum ideal gases. Specific
Radiation: the photon gas. Distribution
functions. The classical gas. Mean free
path. Diffusion. Dense gases.
Prereq: PHYS 359

PHYS 360A F,S 3L 0.25
Intermediate Laboratory
Selected experiments in mechanics,
optics, electronics, atomic, molecular,
nuclear and solid state physics.
Prereq: PHYS 121L, 122L and two
second year Physics labs
18 hours of experiments

PHYS 360B W 3L 0.25
Intermediate Laboratory
Continuation of 360A.
18 hours of experiments

PHYS 364 F,S 3C 0.5
Mathematical Physics 1
Vector operators in curvilinear coordinates.
The partial differential equations of math-
ematical physics. Separation of variables.
Sturm-Liouville theory. Fourier series.
Legendre, Bessel and other special
functions.
Prereq: MATH 227P, 228
Primarily intended for Honours Physics
students
Course Descriptions

PHYS 385 W 3C 0.5
Mathematical Physics 2
Prereq: MATH 227R, 228
Primarily intended for Honours Physics students

PHYS 371A F,S 3L 0.25
Intermediate Laboratory
Further experiments in mechanics, optics, electronics, atomic, molecular, nuclear and solid state physics.
18 hours of experiments

PHYS 371B W 3L 0.25
Intermediate Laboratory
Continuation of 371A.
18 hours of experiments

PHYS 375 W 3C 0.5
Astrophysics 2 – Stars and Stellar Evolution
Observational techniques, spectral classification, stellar motions and distances, open clusters, globular clusters, stellar populations, theory of the structure, atmosphere, formation and evolution of stars.
Prereq: Years One and Two Physics and Calculus. SCI 238 or PHYS 275 strongly recommended

PHYS 380 W 3C 0.5
Molecular Biophysics
Behaviour of biological macromolecules, protein structure and function, weak interactions, physical techniques for determination of macromolecular structure, structure and function of nucleic acids, protein synthesis, energy in biological systems, molecular growth and evolution.
Prereq: Year One Physics and Chemistry
Antireq: CHEM 233 or 237

PHYS 381 F 3C 0.5
Cellular Biophysics
Structure and function of cellular membranes, membrane lipid and protein structure and dynamics, membrane potential and ion transport, nerve conduction, vision and interaction of light with membranes, muscle contraction and energy transduction.
Prereq: Year One Physics and Chemistry
Antireq: BIOL 230, 436

PHYS 432 W 3C 0.5
Physics of Solid State Devices
The theories of solid state physics are applied to explain the operation and use of several modern electronic devices, including the p-n junction, transistors, tunnel diodes, field effect devices, opto-electronic devices, etc.
Prereq: PHYS 435

PHYS 434 F 3C 0.5
Quantum Physics 3
Prereq: PHYS 334, 364 and 365

PHYS 435 F 3C 0.5
Solid State Physics
Prereq: Completion of Year Three Honours Physics

PHYS 437A F,W 0.5
Research Project
A research project in any area of Physics approved by the course co-ordinator(s). The student is required to present a summary of the project orally and to submit a written report in a style suitable for publication. Some projects, especially those with an experimental emphasis, will likely continue as 437B. In these cases, students will submit an interim written report, in addition to the oral presentation.
Prereq: Completion of all third year honours physics program requirements and registration in the fourth year of an honours physics program. Students with <70% average in the third-year core are advised not to take this course. Enrolment will be limited

PHYS 437B W 0.5
Research Project (continued)
A continuation of the project undertaken in PHYS 437A. The student is required to present a summary of the project orally or by poster and to submit a written report in a style suitable for publication.
Prereq: Completion of PHYS 437A and approval of the course coordinator(s)

PHYS 441 A F 3C 0.5
Electromagnetic Theory
Electrostatics, magnetostatics, and the macroscopic description of dielectrics and magnetic materials. Includes appropriate mathematical techniques, potential theory and the method of images.
Prereq: PHYS 252/253, 364/365 or equivalents

PHYS 441 B W 3C 0.5
Electromagnetic Theory
Prereq: PHYS 441 A

PHYS 444 W 3C 0.5
Modern Particle Physics
Prereq: PHYS 334, 364/365 or equivalent

PHYS 445 W 3C 0.5
Modern Optics
Basic electromagnetic wave theory. Polarization, reflection, refraction, and dispersion. Temporal coherence and spectra. Spatial coherence and diffraction. Spatial filtering. Lasers, modes and beam propagation. Special topics may include crystal optics and nonlinear effects, holography, fibre optics and communications.
Prereq: PHYS 256

PHYS 454 W 3C 0.5
Quantum Physics 4
Scattering theory. Relativistic wave equations. Quantization of fields.
Prereq: PHYS 434.
PHYS 454 is strongly recommended for students intending to do graduate work

PHYS 462 F 3C 0.5
Modern Dynamics
Canonical transformations, Hamilton-Jacobi theory. Perturbation theory, Hamiltonian chaos, nonlinearity, integrability and the KAM theorem.
Prereq: PHYS 263

PHYS 464 W 3C 0.5
Mathematical Physics 3
Topics in mathematical physics, as for example integral equations, Green's functions and complex analysis.
Prereq: PHYS 364/365
PHYS 475 F 3C 0.5
Astrophysics 3 - Galaxies and Cosmology
Properties and origin of galaxies, quasars, clusters of galaxies, observational cosmology, the big-bang theory, introduction to general relativity and Riemannian geometry, the origin and fate of the Universe.

PHYS 476A-Z 3C 0.5
Astrophysics 4 - Special Topics in Astrophysics
A lecture course offered upon demand and subject to availability of instructors in a particular branch of astrophysics.
Prereq: Consent of instructor

PHYS 480 F 3C 0.5
Radiation Biophysics
The effect of radiation of various kinds on cells and tissues; mechanisms of damage, repair theories; genetic effects, dose-response relationships; cancer radiotherapy (x-rays, electrons, neutrons, protons, negative π mesons); other types of cancer therapies used in conjunction with radiotherapy (e.g. hyperthermia); late effects of radiation; carcinogenesis; risk vs. benefit applications.

PHYS 481 W 3C 0.5
Biophysics of Organ Systems
Transplantation of organs: storage of organs at suboptimal (0 to +1°C) and subzero temperatures, theories of freezing damage (-196°C) to cells and organs, banking of tissues, blood cells and sperm at -196°C; future application. Temperature regulation, hyperthermia. Physics of the cardiovascular system: hydrostatics, hydrodynamics, electrocardiograms. Two of the following topics: medical imaging systems (CAT, MRI, PET, ultrasound), anatomy and physics of respiration, gas transport and gas exchange, applications to diving.

PHYS 490A-Z 3C 0.5
Special Topics in Physics
A lecture course offered in a particular branch of physics, subject to availability of instructor.
Prereq: Registration in Honours Physics or consent of instructor

COURSES NOT OFFERED 1996-97
PHYS 249/249L Introduction to Waves and Diffraction
PHYS 301/302 Physical Techniques for Biologists 1/2
PHYS 324/325 Atomic and Nuclear Physics 1/2

PHYS 368/369 Geophysics 1/2
PHYS 443 Continuum Mechanics
PHYS 453 Advanced Analogue Electronics
PHYS 465 Mathematical Physics 4

Course Descriptions

Planning, Urban and Regional

Undergraduate Officer
N. Pressman, ES1 327, Ext. 2149

Undergraduate Advisor
M.J. Bauer, ES1 310, ext. 3619

Courses not offered in the current academic year are listed at the end of this section.

PLAN 100 F 2C,1T 0.5
Introduction to Urban and Regional Planning Concepts and Techniques.
The development of contemporary planning concepts and principles; the nature, purpose and scope of urban planning; the planning process and decision-making in a democratic society. Methodological aspects of designing a planning program; identification of objectives and constraints, conduct of basic surveys and analysis, plans and policies preparation, evaluation and implementation.
Prereq: Planning students only
Estimated additional cost to student: $30

PLAN 101 W 2C,1T 0.5
Urban and Regional Planning Concepts and Techniques.
Continuation of PLAN 100.
Prereq: PLAN 100, Planning students only
Estimated additional cost to student: $30

PLAN 110 F,W 3std 0.5
Graphics for Planners
Basic instruction in graphic techniques used in planning. Emphasis will be placed on the principles and techniques of graphics for effective visual communication of ideas.
Planning students only
Estimated additional cost to student: $100
Lab fee $15

PLAN 130 W 2C,1T 0.5
Social Concepts for Planners
This course will look at some basic social features of society which planners need to understand in order to work effectively. These features will include: culture, participation in the political and planning processes, socialization, stratification, gender relations, the family, race and ethnicity, bureaucracy and organizations, social movements, and social change. Each feature will be discussed along with how planners can use this knowledge.
Planning students only

PLAN 190 W 2C,1D 0.5
Introduction to Urban and Regional Planning Concepts.
An introduction to contemporary planning ideas for students whose subsequent work might bring them in contact with professional planners. Planning concepts and principles; the development of contemporary planning ideas; the nature, purpose and scope of urban and regional planning; the planning process and decision-making in a democratic society.
Prereq: None. (Not available for credit to Planning students). Restricted to first and second year students in other programs.

PLAN 210 F 2C,2std 0.5
Principles of Environmental Design 1
Design concepts in urban and regional planning illustrated by recent work. The focus is on theoretical concepts and principles.
Prereq: PLAN 110, second year Planning students only
Studio fee: $15
Estimated additional cost to student for supplies: $100

PLAN 211 W 2C,2std 0.5
Principles of Environmental Design
Individual and group projects in planning design in urban and regional settings, using graphic, model and verbal presentations.
Prereq: PLAN 210, second year Planning students only
Studio fee: $15
Estimated additional cost to student for supplies: $100
Course Descriptions
Planning, Urban and Regional

PLAN 220 W 2C,1T 0.5
Regional Planning and Economic Development
The relationship of economic planning to regional planning. Concepts of economic development and models of regional development planning. Case studies and examples are drawn from federal regional development efforts in Canada and/or from Third World nations. Workshops focus on regional planning and development at both a conceptual and empirical level.
Prereq: One of PLAN 100, 190 or consent of instructor

PLAN 250 F, 2C,2L 0.5
The Small Group in the Planning Process
This course will enable students to learn to work more effectively in groups by improving their knowledge of small groups, by improving their ability to work with others in small groups, and by increasing their ability to make groups work better. The course will be a mix of readings, presentations and practical exercises and projects.
Prereq: Planning students only

PLAN 255 W, 2C,2L 0.5
Introduction to Geographic Information Systems (GIS)
Geographic information systems (GIS) are used as an organizing framework for discussion of data management in planning and geography. Topics include: data sources; methods of collection; database management; principles of geographic information systems; applications of geographic information systems in urban and regional analysis, monitoring and evaluation.
Prereq: Planning students only
Antireq: GEOG 255
Lab fee $20

PLAN 280 F 4C 0.5
Rural Planning and Development
Advanced analysis of the process followed for rural planning and development in Canada and other selected countries. Problems and their solutions as noted in various jurisdictions are presented. Emphasis is placed on government approaches to planning and development.
Prereq: Second-year Planning students or consent of instructor

PLAN 281 W 3C 0.5
Concepts and Ideas in Contemporary Urban Planning
An analytical approach to and examination of the relative livability of cities and their constituent elements from an international planning perspective. The evolution of trends and ideas and their influence upon quality-of-life factors such as public space, housing, transportation, etc. will be undertaken through a case study technique utilizing both group and individual assignments.
Prereq: Planning students or consent of instructor

PLAN 285A-Z, F,W,S 3R 0.5
Readings and Research Planning
Special readings and research on planning topics chosen in consultation with an instructor. This course gives the opportunity for supervised individual reading and study of planning or related topics in which the student is particularly interested.
Prereq: PLAN 100 or consent of instructor

PLAN 300 F 2C,1T 0.5
Planning Theory
An introduction to the theoretical principles which have influenced the practice of planning. The course will examine selected contributions to the theory and practice of planning over the twentieth century.
Prereq: Third-year Planning students only

PLAN 302 W,S 3std 0.5
Studio 1
A project oriented course focusing on a contemporary planning problem. Students will synthesize the various planning perspectives pertinent to the problem, for example, environmental, social, design and other concerns.
Prereq: Third-year Planning students only

PLAN 310 F 2C,2L 0.5
Urban Design
A study of the design of the environment in urban and regional contexts through lectures and studio projects. Field trip to Chicago. Approx. cost $170.00 ond.
Prereq: PLAN 210
Estimated additional material cost to student $40 Approximate field trip fee, $170.

PLAN 321 F 3C 0.5
Regional Planning: Program Development and Implementation
An examination of current regional planning programs (objective, policies, strategies and plans), with regard to both their development and implementation in the context of various institutional structures, arrangements and intergovernmental relations. Emphasis will be given to the process of implementing and monitoring programs in different jurisdictional and administrative settings.
Prereq: Planning students or consent of instructor

PLAN 322 S 3C 0.5
Canadian Regional Issues
Selective study of Canadian development issues pertaining to the use of land, urbanization, regional and resource development; issues will be related to structural and functional forces that are characteristic of the major regions of Canada, e.g. Atlantic Provinces, British Columbia.

PLAN 330 W 3C 0.5
Urban Social Planning
This course looks at social planning as a way of tackling urban social problems. Will examine the different types of social planning and the relationship between physical and social planning.

PLAN 340 W 3C 0.5
Conservation in Wildland and Resource Management
Consideration of the constraints and guidelines that an application of the principles of ecology place on the planning and management of resources within natural and semi-natural ecosystems. The theory of this subject will be discussed, including principles of conservation biology, together with the management of wildlife, forestry, and parks.
Prereq: ENV S 200
Cross listed as GEOG 367
Lab Fee $20

PLAN 341 F 3C 0.5
Conservation/Resource Management of the Built Environment
Consideration of the constraints and guidelines that an application of the principles of ecology place on the planning and management of resources within urban spaces and the implications for urban design. The theory and history of this subject will be discussed together with urban accompaniment, the management of waste, urban open space and parks, rehabilitated sites, and environmentally sensitive areas.
Prereq: ENV S 200
Cross-listed as GEOG 368
Lab fee $20
Course Descriptions
Planning, Urban and Regional

PLAN 350 F 2C, 1L 0.5
Social Research Techniques in Planning
Several social research methods appropriately used in planning practice are presented including types of survey research, participant observation, content analysis, and historical-comparative research. Techniques for selecting a method, structuring a research project and analyzing data will be covered. The purposes of coordinate systems, and edit and clean a database. It addresses theoretical issues regarding data models and data structures. Students may receive credit for only one of PLAN 353 and GEOG 318.

PLAN 355 F 3C 0.5
Spatial Data and Spatial Data Bases
This course focuses on building a GIS base. It addresses theoretical issues regarding data models and data structures used in GIS and considers the processing required to input data from a variety of sources, register map layers, transform coordinate systems, and edit and clean a multi-map-sheet, multi-theme data base. Prereq: PLAN 255 Planning students only
Antireq: GEOG 355
Field trip fee $15.
Estimated additional material cost to student $30.

PLAN 361 F 3C 0.5
Planning Processes in the Third World
Focus on centralization, decentralization, local institutional structure, and participatory approaches to regional/community development planning. Use of case studies (seminar method). Concepts, principles, and methods in practice are critically examined. Provides useful guidelines for students interested in overseas volunteer work and other development projects and programs. Prereq: Third-year students in Planning or consent of instructor

PLAN 380 S 3C 1.0
Theory and Practice of Planning in the U.K.
Additional course fee

PLAN 382 W 3C 0.5
Technology in Urban and Regional Planning
The influence of transportation, communications, and water and sewage systems on the form, function and development of cities and regions; the application of this knowledge in urban and regional planning. Prereq: Environmental Studies students only.
Estimated additional cost to student: $20

PLAN 383 F 3C 0.5
Land Development Planning
An examination of planning issues related to the economics and financing of public and private development projects including shopping plazas, residential subdivisions, and new towns. The course focuses on sources of financing, financial programming, effects of planning decisions on land values, and techniques of project evaluation.

PLAN 390 W, S 3C 0.5
Senior Honours Essay Proposal
In this course, the approaches to research and methods which can be used in the Senior Honours Essay will be discussed. Students will then develop a research proposal for the Senior Honours Essay which they will present in class and use as the basis for PLAN 490. The actual research and writing will be carried out in PLAN 490, although in some cases, students may wish to start the research during their third year. Prereq: Third-year Planning students only

PLAN 400 W 3C 0.5
Challenges and Ethics in Planning
Analysis of a current challenge to basic planning assumptions using problem-based learning in small groups; ethics and planning. Prereq: Fourth-year Planning students only

PLAN 401 F 3std 0.5
Studio 2
An advanced project oriented course focusing on a contemporary planning problem. The emphasis will be on synthesizing the various planning perspectives pertinent to the problem, for example, environmental, social, design and other concerns. Prereq: Fourth-year Planning students only

PLAN 403 W 3C 0.5
The Organizational, Political and Economic Contexts of Planning Practice
The course considers the organizational, political and economic context in which planners operate in order to highlight the possibilities and limitations planners face in their professional activity. The arguments unfolding in the course are based on literature originating from the following fields: organizational theory, public administration, political science, land economics, political theory, and planning theory. Prereq: Fourth-year Planning students only

PLAN 404 F 3C 0.5
Organization and Issue Analysis
The social and political dimensions of public sector decision making and policy development as they apply to professional planning practice. The course will take a case study approach. Prereq: Fourth-year Planning students only

PLAN 410 W 3C 0.5
Site Planning
A design studio workshop involving site planning projects which integrate design and the natural processes of landscape and climate. Topics will vary. Prereq: PLAN 210
Estimated additional cost to student: $60

PLAN 413 S 3C 0.5
Design in Planning
Explorations of various aspects of design in planning and the environment—observation, awareness, comprehension, and idea development in the outdoors and in a studio setting. Prereq: PLAN 210, or consent of instructor.
Estimated additional cost to student: $60.
Course Descriptions
Planning, Urban and Regional - Political Science

PLAN 431 F 3C 0.5
Issues in Housing
The first part consists of an overview of housing in Canada considering federal, provincial and municipal policy as well as the housing industry. In the second part, special topics such as homelessness, affordability, environment and other issues are discussed.
Prereq: Consent of instructor
Cross-listed as HLTH 420
Estimated additional cost to student: $20

PLAN 432 W 3C 0.5
Health, Environment, and Planning
A seminar course on the environmental sources and causes of disease and illness, the concepts of health, e.g. medical, scientific, economic, political, etc., the health services and facilities and related technologies and the role and responsibility of (urban and regional) planners in the creation of a more "healthful" environment.
Prereq: Third and fourth year students or consent of instructor
Cross-listed as HLTH 420
Estimated additional cost to student: $20

PLAN 440 F 3C 0.5
Waste Planning
This course will explore, through an examination of various procedures and techniques, the development of strategies and policies which assist in planning for a comprehensive and integrative approach to waste management. The focus is on the applications of contemporary waste management concepts and principles.
Prereq: Third- or fourth-year students or consent of instructor
Field trip fee $15.

PLAN 455 W 3C 0.5
Application of Geographic Information Systems in Planning.
This course focuses on the application of GIS in planning. Emphasis will be on applications that relate to property ownership, land records management, land use and environmental assessment.
Prereq: PLAN 355. Planning students only
Field trip fee $15.
Estimated additional material cost to student $30.

PLAN 471 W 3C 0.5
Planning Law
An analysis of the legal basis for planning in Ontario and the practice of planning law as it affects planners, municipalities, local councils, property owners and residents. The roles of planning board, municipal councils, the Ontario Municipal Board the Ministry of Housing, provincial Cabinet and the Niagara Escarpment Commission in the planning process will be discussed.
Prereq: ENVS 201
Estimated additional cost to student: $40

PLAN 474A-Z F,W,S 3C 0.5
Special Topics in Urban and Regional Planning
These courses allow for additions to the program on a short-term basis, and for the development of future permanent courses.
Prereq: Consent of instructor

PLAN 481 F 3C 0.5
Professional Practice in Planning
This course is intended for undergraduate planning students in their final year who will be starting professional practice on graduation. The course discusses professional responsibility, administrative tools and methods, office organization and similar topics. Concepts and techniques in other courses will be dealt with from the point of view of the practitioner.
Prereq: Fourth-year Planning students or consent of instructor

PLAN 482 W 3C 0.5
International Winter City Development
A multidisciplinary approach which explores and analyzes case studies of human settlements situated in cold-climate regions. The focus is directed toward Canada, USA, Norway, Sweden, Finland and Iceland, although other countries such as Japan, USSR, China may be included.
Prereq: Third- or fourth-year Planning or Environmental Studies students only

PLAN 485A-Z F,W,S 3R 0.5
Projects, Problems and Readings in Planning
Special planning projects and problems chosen in consultation with instructor.
Prereq: Consent of instructor
Student must arrange with a faculty member to serve as advisor prior to registering for this course. The letter designation allows this course to be taken more than once for credit.

PLAN 490 F,W 0.5
Senior Honours Essay
Practical experience in carrying out the research proposal developed in PLAN 390 under the direction of a faculty member.
The results of this research will be presented in a form that meets both professional and academic standards.
Prereq: Fourth-year Planning students only

COURSES NOT OFFERED 1995-97
PLAN 260 Urbanization in the Third World
PLAN 320 Economic and Social Techniques for Regional Planning
PLAN 351 Multivariate Statistics
PLAN 381 Recreation Planning
PLAN 411 Landscape Planning and Visualization
PLAN 412 Elements of Landscape Architecture
PLAN 430 Social Policy Planning

Polish
For courses in Polish see Germanic and Slavic Languages and Literatures.

Political Science
Undergraduate Officer
Robert J. Williams, HH 311, ext. 3642

Courses not offered in the current academic year are listed at the end of this section.

Note
Extensive descriptions of the content of Political Science courses are available in the Department at the time of preregistration.

PSCI 101A F 0.5
Introduction to Politics I
An introduction to the nature of politics and to the conflict of political ideas within the setting of a liberal democracy. The purpose is a clear understanding of conservatism, liberalism and socialism.
Course Descriptions
Political Science

PSCI 101B F 0.5
Introduction to Public Policy
This course is an introduction to the process of policy making. Students will be given an opportunity to examine, in the context of several examples, the factors affecting choices among policy alternatives. In addition, questions about the range of alternatives and the implementation of policies will be addressed.

PSCI 101F W 0.5
Introduction to Third World Politics
An introductory survey of Third World politics and society with an emphasis on Latin America and Africa.

PSCI 102E W 0.5
Political Rights and Obligations
An introductory examination of the idea of individual rights as a limitation on legitimate governmental authority, the possible grounds for such claimed rights, and their relationships to political obligations (duties).

PSCI 102F W 0.5
Introduction to Third World Politics
An introductory survey of Third World politics and society with an emphasis on Latin America and Africa.

PSCI 102K W 0.5
Mass Political Violence
A distinctive social feature of our century is the amount of political violence. Human-made deaths number well over one hundred million. This course will describe and evaluate various theories of political violence.

PSCI 102M W 0.5
Contemporary Issues in Canadian Public Policy
An evaluation of various public policy responses to selected issues, as well as the process of policy-making.

PSCI 102N W 0.5
The Politics of Nationalism and Ethnicity
An examination of the roots of nationalism, and the impact of nationalism and ethnicity on the political process and political change.

PSCI 214 2C,1L 0.5
Quantitative Analysis
An introduction to the use of quantitative methods in Political Science. Only a rudimentary understanding of mathematics is required.
Prereq: Second-year standing
Refer to overlapping content note under Grading Systems

PSCI 225 F 3C 0.5
Classics in Political Thought 1
A selection of some of the most influential texts in the canon of political thought from ancient to modern times.
Prereq: Second-year standing

PSCI 226 W 3C 0.5
Classics in Political Thought 2
An examination of some of the most important themes in political thought in the modern period including contemporary debates. Examples include political obligation, human rights, economic justice, and the extent of personal liberty.
Prereq: Second-year standing

PSCI 231 0.5
Government and Business in Canada
An examination of the political environment in which business functions in Canada with particular emphasis on the constraints and opportunities presented by government intervention in and interaction with the private sector.
Prereq: Second-year standing

PSCI 255 0.5
The Politics of Advanced Industrial Nations 1
A systematic introduction to the political processes of industrial countries. The central focus will be on Western Europe, Japan and North America.
Prereq: Second-year standing

PSCI 256 0.5
The Politics of Advanced Industrial Nations 2
This course will examine a number of ways by which developed countries have tried to overcome contemporary problems. Particular attention will be paid to foreign economic policy.
Prereq: Second-year standing

PSCI 260A 0.5
Canadian Government and Politics 1
An analysis of the political environment in which the Canadian political system operates, including discussion of the Canadian political culture, federalism, the constitution, federal-provincial relations, and the role of the Governor General.
Prereq: Second-year standing

PSCI 260B 0.5
Canadian Government and Politics 2
An analysis of the decision-making machinery of the Canadian political system, including discussion of cabinet government, the role of the House of Commons, interest groups, the electoral system, the party system and voting behaviour.
Prereq: PSCI 260A or consent of instructor

PSCI 264 F 2C 0.5
American Government and Politics
The theory and practice of the American political system as revealed by the institutions and operations of American national government.
Prereq: Second-year standing

PSCI 265 W 2C,1T 0.5
British Government and Politics
An examination of the uniquely British characteristics of the British political system.
Prereq: Second-year standing

PSCI 281 F 2C 0.5
International Politics
This course studies the transformation of the international system stressing East-West, Rich-Poor, and North-South perspectives and interactions.
Prereq: Second-year standing. Fourth-year students require consent of instructor

PSCI 282 W 2C 0.5
Foreign Policy
This course studies the roots of foreign policy behaviour of selected western and non-western (particularly Asian) states.
Prereq: PSCI 281 or consent of instructor. Fourth-year students require consent of instructor

PSCI 291 F, S 3C 0.5
The Canadian Legal Process
An analysis of the manner in which the Common Law functions, together with an examination of the structure and jurisdiction of the Canadian court systems. Taught by a member of the legal profession.
Prereq: Second-year standing and above

PSCI 292 W,S 3C 0.5
Issues in Canadian Criminal Law
Rational principles and concepts applicable to current emotional criminal issues are analysed by a practising crown attorney, for example, abortion, euthanasia, pornography, seat belts, marijuana, police power, civil rights, criminal trials, jury, capital punishment, prisons, etc.
Prereq: Second-year standing and above
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PSCI 315 0.5  
Research Design in Political Science  
Introduction to the logic and limitations of experimental and non-experimental research designs. Selected studies in political science are examined to demonstrate how plausible threats to validity are made less plausible with appropriate design and data analysis.  
Prerequisites: PSCI 214 or consent of instructor

PSCI 221 F 3L 0.5  
Marxist Theory  
A basic introduction to the political and social thought of Karl Marx from the early writings to Das Kapital.

PSCI 322 W 3L 0.5  
Marxism after Marx  
A selective study of developments in Marxist theory and political movements after Marx.

PSCI 324 0.5  
Contemporary Political Philosophy  
This course provides an introduction to, and critical assessment of, the major schools of thought which dominate contemporary debates in political philosophy. Ideas of justice, freedom and community will be examined.  
Prerequisites: Consent of instructor

PSCI 331 F 2C 0.5  
Public Administration 1  
An introduction to the principles and practices of administration in the public sector in Canada including studies of administrative structures, processes and norms, bureaucracy, regulation, crown corporations, public personnel administration, motivation and leadership.  
Prerequisites: PSCI 260A and 260B or consent of instructor

PSCI 332 W, S 2S 0.5  
Public Administration 2  
Selected issues in public administration and policy with particular reference to Canada. Topics include: bureaucratic power; ethical conduct and accountability in the public service; professional, economic and social regulation; motivation and leadership in the public sector.  
Prerequisites: PSCI 331 or consent of instructor

PSCI 333 W 0.5  
Administrative Law  
A study of Canadian administrative law including the delegation of political power to various administrative agencies which play a prominent role in controlling contemporary social and economic life. The supervisory role of the courts will also be examined.  
Prerequisites: PSCI 331 or consent of instructor

PSCI 341 F 2C 0.5  
Provincial Politics  
A comparative analysis of the political systems of the Canadian provinces.  
Prerequisites: PSCI 260A and/or 260B

PSCI 342 W 2C 0.5  
Politics in Quebec  
A seminar dealing with the political and social development of Quebec. The emphasis will be on the problems and issues of contemporary Quebec.  
Prerequisites: PSCI 260A and 260B or consent of instructor

PSCI 343 F 3C 0.5  
Canadian Municipal Government  
A study of the assumptions, structures and performance of municipal government in Canada with reference to metropolitan and regional structural innovations (particularly in Ontario).  
Prerequisites: Third-year standing and above with at least one term course in Political Science

PSCI 344 W 3C 0.5  
The Politics of Local Government  
A study of the political process in selected Canadian local governments focusing on citizen participation, internal decision-making, leadership, and the allocation of power.  
Prerequisites: PSCI 343 or consent of instructor

PSCI 350A F 3C 0.5  
The Politics of the Developing Areas 1  
An examination of international and national sources of poverty in the Third World. Special attention is paid to Third World development policies. Topics include multinational corporations, foreign debt, industrialization and Green Revolution.  
Prerequisites: Third-year standing and above

PSCI 350B W 3C 0.5  
The Politics of the Developing Areas 2  
An analysis of Third World political structures and processes. Topics include the colonial and post-colonial state, political parties, the military and revolutions. The case of Central America is examined in greater detail.  
Prerequisites: Third-year standing and above

PSCI 351 F 2S 0.5  
Federal and Consociational Political Systems  
Federal and Consociational Political Systems are examined with emphasis on processes of political integration, patterns of conflict resolution, and the impact of modernization on political development.  
Prerequisites: Consent of instructor

PSCI 353 F 0.5  
Canadian Constitutional Law  
An introduction to the nature and basic principles of constitutional law. This course will deal especially with the distribution of powers in the Canadian federation, and its evolution, notably by judicial decision. Leading cases will be examined.  
Prerequisites: PSCI 260A and 260B or 260A and consent of instructor

PSCI 355A F 0.5  
Politics in the Soviet Successor States 1  
An introduction to the study of political processes in the new states which emerged after the disintegration of the Soviet Union.  
Prerequisites: Third-year standing or consent of instructor  
(Formerly PSCI 352A)

PSCI 355B W 0.5  
Politics in the Soviet Successor States 2  
An examination of policy-making and implementation in the policy areas which pose the greatest challenges to the Soviet successor states.  
Prerequisites: PSCI 355A or consent of instructor  
(Formerly PSCI 362B)

PSCI 372 W 0.5  
Political Parties and Interest Groups  
An examination of the roles of interest groups and political parties in influencing government policy. The origins, tactics, structures and impact of the largest of these two avenues of political participation will be compared. Discussion will focus on Canadian examples.  
Prerequisites: Third-year standing or consent of instructor
PSCI 380A F 0.5
World Politics
An examination of the structure of the world capitalist system concentrating upon war and peace between core states from 1815 until the present. A number of classic theories of imperialism are considered.
Prereq: Third-year standing and above

PSCI 381 W 0.5
Foreign Policies of South Asian States
The course (1) defines the central issues in each country's foreign policy; (2) discusses the factors which shape the decision-making processes; and (3) evaluates the impact of these policies on regional and international thinking.

PSCI 382 W 0.5
Politics of Canadian Foreign Policy
An examination of issues and the foreign policy-making process in Canada. Special attention is paid to the domestic context of foreign policy.

PSCI 384 0.5
Foreign Policies of Select Middle East States
An examination of the key determinants and decision-making processes of the foreign policies of Israel, Egypt, Iran, and Saudi Arabia.

PSCI 390-398 0.5
Special Studies
From time to time courses of special study may be added to the program at the third-year level. Students wishing to take such courses should consult the Department's Undergraduate Officer.

PSCI 421 W 0.5
Justice and Gender
Theories of justice are concerned with the distribution of the basic goods of society - money, power, status, leisure, and so on. One would expect that they would be of particular interest to feminist theory, which is also concerned with the distribution of these goods. This course will consider how the gender system fares from the standpoint of liberal justice, and to what extent the promises of liberal justice can be used to overturn the unequal treatment of women. The issues of equality and difference will also be explored.

PSCI 422 0.5
Conflict of Political Ideas in Canada
A course designed to introduce students to some of the major ideas about politics and democracy which Canadians have developed in the course of this century. Conservatism, liberalism, socialism, agrarian protest politics, and nationalism will be considered in their historical context. In particular, the course will address the issues of democracy and industrialization in Canada and will examine closely the conflicting liberal, socialist and conservative notions of progress and political community.

PSCI 423 0.5
Democratic Theory and Practice
An examination of the justification and limitations of democratic government, as well as more practical applications of democratic theory to the workplace, judicial review, legal obligations, etc. The focus will be on problems of democratic theory and practice.
Prereq: Fourth-year standing or consent of instructor

PSCI 426 0.5
Selected Subjects in Political Philosophy
A selective treatment of basic themes in political philosophy in the modern and pre-modern times.
Prereq: PSCI 225, 226, 323, or 324, or consent of instructor

PSCI 427 F 0.5
Special Topics in Political Philosophy
A selective examination of basic problems in political philosophy in the modern and pre-modern periods.
Prereq: PSCI 225, 226, 323, or 324 or consent of instructor

PSCI 428 F 0.5
State and Economic Life
An analytical and comparative study of the growth of government intervention in the economic process, and of the development of the welfare state.
Prereq: Consent of instructor

PSCI 431 F 0.5
Canadian Public Policy
An examination of the way that policy processes and institutions have responded to the problems of governing, especially at the federal level in Canada.
Prereq: PSCI 260A, 260B, 331 or consent of instructor

PSCI 434 F 0.5
Comparative Public Administration
A comparative survey of public administration in both developed and developing areas. The focus is on the rise of the administrative state in a variety of cultural and political contexts.
Prereq: PSCI 331 or consent of instructor

PSCI 435 F 0.5
The Politics of Canadian Resource Development
An examination of various public policies designed to promote the exploitation and export of Canada's natural resources with an emphasis on the economic, political, social and environmental implications of these developmental strategies.
Prereq: Fourth-year standing or consent of instructor

PSCI 442 W 0.5
Politics in Ontario
A critical examination of the distinctive elements of government and politics in the Province of Ontario.
Prereq: PSCI 260A and 260B or consent of instructor

PSCI 443 0.5
Politics in Western Canada
A critical examination of the distinctive elements of government and politics in the provinces of Manitoba, Saskatchewan, Alberta and British Columbia.
Prereq: PSCI 260A or consent of instructor

PSCI 451 F 0.5
Comparative Political Systems: Eastern Europe
A comparative examination of political institutions and processes in the states of Eastern Europe.
Prereq: Fourth-year standing or consent of instructor

PSCI 453 0.5
Comparative Politics of Latin America
A study of the social and political implications of Latin American economic development strategies. The focus is on the recent shift to free market policies and the rise of new social and political actors.
Prereq: Fourth-year standing or consent of instructor

PSCI 454 0.5
Rural Politics and Development
An analysis of the causes and political implications of rural poverty in Latin America, Africa and Asia. Special attention is paid to the process of agricultural modernization and peasant political responses to it.
Prereq: Fourth-year standing or consent of instructor
Course Descriptions

Political Science

Psychology

PSCI 481 F 0.5
Problems in Canadian Politics 1
Selected aspects of Canadian national politics.
Prereq: Fourth-year standing or consent of instructor

PSCI 482 W 0.5
Problems in Canadian Politics 2
Selected aspects of Canadian provincial politics.
Prereq: Fourth-year standing or consent of instructor

PSCI 472 0.5
Women and Public Policy
An examination of public policy from the perspective of women's experiences and needs. The course reviews policy developments in Canada and elsewhere, and reflects on the significance of feminist approaches to public policy.

PSCI 473 2S 0.5
Voting Behaviour
Prereq: PSCI 214 or consent of instructor

PSCI 479 2S 0.5
Senior Research Seminar: Violence in the Political Process
Politics can be brutal. This seminar deals with riot, revolt, revolution and state-directed mass murder.
Prereq: Third- or fourth-year standing

PSCI 481 2S 0.5
Research Seminar on World Politics
An examination of research on the causes and consequences of interstate warfare.
Prereq: PSCI 360 or consent of instructor

PSCI 483 F 3S 0.5
Power Politics and World Order Studies
This theory course examines the evolution of the international system; the capacity of the system of states to cope with the demands on it; meanings of international and regional power and order. There is an emphasis on the international politics of regions.
Prereq: Fourth-year standing or consent of instructor

PSCI 484 F 3S 0.5
Contemporary Strategies: Theories and Policies
The course examines strategic studies and their premises, the evolution of strategic thinking, the role of national policies of military power. Strategic concepts are studied with specific reference to military policies of regional powers.
Prereq: Fourth-year standing or consent of instructor

PSCI 485 W 3S 0.5
Selected Topics in International Political Economy
Contemporary perspectives and issues in international political economy, with particular attention to advanced industrial countries. Topics include political/economic cooperation, the politics of trade, and the politics of adjustment.
Prereq: Fourth-year standing or consent of instructor

PSCI 490-498 0.5 each
Special Subjects
From time to time courses of special study may be added to the program at the fourth-year level. Students wishing to add such courses should consult the Department's Undergraduate Officer.

PSCI 499A/B F,W 0.5/0.5
Special Honours Essay
Students wishing to undertake a senior honours essay in their fourth year should consult the Department's Undergraduate Officer.
A letter grade for PSCI 499A will be submitted only after the completion of PSCI 499B.

COURSES NOT OFFERED 1996-97
PSCI 102D The Political Process in the Modern Democracies
PSCI 102E Political Rights and Obligations
PSCI 264 American Government and Politics
PSCI 288 British Government and Politics
PSCI 384 Foreign Policies of Select Middle East Studies
PSCI 422 Conflict of Political Ideas in Canada
PSCI 443 Politics in Western Canada
PSCI 473 Voting Behaviour
PSCI 479 Senior Research Seminar: Violence in the Political Process
PSCI 481 Research Seminar on World Politics

Psychology

Undergraduate Office
H. Smith, PAS 4053, ext. 2819

Notes
1. See departmental course listing for specific terms for the current course offerings.

PSYCH 101 F,W,S 3C 0.5
Introductory Psychology
A general survey course designed to provide the student with an understanding of the basic concepts and techniques of modern psychology as a behavioural science.
Prereq: PSYCH 101
Also offered at St. Jerome's College

PSYCH 207 F,W,S 3C 0.5
Cognitive Processes
An examination and evaluation of selected topics dealing with human learning, thinking, concept formation, memory and language.
Prereq: PSYCH 101
Priority enrolment for Psychology majors

PSYCH 211 F,W,S 3C 0.5
Developmental Psychology
An examination of the process and factors of human development.
Prereq: PSYCH 101
Priority enrolment for Psychology majors
Also offered at St. Jerome's College

PSYCH 212 F,W 3C 0.5
Educational Psychology
A consideration of the main variables affecting learning in the classroom with special focus upon the conditions essential to efficient learning.
Prereq: PSYCH 101
Also offered at St. Jerome's College

PSYCH 213 F,W 3C 0.5
Exceptional Children
Educational problems associated with mental retardation, emotional disturbances, sensory and physical impairments, and intellectual giftedness.
Prereq: PSYCH 101
Course Descriptions
Psychology

PSYCH 217 3C 0.5
Aging and Basic Psychological Processes
What processes change as adults age? Is the idea of age-related decline functioning a myth? The course deals with processes such as memory, perception, intelligence, and problem-solving. It also outlines the problems in interpreting developmental research.
Prereq: PSYCH 101
Cross-listed as GERON 217 and HLTH 217

PSYCH 218 W 3C 0.5
Aging, Dying and Death
An examination of the social psychological aspects of aging and the traditional and recent literature relating to various views on the reality of death in human life. Therapy with dying individuals is reviewed and evaluated.
Prereq: PSYCH 101 or permission of instructor
Cross-listed as GERON 218 and HLTH 218
Offered at St. Jerome's College

PSYCH 231 W 3C 0.5
The Psychology of Religious Experience
Approaches of traditional psychological theories toward phenomena of religious experience, mysticism, and prayer are examined. The psychological process of creating and naming 'gods' is considered as well as comparisons among altered states of consciousness including some forms of prayer.
Prereq: PSYCH 101
Offered at St. Jerome's College

PSYCH 236 F,W 3C 0.5
A Psychological Analysis of Human Sexuality
This course will examine psychological and social psychological theories and empirical investigations of human sexuality.
Prereq: PSYCH 101 or permission of instructor
Antireq: SMF 204 (formerly SMF 201A)
Offered at St. Jerome's College

PSYCH 253 F,W,S 3C 0.5
Social Psychology
An introduction to the scientific study of social behaviour and social influences on behaviour. Theories and research on such topics as attitude change and persuasion, stereotypes and prejudice, conformity and obedience to authority, altruism, conflict, attraction and love will be introduced.
Prereq: PSYCH 101
Priority enrolment for Psychology majors
Cross-listed as PSYCH 220R
Also offered at St. Jerome's College

PSYCH 256 3C 0.5
Introduction to Cognitive Science
Cognitive Science is the interdisciplinary study of mind and intelligence. This course will draw on philosophy, psychology, artificial intelligence, linguistics, neuroscience, and anthropology to address central questions about the nature of thinking. Topics discussed will include mental representation, computational models of mind, and consciousness.
Cross-listed as PHIL 256

PSYCH 257 F,W 3C 0.5
Psychopathology
This course will examine the major categories of abnormal or deviant behaviour such as personality, mood, and psychological disorders, schizophrenia, anxiety, panic states, post-traumatic stress disorder, obsessive-compulsive behaviour, autism, and substance abuse. Clinical interventions and treatment outcomes will also be considered.
Prereq: PSYCH 101
Priority enrolment for Psychology majors
Cross-listed as PSYCH 323R
Also offered at St. Jerome's College (Formerly PSYCH 357)

PSYCH 261 F,W 3C 0.5
Physiological Psychology
Introduction to brain, basic physiological processes, and their roles in behaviour. Course covers sensing and perceiving; neural bases of action; motivation; learning and memory; and consciousness. Both experimental and clinical data are considered.
Prereq: PSYCH 101 or permission of instructor
Priority enrolment for Psychology majors

PSYCH 292 F 4C,1.5L 0.5
Basic Data Analysis
An introduction to the logic and methods of descriptive and inferential statistics with emphasis on application in Psychology. Topics covered include measures of central tendency and variability, distributions, the normal distribution, z-scores, hypothesis testing, probability, chi-square tests, t-tests, power, and correlation and regression.
Prereq: PSYCH 101 and second-year standing in General or Honours Psychology
Refer to overlapping content note under Grading System

PSYCH 304 F,W 3C 0.5
Thinking and Deciding
Cognitive processes underlying human reasoning, problem solving, judgment, and decision making will be examined. Much of the discussion focuses on current models of these processes, and on the comparison between how rational people (or machines) should ideally behave and how they actually behave in everyday problem solving and decision making.
Prereq: PSYCH 207
This course counts as an Advanced Psychology Course (Natural Science) for Psychology majors
Priority enrolment for Psychology majors

PSYCH 306 F,W 3C 0.5
Perceptual Processes
An examination of the basic mechanisms of vision and hearing. Topics include the measurement of thresholds and perceptual attributes, the anatomy and physiology of the eye, ear, and neural pathways mediating vision and hearing, including higher centers in the brain. The perception of brightness, colour, objects, space, pitch, location, speech, and music will be considered, as will the role of learning and attention.
Prereq: PSYCH 207 or 261 or permission of instructor
Antireq: PSYCH 206
This course counts as an Advanced Psychology Course (Natural Science) for Psychology majors
Priority enrolment for Psychology majors
PSYCH 307 F,W 3C 0.5
Human Neuropsychology
An introduction to current human experimental neuropsychology. The course will review evidence for brain-behaviour interactions obtained from studies of human brain damage and from investigations of the normal brain. Topics such as the representation of language, hemispheric specialization, memory, spatial ability, dyslexia, movement disorders and affective disorders will be considered.
Prereq: One of PSYCH 206, 207, 261, or KIN 356
This course counts as an Advanced Psychology Course (Natural Science) for Psychology majors
Priority enrolment for Psychology majors

PSYCH 308 F,W 3C 0.5
Psychology of Reading
An introduction to the psychology of reading with emphasis on 1) how adults read acquired dyslexias consequent to brain damage, 3) computational models of word recognition, and 4) the role of attention and eye movements in reading.
Prereq: PSYCH 207
This course counts as an Advanced Psychology Course (Natural Science) for Psychology majors
Priority enrolment for Psychology majors

PSYCH 311 F,W 3C 0.5
Biological Bases of Human Development
The development of human behaviour is influenced by genetic, embryological, pre-natal, and postnatal environment. In this course we will review some of the biological factors that guide sensory, motor, cognitive, and temperamental processes in early infancy. Recent research which links biological to psychological development will be reviewed and evaluated.
Prereq: PSYCH 211
This course counts as an Advanced Psychology Course (Natural Science) for Psychology majors
Priority enrolment for Psychology majors

PSYCH 312 F,W 3C 0.5
Learning Disabilities
A critical examination of the concept of learning disability and of current issues in the assessment and remediation of learning problems.
Prereq: PSYCH 211, 212, or 213
Prereq: PSYCH 180
This course counts as an Advanced Psychology Course (Social Science) for Psychology majors
Priority enrolment for Psychology majors
Also offered at St. Jerome's College

PSYCH 314 3C 0.5
Cognitive Development
A consideration of psychological research and theory concerned with the origins and development of cognition in humans. This course traces the development of such cognitive skills as problem solving, memory, concept formation, language, and other symbolic capacities from birth to adulthood. Cultural influences on cognitive development will also be considered.
Prereq: PSYCH 207 or 211
This course counts as an Advanced Psychology Course (Natural Science or Social Science) for Psychology majors
Priority enrolment for Psychology majors

PSYCH 315 W 3C 0.5
Psychology of Adolescence
A study of the psychological processes in the second decade of human development. Consideration is given to such areas as intellectual, emotional and social growth, and identity formation. Current concepts, issues, and research are stressed.
Prereq: PSYCH 211
This course counts as an Advanced Psychology Course (Social Science) for Psychology majors
Priority enrolment for Psychology majors
Also offered at St. Jerome's College
(Formerly PSYCH 214)

PSYCH 317 F,W 3C 0.5
The Emotionally Disturbed Child
An examination of children's psychological disorders from several major perspectives with an emphasis on current research findings. Theoretical and clinical issues are considered.
Prereq: PSYCH 211
This course counts as an Advanced Psychology Course (Social Science) for Psychology majors
Priority enrolment for Psychology majors
Offered at St. Jerome's College

PSYCH 318 F 3C 0.5
Psychosexual Organization
A detailed examination of concepts related to the formation of gender identity and psychosexual orientation. The 'Nature-Nurture' debate will be explored as well as gay and lesbian identity and consciousness throughout the life cycle.
Prereq: PSYCH 211 or permission of instructor
This course counts as an Advanced Psychology Course (Social Science) for Psychology majors
Priority enrolment for Psychology majors
Offered at St. Jerome's College

PSYCH 334 F,W 3C 0.5
Theories of Individual Counselling Psychology
An introduction to the methods, theories and problems in individual Counselling Psychology.
Prereq: PSYCH 101
Antireq: Students who have taken both PSYCH 336 and PSYCH 344 may not receive credit for this course
Offered at Renison College and St. Jerome's College
Priority in Renison College section will be given to Social Development Studies majors

PSYCH 335 3C 0.5
Personality and Behaviour Change
Forms of psychological intervention that produce important changes in the way people think, feel and behave including psychoanalysis, behaviour therapy, brainwashing, cult conversions, deprogramming, hypnosis, biofeedback and meditation.
Prereq: PSYCH 101

PSYCH 336 W 3C 0.5
Clinical Intervention
An exploration of some of the key ways in which psychology addresses the realm of intervention. Included will be prevention and treatment models of intervention.
Prereq: PSYCH 257 or permission of instructor
Antireq: Students who have taken both PSYCH 334 and 344 may not receive credit for this course
This course counts as an Advanced Psychology Course (Social Science) for Psychology majors
Priority enrolment for Psychology majors
Offered at St. Jerome's College

PSYCH 337 F 3C 0.5
The Psychology of the Healing Process
This course will examine psychological dimensions in the experience of healing. From research on the effectiveness of the 'Placebo effect,' to contemporary studies detailing relatively new mind-body interactions, theory and research interact with some surprising results. By necessity, this study will be multidisciplinary, taking into account medical, psychological, and spiritual traditions in the healing arts.
Prereq: PSYCH 257
This course counts as an Advanced Psychology course (Social Science) for Psychology majors
Offered at St. Jerome's College
PSYCH 338 F,S 3C 0.5  
Organizational Psychology  
Survey of organizational, group, and individual processes involved in work motivation, group dynamics, leadership, organizational climates and organizational culture.  
Prereq: PSYCH 101  
Antireq: M SCI 211

PSYCH 344 F 3C 0.5  
Theories of Group Counselling  
Contemporary theories on the therapeutic application of group processes. Issues such as group development, leader skills and training, selection of members, problems encountered in both process and outcome research will be examined.  
Prereq: PSYCH 101  
Antireq: Students who have taken both PSYCH 336 and 334 may not receive credit for this course  
Offered at St. Jerome's College

PSYCH 353 F or W 3C 0.5  
Social Cognition  
This course examines how people make sense of their social world: How they perceive, represent, interpret, and remember information about themselves and about other individuals and groups. Topics include representation, recall, and use of social knowledge, controllability of thought processes, effects of feelings and desires, stereotype activation and use, and cultural influences.  
Prereq: PSYCH 253. PSYCH 207 is also recommended  
This course counts as an Advanced Psychology Course (Natural Science or Social Science) for Psychology majors  
Priority enrolment for Psychology majors

PSYCH 354 F,W 3C 0.5  
Interpersonal Relations  
A psychological analysis of social interaction. The development of interpersonal attraction from first impressions to long-term relationships. The roots of hostility, conflict and communication problems.  
Prereq: PSYCH 253  
This course counts as an Advanced Psychology Course (Social Science) for Psychology majors  
Priority enrolment for Psychology majors  
Cross-listed as PSYCH 221R  
(Formerly PSYCH 254)  
Also offered at St. Jerome's College

PSYCH 355 3C 0.5  
Personality Theory  
This course presents the major approaches to understanding personality, which underlies much of the work in clinical psychology. Current research and theorizing about personality differences will be examined and applied to real life cases and experiences.  
Prereq: PSYCH 101  
Cross-listed as PSYCH 322R

PSYCH 361 (A-Z) 3C 0.5  
Special Topics in Advanced Physiological Psychology  
This course continues and extends PSYCH 261. Departmental listings of topics should be consulted.  
Prereq: PSYCH 261 or permission of instructor  
This course counts as an Advanced Psychology Course (Natural Science) for Psychology majors  
Priority enrolment for Psychology majors

PSYCH 363 (A-Z) - 366 (A-Z) 3C 0.5  
Special Subjects  
These courses will be offered at different times as announced by the Department.  
Consult departmental listings for topics and prerequisites.

PSYCH 391 W 3C,1L 0.5  
Advanced Data Analysis  
Aimed at developing an understanding of the use and interpretation of statistics in complex research designs. Emphasis on analysis of variance and multiple comparison techniques to interpret the results of multi-factor experiments. The importance of power in factorial designs will be discussed. The course includes a computer component that ties the use of a statistical package to the topics discussed in lectures.  
Prereq: PSYCH 292 and second-year standing in Honours Psychology  
Coreq: PSYCH 291  
Refer to overlapping content note under Grading Systems

HONOURS RESEARCH COURSES

PSYCH 392-398  
Research courses may include research proposals, group and/or individual projects (e.g., "hands on" lab experience and data collection), research reports, critiques of published research, journals of research ideas, individual and/or group presentations, class discussions, one or two midterms, and final exams.  
These courses are restricted to students in third and fourth year of Honours Psychology and Make-Up Psychology.  
Individual titles and prerequisites are listed below.

PSYCH 392 W,S 2S,2L 0.5  
Psychological Measurement  
An introduction to the logic of measurement in Psychology with special emphasis placed on the use of psychological tests to assess individual and group differences.  
Prereq: PSYCH 391

PSYCH 393 F,W 2S,2L 0.5  
Research in Developmental Psychology  
Prereq: PSYCH 211 and 391  
(PSYCH 391 acceptable as a corequisite)

PSYCH 394 F,W 2S,2L 0.5  
Research in Perceptual and Cognitive Processes  
Prereq: PSYCH 207 and 391  
(PSYCH 391 acceptable as a corequisite)

PSYCH 395 F,W 2S,2L 0.5  
Research in Social Psychology  
Prereq: PSYCH 253 and 391  
(PSYCH 391 acceptable as a corequisite)

PSYCH 396 F 2S,2L 0.5  
Research in Biopsychology  
Prereq: PSYCH 261 and 391  
(PSYCH 391 acceptable as a corequisite)

PSYCH 397 F,W 2S,2L 0.5  
Research in Personality and Psychopathology  
Prereq: PSYCH 257 or 355 and 391  
(PSYCH 391 acceptable as a corequisite)

PSYCH 398 F,W 2S,2L 0.5  
Research in Learning and Motivation  
Prereq: PSYCH 203 or 207 or 261 or 271 and 391  
(PSYCH 391 acceptable as a corequisite)

PSYCH 440A/B F,W 3C,3C 0.5/0.5  
Group and Individual Counselling  
The practice of counselling in terms of current psychological theories and research. The demonstration and development of these concepts are aided by personal participation, exercises, role play and videotape simulation.  
Prereq: Two of PSYCH 334, 336, and 344  
Offered at St. Jerome's College  
A grade for PSYCH 440A will be submitted only after the completion of PSYCH 440B  
This course counts as an Advanced Psychology Course (Social Science) for Psychology majors  
Priority enrolment for Psychology majors
PSYCH 460 0.5  
**Research Apprenticeship**

This course is only open to Honours Psychology students who are enrolled in PSYCH 495. This course involves an unpaid apprenticeship in a faculty research program combined with regular seminar meetings. The apprenticeship will require no more than eight hours per week. Students will be assigned duties that will enable them to acquire new skills and understanding of the research process. Specific duties will be agreed to by the faculty member and student. A document outlining this agreement must be submitted to the Psychology Undergraduate Office for approval. The course is offered on a credit/no credit basis. Paid or unpaid co-op placements are not acceptable for credit in this course.  

Prereq: PSYCH 391 and at least one Research Course.  

This course cannot be used to meet the Advanced PSYCH Course Requirement.

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PSYCH 486 0.5  
**Applied Apprenticeship**

For Honours Psychology students interested in a career in Applied Psychology. The course involves an unpaid apprenticeship in an industrial, medical, government, or other applied setting combined with regular seminar meetings. The apprenticeship will require no more than eight hours per week. The course is offered on a credit/no credit basis. Paid or unpaid co-op placements are not acceptable for credit in this course.  


This course cannot be used to meet the Advanced PSYCH Course Requirement.

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PSYCH 498 (A-Z) 0.5  
**Directed Studies in Special Topics**

This is an opportunity for independent experimental research or extensive reading. Before a student can register for this course, a proposal outlining the course, e.g., area of study, method of evaluation, etc., as agreed to by both the student and the professor, must be approved by the Psychology Undergraduate Officer. A maximum of one term course in directed studies may be used toward the Psychology electives required for the General Program and a maximum of two term courses towards the Psychology electives required in the Honours Psychology Program. A 480 project may be used to fulfill either an Honours Seminar or an Advanced Psychology requirement in the Honours Program.  

Prereq: Open to third- and fourth-year Psychology students who have a cumulative Psychology average of 75% or better.

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PSYCH 499A/B/C 0.5/0.5/0.5  
**Honours Thesis**

Each student will work under the direction of a member of the department on a research project. The project will involve an empirical study and/or a critical integrative review of some issue or issues in the research literature of Psychology. The result of this investigation will be presented by the student in the form of a thesis which will be examined critically by members of the department. Although a thesis supervisor normally comes from within the Psychology Department, approval for other thesis supervisors may be sought from the course co-ordinator. Students may choose to begin 499 in their 3B or 4A term.  

Prereq: PSYCH 391 and one Research Course.  

This course cannot be used to meet the Advanced PSYCH Course Requirement.
The following courses are administered by Renison College. See Social Development Studies for course descriptions. Since these courses are intended primarily for students in the Social Development Studies program, students planning a General or Honours Psychology program must consult their faculty advisor concerning Psychology major credit for these courses.

PSYCH 120R 3C 0.5
Introductory Psychology

PSYCH 121R 3C 0.5
Introductory Psychology (Special Topics)

PSYCH 220R 3C 0.5
Social Psychology
Cross-listed as PSYCH 253

PSYCH 221R 3C 0.5
Interpersonal Interaction
Cross-listed as PSYCH 354
(Formerly PSYCH 254)

PSYCH 322R 3C 0.5
Personality Theory
Cross-listed as PSYCH 355

PSYCH 323R 3C 0.5
Abnormal Psychology
Cross-listed as PSYCH 257
(Formerly PSYCH 357)

PSYCH 367R-369R
Special Topics in Psychology

PSYCH 398R/399R R 0.5
Independent Study
Open to senior Social Development Studies majors only

GROUP 1 COURSES

PMATH 330 F,W,S 3C 0.5
Introduction to Mathematical Logic 1
Prereq: MATH 235, or CS 212 and MATH 126
PMATH 432 may be substituted for PMATH 330 whenever the latter is a requirement in an Honours program.

PMATH 331 F,W 3C 0.5
Real Analysis
Topoogy of Rn, continuity, norms, metrics, completeness, Fourier series, and applications, for example, to ordinary differential equations, the heat problem, optimal approximation, the isoperimetric inequality.
Prereq: MATH 237
Antireq: PMATH 351
PMATH 352 may be substituted for PMATH 331 whenever the latter is a requirement in an Honours program.

PMATH 332 W,S 3C 0.5
Complex Analysis
Complex numbers; continuity, differentiability, analyticity of functions; the Cauchy-Riemann equations; solution of Laplace’s equation; conformal mapping by elementary functions, and applications; contour integration, the Cauchy and allied theorems; Taylor and Laurent expansions, uniform convergence and power series; the residue calculus, and applications.
Prereq: MATH 237
Antireq: PMATH 351
Cross-listed as AM 332
PMATH 352 may be substituted for PMATH 332 whenever the latter is a requirement in an Honours program.

GROUP 2 COURSES

PMATH 334 W,S 3C 0.5
Introduction to Rings and Fields
Rings, ideals, factor rings, homomorphisms, finite and infinite fields, polynomials and roots, field extensions, algebraic numbers, and applications, for example, to Latin squares, finite geometries, geometrical constructions, error-correcting codes.
Prereq: MATH 235
Credit will be granted for at most two of PMATH 334, 336 and 343.
Credit cannot be obtained for PMATH 334 after credit has been granted for PMATH 343.

PMATH 335 F,S 3C 0.5
Introduction to Group Theory
Groups, subgroups, normal subgroups, quotient groups, morphisms. Products of groups. Permutation groups. Symmetry groups.
Prereq: MATH 235
Credit will be granted for at most two of PMATH 334, 336 and 343.
Credit cannot be obtained for PMATH 336 after credit has been granted for PMATH 343.

PMATH 340 W 3C 0.5
Elementary Number Theory
An elementary approach to the theory of numbers: the Euclidean algorithm, congruence equations, multiplicative functions, solutions to Diophantine equations, continued fractions, and rational approximations to real numbers.
Prereq: MATH 126
Antireq: PMATH 440
PMATH 440 may be substituted for PMATH 340 whenever the latter is a requirement in an Honours program.

PMATH 343 F,W 3C 0.5
Abstract Algebra 1
Groups: examples of groups, permutation groups, groups of low order, homomorphisms, subgroups and normal subgroups, factor groups, Lagrange’s theorem, Cayley’s theorem, Abelian groups, direct products, the structure of finitely generated Abelian groups, applications. Rings: ideals, quotient rings, homomorphisms, domains, primes, maximal ideals and fields, field of fractions, Euclidean domains, principal ideal domains, unique factorization, polynomial extensions or unique factorization domains, applications.
Prereq: MATH 235
Credit will be granted for at most two of PMATH 334, 336 and 343.
Credit cannot be obtained for PMATH 334 or 336 after credit has been granted for PMATH 343.
Course Descriptions
Pure Mathematics

PMATH 344 F,S 3C 0.5
Abstract Algebra 2
- Field theory, examples of fields, field of fractions, algebraic extensions, construction of roots, separable extensions, splitting fields, classification of finite fields. Finite non-Abelian groups, Sylow theorems. Introduction to Galois theory.
  Prereq: PMATH 343, or PMATH 334 and 335 with consent of instructor

PMATH 351 F,S 3C 0.5
Real Analysis
- Metric spaces, compactness, completeness, continuity, convergence, integration, function spaces.
  Prereq: MATH 237, or consent of instructor
  Antireq: AM/PMATH 331

PMATH 352 W 3C 0.5
Complex Analysis
- Analytic functions, Cauchy's theorem, Laurent series, the residue theorem, integral evaluation, Möbius and other conformal maps.
  Prereq: MATH 237. PMATH 351 is strongly recommended

PMATH 353 W 3C 0.5
Fourier Analysis
- Fourier analysis: A descriptive introduction to $L^p$ spaces, inner products and Hilbert spaces, Fourier series on the circle, convergence theorems, the Fourier transform.

PMATH 354 F,S 3C 0.5
Elementary Differential Geometry and Tensor Analysis
- Curves in Euclidean 3-space ($\mathbb{E}^3$) and the Serret-Frenet formulas; surfaces in $\mathbb{E}^3$ and their intrinsic geometry, Gaussian curvature and the Gauss-Bonnet theorem.
  Prereq: PMATH 352

PMATH 360 S 3C 0.5
Geometry
  Prereq: MATH 126, or consent of instructor
  This course will be of interest to all math students.

PMATH 365 F,S 3C 0.5
Topics in Complex Analysis
- Curves in Euclidean 3-space ($\mathbb{E}^3$) and the Serret-Frenet formulas; surfaces in $\mathbb{E}^3$ and their intrinsic geometry, Gaussian curvature and the Gauss-Bonnet theorem.
  Prereq: PMATH 353 or AM/PMATH 331 with consent of instructor

PMATH 367 W 3C 0.5
Set Theory and General Topology
- Intuitive set theory, metric spaces, point set topology.
  Prereq: MATH 237. PMATH 351 is strongly recommended

PMATH 369 Readings in Pure Mathematics

PMATH 382 F 3C 0.5
Mathematical Logic
- First order languages and theories.
  Prereq: PMATH 343
  Next offered Fall 1997, and each alternate Fall thereafter

PMATH 391 F 3C 0.5
Analytic Number Theory
- An introduction to elementary and analytic number theory; primitive roots, law of quadratic reciprocity, Gaussian sums, Riemann zeta-function, distribution of prime numbers.
  Prereq: PMATH 352
  Antireq: PMATH 340
  Next offered in Winter 1998, and each alternate Winter thereafter

PMATH 400 W 3C 0.5
Elementary Algebra
- Modern algebra: Groups, rings, fields, field theory, examples of fields, field of fractions, algebraic extensions, construction of roots, separable extensions, splitting fields, classification of finite fields. Finite non-Abelian groups, Sylow theorems. Introduction to Galois theory.
  Prereq: PMATH 343, or PMATH 334

PMATH 441 F 3C 0.5
Algebraic Number Theory
- An introduction to algebraic number theory; unique factorization, Dedekind domains, class numbers, Dirichlet's unit theorem, solutions of Diophantine equations, Fermat's `last theorem'.
  Prereq: PMATH 343
  Next offered in Fall 1996, and each alternate Fall thereafter

PMATH 444 3C 0.5
Non-Commutative Algebra
  Prereq: PMATH 344
  Next offered in Fall 1997

PMATH 446 3C 0.5
Group Theory
- Permutations, Cayley Theorem, Sylow Theorem, Jordan-Hölder Theorem, nilpotent and solvable groups, direct and semidirect products, free groups.
  Prereq: PMATH 343
  Next offered in Winter 1997

PMATH 448 3C 0.5
Commutative Algebra
- Prime ideals, Krull dimension, integral elements, localization, discrete valuations, Dedekind domains, Noetherian domains. Algebraic and transcendental field extensions, algebraic closure. Introduction to algebraic geometry.
  Prereq: PMATH 344
  Next offered in Fall 1996

PMATH 451 F 3C 0.5
Measure and Integration
- Lebesgue measure and integral for the real line, general measure and integration theory, convergence theorems, Fubini's theorem, absolute continuity, Radon-Nikodym theorem, LP spaces.
  Prereq: PMATH 351 or PMATH 353
  Cross-listed as AM 431

PMATH 452 W 3C 0.5
Topics in Complex Analysis
- The Riemann mapping theorem and several topics such as analytic continuation, harmonic functions, elliptic functions, entire functions, univalent functions, special functions.
  Prereq: PMATH 352
  Next offered in Winter 1997, and each alternate Winter thereafter

PMATH 453 W 3C 0.5
Functional Analysis
- Banach spaces, linear operators, geometry of Hilbert spaces, Hahn-Banach theorem, open mapping theorem, compact operators, applications.
  Prereq: PMATH 353 or AM 431
  PMATH 451
  Cross-listed as AM 432
PMATH 465 3C 0.5
Differential Geometry
Some global aspects of surface theory, the Euler-Poincaré characteristic, the global interpretation of Gaussian curvature via the Gauss-Bonnet formula. Submanifolds of \( E^n \), induced Riemannian metrics, extrinsic and intrinsic curvatures, Gauss-Codazzi equations. Local Lie groups of transformations on \( R^n \), infinitesimal generators, the Lie derivative. An introduction to differentiable manifolds, the tangent and cotangent bundles, affine connections and the Riemann curvature tensor. The above topics will be illustrated by applications to continuum mechanics and mathematical physics.
Prerequisite: AM 333/PMATH 365 or consent of instructor
Cross-listed as AM 433

PMATH 467 3C 0.5
Topology
Topics from algebraic, combinatorial and geometric topology.
Prerequisite: PMATH 336, 367

PMATH 499
Readings in Pure Mathematics

Course Descriptions
Recreation and Leisure Studies

REC 250 W 3C 0.5
Introduction to Recreation for Special Populations
This course is designed to introduce the broad scope of recreation for special populations. Students will develop an understanding of skills and competencies, societal and individual attitudes, barriers, programming and disabling conditions and the role of recreation and leisure services as applied to the wide variety of populations. Emphasis is on aspects of human behaviour which influence participation in leisure. A volunteer placement is required.
Prerequisite: REC 250

REC 270 F 3C 0.5
Research Design Applicable to Leisure Studies
An introduction to the methods and techniques of research as applied to leisure studies and services. General consideration will be given to the technical problems involved in various stages of research methodology with emphasis on the logic underlying the research process.
Prerequisite: Second-year standing

REC 280 W 3C 0.5
Travel and Tourism
The scope and nature of travel and tourism as contemporary leisure experiences is examined along with economic, political and social ramifications, research strategies employed and implications for the future.

REC 301 W 3C 0.5
Sociology of Leisure
Nature and extent of leisure phenomena in contemporary society. Examination of institutional and formal organizational aspects, social roles, socio research strategies employed in the study of leisure.
Prerequisite: SOC 101
Cross-listed as SOC 347

REC 303 F 3C 0.5
Leisure, Media, and the Performing Arts
This course looks at the performing arts -- dance, drama, and music -- as contemporary leisure activities which are experienced through a range of media.
Prerequisite: Third-year standing and two social science courses

Recreation and Leisure Studies

Undergraduate Officer
A. Gilbert, BMH 2212, ext. 3015

Course offerings are subject to the availability of instructors.

REC 100 F 3C 0.5
Introduction to the Study of Leisure and Recreation and Leisure Services
An overview of the broad field of recreation and leisure services emphasizing the understanding of various leisure phenomena. As such, it provides the student with an introductory understanding of the nature and scope of leisure, leisure behaviour, affiliated recreation activity, and the array of resources associated with each.

REC 220 F 3C 0.5
Program Management and Evaluation
The scope of recreation program planning, design, implementation and evaluation is examined along with current associated issues and trends. Emphasis is placed on the planning and evaluation processes and their existence as core elements in any recreation and leisure services organization.
Prerequisite: REC 100, REC 210 and second-year standing

REC 230 W 3C 0.5
Outdoor Recreation Resources Management
A study of major facets of outdoor recreation programs and facilities from a variety of approaches; history, values, attitudes, economics, ecology, law, policy planning and trends. The emphasis is on providing a knowledge base for decision making by managers. It includes the role of selected governmental, voluntary and private sector bodies.

REC 255 F 3C 0.5
Social Psychology of Leisure
A study of the effects of personality and social factors in shaping how people perceive, experience and respond to discretionary time. Current theory and research focusing on the impact of leisure on the socio-psychological adjustment of the individual, and applications to human problems associated with leisure will be examined.
Prerequisite: PSYCH 101

REC 210 F 3C 0.5
Introduction to Leisure Service Management
Using a wide variety of leisure service agencies as examples, this course focuses on the management functions of planning, organizing, influencing and controlling. Topics include marketing, budgeting, leadership, staffing, goal setting, motivation, communication and problem solving.
Prerequisite: REC 210

REC 215 W 3C 0.5
Marketing Recreation and Leisure Services
Exploration of marketing concepts and methods available to public, commercial and private leisure service organizations. Topics include: the societal marketing philosophy, market research, market segmentation, and marketing mix strategies related to programming, distributing, pricing, and promoting leisure services.
Prerequisite: PSYCH 101
**Course Descriptions**

**Recreation and Leisure Studies**

**REC 304 S 3C 0.5**

**Culture and Recreation**

A study of major issues of Canadian cultural policy from a socio-historical, political and sociological perspective. Students will examine the role and organizational structure of the arts and major cultural agencies, and discuss social, economic and administrative aspects of professional, amateur, commercial and public art organizations and services.

Prereq: REC 205 or consent of instructor

**REC 310 F 3C 0.5**

**Commercial Recreation Business Development**

Students will develop an idea for a small recreation business and will then determine whether or not the idea is feasible. The course emphasizes marketing research, organizational structure, short and long range planning, financial analysis and promotions.

Prereq: REC 210, BUS 121 and third-year standing

**REC 333 W 3C 0.5**

**Recreation Geography**

The environmental implications of existing and potential recreational demands. Recreation travel, site capability, economic and ecological impact models will be considered as well as the behavioral aspects of amenity resources.

Prereq: REC 230 or GEOG 202A
Cross-listed as GEOG 333

**REC 334 W 3C, L 0.5**

**Introduction to Park Management**

Basic administrative procedures in park management. Operational techniques are examined together with general policies of acquisition, operation and development.

Prereq: REC 230 required, BIOL 250 or ENV S 200 are recommended
Cross-listed as ENV S 334

**REC 350 F 3C 0.5**

**Therapeutic Recreation Program Management**

This course is designed to examine techniques, tools, knowledge and skills required to design, plan, develop and facilitate therapeutic recreation programs in a variety of settings for individuals and groups.

Prereq: REC 251 or consent of instructor and third-year standing

**REC 354 F 3C 0.5**

**Leisure Education — Concepts and Practices**

This course covers concepts, theories, and practices of leisure education. Various models, assessment tools, and intervention strategies of leisure education are discussed. Also, settings for leisure education are examined including: school-based programs, job-related programs, institutional programs and transitional programs.

Prereq: REC 250, 220

**REC 356 F 3C 0.5**

**Recreation and Social Action**

This course covers concepts, theories and the practice of social change in relation to leisure and recreation behavior and services. Various issues such as poverty, ethnicity, and disability will be addressed. Major areas of discussion will include organizational sources of community and individual effort, leadership, participation, stresses, strains and strategies of social action. Attendance at the first class is required.

Prereq: REC 250 and third-year standing

**REC 351 F 3C 0.5**

**Aging and Leisure**

This course familiarizes the student with the characteristics of the aging population as related to recreation, leisure and lifestyle. Focus is on the understanding and attainment of administrative, management and leadership skills and techniques necessary in the assumption of the direction of programs of recreation, leisure and cultural services of all kinds. Specific emphasis is placed on public sector community services and resources.

Prereq: Third-year standing or consent of instructor

**REC 371 F 3C 0.5**

**Statistical Techniques Applied to Leisure Studies**

An introduction to descriptive and inferential statistics and the interpretation of data. A major consideration of the course is the use of statistics in the solution of problems in recreation and leisure.

Prereq: REC 270 and third-year standing

**REC 383 F 3C 0.5**

**Perspectives on International Tourism**

The character, problems of and prospects for tourism are examined through consideration of tourism in a variety of countries and regions, both developed and developing. Topics include the nature and significance of tourism; economic, environmental and social impacts of tourism; and costs and benefits of tourism to destination areas.

Prereq: GEOG 202A or REC 230 or consent of instructor
Cross-listed as GEOG 323

**REC 408 W 3C 0.5**

**Gender, Leisure and the Family**

This seminar course will focus on recent theoretical and empirical research on the relationships between gender, leisure and the family. Topics will include analysis of men's and women's leisure experiences, attitudes, constraints, challenges and behaviors. The role of the family as a leisure location and as an important agent in the construction of leisure experiences and behaviors for both adults and children will also be explored. Emphasis will be placed on understanding ways in which gender relations and gender role expectations affect and are affected by leisure.

**REC 414 F 3C 0.5**

**Quality Assurance in Leisure Services: Theory and Application**

This course reviews the quality assurance literature and places it in the context of leisure services. The course is multidisciplinary in its approach to quality assurance drawing primarily from social psychological, marketing and management sources. Emphasis is placed on the characteristics of services, staffing, and systems control issues. The course is suitable for all students interested in planning of programs and services.

Prereq: Third-year standing
Offered in even-numbered years only

**REC 415 W 3C 0.5**

**Consumer Behaviour and Leisure Services**

This seminar style course will examine consumer behavior theory in a broad context and focus specifically on consumer behavior issues that have been widely researched in leisure contexts. Application of these issues to the effective marketing of public, private, nonprofit, and commercial leisure delivery systems will be explored.

Prereq: REC 270 and one of REC 215 or BUS 352W; REC 371 recommended
Offered in odd-numbered years only
Course Descriptions

Recreation and Leisure Studies

Religious Studies

COURSES OFFERED 1996-97

REC 200 Theories of Play
REC 204 Leisure and Recreation in Historical Perspective
REC 300 Philosophy of Leisure
REC 331 Outdoor Education
REC 380 Recreation and Tourism Analysis
REC 402 Colloquium on Religion and Leisure
REC 406/8 Comparative Recreational Systems
REC 409 Computerized Database Applications in Leisure and Cultural Agency Management
REC 413 Advanced Seminar in Leisure Service Management
REC 416 Principles of Recreation Planning
REC 434 Advanced Park Planning and Management

Religious Studies

Undergraduate Officer
T. Yoder Neufeld, Conrad Grebel College, 885-0220

Courses not offered in the current academic year are listed at the end of this section.

Note
Numbers below the course description indicate the area of Religious Studies to which the course belongs. Explanation is provided in the Arts program section.

RS 100A-K Introduction to Religion
An introduction to Religion, religious phenomena, beliefs, ideas, practices and experience through the study of material and examples from the various fields in Religious Studies.

RS 100A F, W 3C 0.5
Religions of the East
An introduction to the religious traditions of the East: history, religious beliefs and practices of Hinduism, Buddhism, Confucianism, Taoism and Shinto.

Area 1

RS 100C F, W 3C 0.5
Religious Quests
Profiles, biographies and autobiographies of individuals in search of ultimate meaning. Persons studied are spiritual seekers from all walks of life: traditional religious figures, artists, novelists, scientists and others.

Area 5

RS 109D F 0.5
Introduction to Christian Ethics

Area 4

RS 100E F 3C 0.5
Biblical Studies 1
A survey of the literature, history and religious thought of the Old Testament as seen in its cultural setting in the ancient Near East.

Area 3

RS 100F F, S 3C 0.5
Biblical Studies 2
A survey of the literature, history and religious thought of the New Testament as seen in its cultural setting in the Greco-Roman world.

Area 3

Area 4

RS 100H F, W, S 3C 0.5
Introduction to the Roman Catholic Tradition
A study of the principal teachings of the Christian Faith affecting Catholics today. Topics will include Bible and Tradition; worship and sacraments; authority; changing views concerning liturgy, women, ministry, and ecumenism.

RS 100K F, W 3C 0.5
Introduction to Theology
The basics of Christian theology explored systematically and historically: theological language, revelation and truth, God and creation, sin and the fall, Christ and salvation, tradition and church, consummation and the end of history.

Area 4

RS 105A F 3C 0.5
Elementary Biblical Hebrew
An introductory course designed to teach a reading knowledge of Biblical Hebrew: the sounds and forms of the language followed by the reading of selected texts from the Hebrew Bible.

Taught at WLU as RE 140-3C

This course may be used toward the Aii requirement.
RS 106B W 3C 0.5
Elementary Biblical Hebrew
A continuation of the introduction to Biblical Hebrew.
Taught at WLU as RE 140-3C
This course may be used toward the
Area requirement

RS 106A F 3C 0.5
New Testament Greek
An introduction to Greek grammar with appropriate grammatical exercises and development of vocabulary.
Prereq: GRK 100A
This course may be used toward the
Area requirement
Area 3

RS 106B W 3C 0.5
New Testament Greek
The completion of the study of Greek grammar and syntax with appropriate exercises and translation of various texts of the Greek New Testament.
Prereq: RS 201
This course may be used toward the
Area requirement
Area 3

RS 200 F 3C 0.5
The Study of Religion
An exploration of the nature of religion through: 1) the history of the study of religion, 2) exposure to varying methods and ways of approaching religious phenomena, and 3) consideration of accounts of religious experience.

RS 206 W 3C 0.5
Jesus: Life and Legacy
The life, teachings, and significance of Jesus of Nazareth as experienced and interpreted by his followers, and as recorded by the writers of the New Testament.
Attention is given to traditions of virgin birth, crucifixion, resurrection, and divinity, and to Jesus’ contemporary importance.
Area 3

RS 207 W 3C 0.5
Contemporary Christian Spirituality
Contemporary Christian spirituality from Biblical, theological, and psychosocial perspectives. Formation of traditional Christian spiritual disciplines such as prayer and meditation is discussed in relation to the secularization of society and emerging New Age spirituality.
Area 5

RS 209 F,S 3C 0.5
Paul: Life and Letters
The career and thought of a pioneer of Christian religion as seen in his writings, with attention to issues such as spirit, grace and law, freedom and slavery, Christ and church, women and men.
Area 3

RS 214 W 3C 0.5
Buddhism
An introduction to the unifying beliefs and philosophical presuppositions of the Buddhist world-view, and an overview of the diverse forms of Buddhism in South and South-East Asia, Tibet, China and Japan.
Area 1

RS 219 F 3C 0.5
Religion in Sociological Perspective
An examination of the nature of religious experience, the elements of religious group life, the ways in which religions are a source of social stability and peace as well as of social change and conflict.
Prereq: SOC 101 or consent of instructor
Cross-listed as SOC 260
Area 5

RS 219 W 3C 0.5
Religion in America
The course examines religion in the American context regarding issues like secularization, the nature and the influence of sects (e.g. Mormonism, Pentecostalism), Protestant revivalism and televangelism, and the impact of non-Christian traditions (e.g. Buddhism, Islam).
Prereq: SOC 101 or consent of instructor
Cross-listed as SOC 261
Area 5

RS 221 F 3C 0.5
Guilt and New Religious Movements
This course examines various cults and new religious movements (e.g. Scientology, Krishna Consciousness, Neo-paganism) and places them within the context of our sociological knowledge of their emergence, who joins and why, and other issues.
Cross-listed as SOC 262
Area 5

RS 226 F 3C 0.5
Catholic Social Thought
This course will explore the origins, development and contemporary challenges to Catholic social thought. The main focus will be on the critical and global influences of the past 100 years.
(Formerly RS 331B)
Area 4

RS 227 F 3C 0.5
Perspectives on the Papacy
The Papacy is one of the most visible, enduring and yet controverted elements of the Roman Catholic tradition. This course will adopt a critical, historical, cultural and theological analysis of the papacy.
Area 2

RS 230 F,W 3C 0.5
History of Christianity
The development of Christianity in its Roman Catholic, Eastern Orthodox and Protestant traditions from the time of Christ to the present.
Cross-listed as HIST 235
Area 2

RS 231 F,W 3C 0.5
History of Christian Thought
An analysis of the major theological developments in the Christian traditions from the apostolic era to the present.
Area 4

RS 236 F,W 2C,1D 0.5
Human Sexuality and Christian Morality
An examination of the moral implications of an evolving sexual consciousness in the Christian tradition.
Prereq: Second-year standing or consent of instructor
Area 4

RS 256 W 3C 0.5
Current Ethical Issues
An examination of specific current individual and social problems such as human sexuality, social justice, urban decay, and human rights, in the light of Christian moral consciousness.
Area 4

RS 257 W 3C 0.5
Women and the Great Religions
Through a review of the teachings of the great religious traditions about women, this course aims to arrive at a global view of the situation of women 'in the world of religion'. On the basis of the evidence gathered, it will attempt an estimation of the role of religion as an intimate and important influence on human development.
Area 5

RS 263 F 3C 0.5
Justice, Peace and Development
An examination of communities, movements and theologies which express a Christian hope for justice, peace and development in the encounter with injustice, oppression and poverty.
Prereq: One of RS 100A-K, 253/256, or consent of instructor
Area 5

RS 286 F 2C,1D 0.5
Film and the Quest for Meaning
An exploration of spiritual themes and issues in the cinema. An assessment of film's special characteristics as an art form capable of addressing the human quest for a significant existence. Emphasis upon the films of Ingmar Bergman.
Cross-listed as FINE 252
Area 5
Course Descriptions
Religious Studies

RS 207 W 2C,1D 0.5
Film and the Quest for Meaning 2
A consideration of selected themes – death, evil, guilt, fate, alienation, courage, love, redemption – in the films of several of today's leading directors. Emphasis upon a variety of directors from divergent cultural backgrounds.
Cross-listed as FINE 253
Area 5

RS 249A F 3C 0.5
Religion in the Canadian Context
This course will consist of a multi-disciplinary examination of some of the rich and complex factors that constitute the Canadian religious mosaic – social, historical, artistic, and political – with the intention of working toward a uniquely Canadian theology or religious vision.
Area 5

RS 249B W 3C 0.5
Religion in the Canadian Context
A continuation of RS 249A.
Area 5

RS 298
Directed Reading in Special Subjects

RS 270 F 3C 0.5
Psychology of Religion
A study of theories of the psychological nature of religious experience, the sources of religious belief and the religious significance of psychological phenomena. Topics include faith, doubt, evangelism, conversion, faith healing, mysticism, drugs and religious experience, tongues-speaking.
Area 5

RS 271 W 3C 0.5
Personality and Religion
A study of the psychology of personality in its relationship between personality and religious thought, experience and behaviour.
Area 5

RS 272 W 3C 0.5
Sacred Places
From Mecca to Benares, Stonehenge to Chartres – a consideration of sacred cities, shrines, rivers, mountains, worship centres and other places which have inspired the spiritual imagination of individuals and communities within various religious traditions.
Area 5

RS 291 A-D
Studies in the History of Religion
Consult Department for current offerings.

RS 292 F 3C 0.5
Women and the Church
A multi-disciplinary examination of the evolution of the relationship between women and the church in the Christian tradition.
Area 5

RS 305A F 3C 0.5
Intermediate New Testament Greek
Prereq: RS 106 or consent of instructor
Area 3

RS 305B W 3C 0.5
Intermediate New Testament Greek
Prereq: RS 106 or consent of instructor
Area 3

RS 306A F 3C 0.5
Intermediate Biblical Hebrew
Reading and grammatical analysis of selected prose and poetic portions of the Hebrew Bible.
Taught at WLU as R&C 206

RS 306B W 3C 0.5
Intermediate Biblical Hebrew
Continuation of RS 306A.
Taught at WLU as R&C 255

RS 294 A-F 3C 0.5
Religion in the Canadian Context
This course will consist of a multi-disciplinary examination of some of the rich and complex factors that constitute the Canadian religious mosaic – social, historical, artistic, and political – with the intention of working toward a uniquely Canadian theology or religious vision.
Area 5

RS 309 W 3C 0.5
Unity and Diversity in the New Testament
A study of both distinctive and shared ways authors of the New Testament view Jesus, law, ministry, authority, worship, and Jewish and Gentile traditions.
Prereq: RS 100F or consent of instructor
Area 3

RS 322 W 3C 0.5
Radical Reformation
A study of Anabaptism and its place in the history of the Christian Church and of the Reformation period.
Prereq: Second-year standing
Cross-listed as HIST 348
Area 2

RS 328 W 0.5
Christian Feminist Thought
Christian feminist thought challenges traditional Christian teaching at every level. This course will explore in particular the challenges to traditional disciplines of theology and spirituality.
Prereq: RS 292 or consent of instructor
Area 5

RS 335 W 3C 0.5
Modern Christian Thought
A biographical and thematic approach to the study of the major nineteenth-century thinkers who shaped modern theology. Among theologians and issues to be considered are Schleiermacher and liberalism, Kierkegaard and existentialism, Troeltsch and historicism.
Prereq: RS 230 or 231 or consent of instructor
Area 4

RS 354 F 3C 0.5
War and Peace in Christian Theology
The contemporary discussion. A survey of Christian teaching on war and peace, focusing on the 20th-century discussion.
Prereq: RS 230 or 231 or consent of instructor
Area 4

RS 355 F 3C 0.5
Interreligious Encounter and Dialogue
A study of the encounter and dialogue of men and women of different faiths, emphasizing movements, figures and ideas central to the contemporary scene. Both bilateral, for example Christian-Buddhist, and multilateral developments will be explored.
Prereq: RS 200 or 221, or courses in Eastern religions, or consent of instructor
Area 5

RS 377A-D
Selected Topics in Biblical Studies
Consult Department for current offerings.
Course Descriptions
Religious Studies - Science

RS 369A-F
Study-Travel Seminar in Religion
Consult Department for current offerings.

RS 370 F 3C 0.5
Dramas In Religious Experience
The course examines the place of dreams in religious experience from ancient to modern times. Present day advances in understanding dream symbols will be explored, as well as the possibility of incorporating the use of dreams in one's personal religious growth and development.
Prereq: RS 271 or consent of instructor
Area 5

RS 380 W 3C 0.5
Carl Jung's Theory of Religion
Jung's analysis of the development of the personality through his life cycle, and of the central place which religion holds within the process of maturation. This study includes a study of the unconscious, the collective unconscious, dreams, myths, symbols and archetypes; and the implications of Jung's theories for religious thought, therapy, and definitions of community.
Prereq: RS/SIPAR 270 or 271 or consent of instructor
Cross-listed as SIPAR 380
Area 5

RS 382 F 3C 0.5
Theology of Marriage
A study of the development of the theology of marriage in the Christian tradition.
Prereq: RS 286/286 or consent of instructor
Area 4

RS 383 W 3C 0.5
Shapers of the Roman Catholic Tradition
An examination of some influential thinkers in the Christian tradition who have played a critical role in Roman Catholic theology; including individuals like Augustine, Thomas Aquinas, John Henry Newman, Karl Rahner.
Prereq: RS 109H or 230 or 231 or consent of instructor
Area 4

RS 390A-D 0.5
Studies in Religion
See Department for current offerings.

RS 398A-D F,W,S 0.5
Directed Reading in Special Subjects
Permission of Undergraduate Officer required

RS 400A-H
Special Topics in Religious Studies
Consult the Department for special topics.

RS 490A F,W,S 0.5
Honours Seminar
A course of study and research designed to provide the student with guidance and supervision towards completing an Honours research assignment.
Prereq: Fourth-year standing and consent of Undergraduate Officer

RS 490B F,W,S 0.5
Honours Seminar
A continuation of the above.

COURSES NOT OFFERED 1996-97
RS 100B Religions of the West
RS 107A Introductory Standard Arabic
RS 205 The Hebrew Prophets
RS 206 The Parables of Jesus
RS 213 Hinduism
RS 216 Islam
RS 217 Judaism
RS 229 The Cult of Mary
RS 257 Christian Approaches to Peacemaking
RS 268B Religious Perspectives in Contemporary Canadian Literature
RS 290C Gospel and Liberation
RS 302 The Gospel of John
RS 310 The Sacred Book of Islam
RS 315 The Narrative Expression of Canadian Native Religions
RS 316 Canadian Native Religious Traditions
RS 318 Islam and Christianity
RS 321 The History and Culture of the Orthodox Church
RS 325 Medieval Church History
RS 326 Medieval Women Mystics
RS 331 Vatican II, Assessments and Perspectives
RS 334 Islamic Theology, Philosophy and Mysticism
RS 336 Christian Thought in the 20th Century
RS 337 Contemporary Mennonite Thought
RS 351 Religious Perspectives on the Environmental Crisis
RS 353 The Bible and Peace
RS 356 Bioethics and Religious Values
RS 360 Religion and the Arts
RS 372 Psychology of Religion in Historical Perspective
RS 373 Folk Religion: Custom, Belief and Ritual
RS 375 Religion and Psychotherapy
RS 384 Christian Hymnody
RS 450A Study Term Abroad

Russian

For courses in Russian see Germanic and Slavic Languages and Literatures.

Science

Notes
1. Most science labelled courses are offered by the Departments of Biology, Chemistry, Earth Sciences and Physics, determined by course content.
2. The Faculty of Science offers courses at the 200-, 300- and 400-level of a general nature intended for students registered in other Faculties (Applied Health Sciences, Arts, Environmental Studies, Engineering, Mathematics) as well as for Science students desiring electives.
3. Normally, no more than three SCI credits may be applied towards any Science degree program.

SCI 010 F,W,S 13 0.0
Science Education Seminar
A visiting speaker and discussion hour for students in all years of the Waterloo-Queen's Co-operative Science Education program in Biochemistry, Biology, Chemistry and Physics.

SCI 040 F,W 15 0.0
Seminar
These seminars bring together Science and Business students and Environmental Science students in all years, to hear invited speakers, view films relating to their programs, and learn about current research.

SCI 100A-104C F,W,S
These courses are taken at foreign universities by University of Waterloo Science students while enrolled in an international exchange program. The grades for these courses will be either CR or NCR.
Course Descriptions

Science

SCI 100A-C F,W,S 2.5
Science Study Abroad Program: Germany
For studies abroad under the Baden-Württemberg Exchange Program, Waterloo students register for SCI 100A (Fall), SCI 100B (Winter) and SCI 100C (Spring) as appropriate. Maximum 5.0 credits.

SCI 101A-C F,W,S 2.5
Science Study Abroad Program: France
For studies abroad under the Rhône-Alpes Exchange Program, Waterloo students register for SCI 101A (Fall), SCI 101B (Winter) and SCI 101C (Spring) as appropriate. Maximum 5.0 credits.

SCI 102A-C F,W,S 2.5
Science Study Abroad Program: England
For studies abroad under the Sussex University Exchange Program, Waterloo students register for SCI 102A (Fall), SCI 102B (Winter) and SCI 102C (Spring) as appropriate. Maximum 5.0 credits.

SCI 103A-C F,W,S 2.5
Science Study Abroad Program: Northern Ireland
For studies abroad under the Ulster Exchange Program, Waterloo students register for SCI 103A (Fall), SCI 103B (Winter) and SCI 103C (Spring) as appropriate. Maximum 5.0 credits.

SCI 104A-C F,W,S 2.5
Science Study Abroad Program: Australia
For studies abroad under the Queensland University Exchange Program, Waterloo students register for SCI 104A (Fall), SCI 104B (Winter) and SCI 104C (Spring) as appropriate. Maximum 5.0 credits.

SCI 219 W 2C 0.5
Chemistry in Modern Society
The impact of chemistry on the environment and modern society will be discussed under such topics as carcinogens, lead pollution, chemical warfare, food additives, pesticides, contraception, ozone layer, "social" (marijuana, cocaine) and sport drugs. Topics vary from year to year.
Prereq: At least one year of Secondary School Chemistry

SCI 220 W,S 0.5
Chemistry of Pollution
A study of the chemistry involved in pollution problems encountered with consumer products and in selected industries. Progress on overcoming the pollution will be discussed with emphasis on the Chemistry. (Open to all interested students.)
Prereq: At least one year of Secondary School Chemistry
Available by Distance Education only

SCI 237 F 3C 0.5
Descriptive Astronomy
A study of the solar system, the Milky Way, galaxies and the Universe.
Open to students in all years
Not for Engineering, Mathematics or Science students
Antireq: SCI 238

SCI 238 W,S 3C 0.5
Introductory Astronomy
A survey course in astronomy intended for Mathematics, Engineering and Science students. The solar system, the Sun and planets, stars, the Milky Way, galaxies and cosmology.
Open to students in all years
Antireq: SCI 237 (SCI 238 is a more quantitative version of SCI 237.)
Students interested in the above courses in Astronomy (i.e. SCI 237, 238) should note that because of overlapping material both courses may not be taken for credit, only the one most suitable to their background. Students with a weak background in Physics and/or Mathematics may well find it advisable to take SCI 238 before taking PHYS 275.

SCI 250 W 3C 0.5
Environmental Geology
An introduction to geological concepts; the influence of geological factors on the natural environment; Earth processes and natural hazards; Earth resources; waste disposal and pollution; global climatic and environmental change.
Prereq: none
Antireq: EARTH 121/122, 126, GEO E 126

SCI 255 W 3C 0.5
The Biology of Aging
An introduction to the biological mechanisms of aging at the molecular, cellular and systemic levels. Topics to be discussed will include the theories of aging, methods for studying the aging process, the role of diseases in aging and chronological changes in organisms during aging.
Cross-listed as GERON 255

SCI 280 W 3C 0.5
The Science of Senses
Vision, hearing, smell, taste and other senses. A multidisciplinary view of some of the basic principles underlying these, with emphasis upon concepts which are common to all senses. Various aspects of the senses (e.g. social consequences of sensory impairment, esthetics, historical theories of sensory function) are discussed and demonstrated.

SCI 281 F 3C 0.5
Models in Science
Origins and rise of some important scientific models. Resistance to and acceptance of new models. Strengths and weaknesses of some current models. Examples will be drawn from three different areas of science, and may vary from year to year.

SCI 283 F 3C 0.5
Science and Society
Selection of areas of science for development and commercial exploitation. Economic and social impact of science. Societal pressures on science. At present, the focus of this course is biotechnology.
Prereq: For upper-year students only

SCI 285 F 3C 0.5
Scientists and the Science Community
Professionalism, ethical and political issues, and other aspects of how science is done will be raised. Memoirs and other writings of scientists about their science will be included in the readings.
Prereq: For upper-year students only
SCI 270 W 3C 0.5
Nuclear Science
A non-mathematical general treatment of the following areas of nuclear Science: historical development and discovery of new fundamental particles; artificial transmutation of elements; nuclear sources of energy; biological effects of radiation and use of radioisotopes in industry, medicine and agriculture. The impact of nuclear science on social, economic and political systems will be discussed.
Prereq: At least one year Secondary School Chemistry or Physics
Antireq: CHEM 412

SCI 333 F 3S 0.5
Science and Business Senior Seminar
A framework for understanding the ways in which science and business interacts and the importance of this interaction to society. Historical and innovative examples will be provided.
Prereq: Third- or Fourth-year standing in the Honours Science and Business program or consent of instructor
Offered in odd-numbered years

SCI 351 F,W,S 0.5
Human Physiology 1
An introduction to selected topics in human physiology: the nervous system; sensation; muscles; the heart and circulatory system; blood; the immune system; respiration.
Antireq: BICL 273
Offered by Distance Education only

SCI 352 F,W,S 0.5
Human Physiology 2
An introduction to selected topics in human physiology. Attention will be given to the areas of homeostasis, nutrition, digestion, reproduction and the endocrine hormones, chemical messengers and receptors.
Antireq: BICL 273
Offered by Distance Education only

SCI 355 F 2C 0.5
Biology of Cancer
An introduction to cell and developmental biology in relation to cancer in the human body.
Students whose major field is Biology may not take this course for credit.
Offered in even numbered years.

SCI 356 A F 0.5
Cancer: Its Presentation and Treatment in Humans
The clinical signs, epidemiology, routes of spread and management approaches of the major tumour sites in adults. There will be emphasis placed on prognostic factors, decision-making skills and treatment results.
Prereq: SCI 351/352, PHYS 480
Students whose major field is Biology may not take this course for credit.
Offered by Distance Education only

SCI 356 B W 0.5
Cancer: Its Presentation and Treatment in Humans
A continuation of SCI 356A with emphasis on paediatrics.
Prereq: SCI 356A
Students whose major field is Biology may not take this course for credit.
Offered by Distance Education only

SCI 453 F 2C 0.5
Marine Ecosystems and the Human Impact
Study of the oceans from a biological point of view, and consideration of the effects of exploitation and pollution upon the animals and plants that inhabit them.
Students whose major field is Biology may not take this course for credit.
Antireq: BICL 450

SCI 454 W 2C 0.5
Biological of Freshwater Pollution
Study of lakes, rivers and streams from a biological point of view, and consideration of the effects of pollution upon the animals and plants that inhabit them.
Students will find a course in Biology to be an advantage. Students whose major field is Biology may not take this course for credit.
Antireq: BICL 451

SCI 482 F 3C 0.5
Biology of Food Production
A survey of world food production from the biologist's viewpoint. Topics: nutrition; food chains; origins of agriculture; basic plants and animal food crops; primitive and modern scientific agricultural practices and the environmental implications of each.
SMF 304 F 3C 0.5
Advanced Study of Sexuality and Sex Education
A detailed analysis of various disciplinary perspectives on human sexuality. Usually the following perspectives will be discussed: historical-religious, ethical, literary, developmental, psychological, and feminist.
Prereq: SMF 204 or PSYCH 236 or consent of instructor
(Formerly SMF 301A)

SMF 306 F 3C 0.5
Advanced Study of Marriage and the Family
A detailed analysis of various disciplinary perspectives on marriage and the family.
Prereq: SMF 206 or consent of instructor
(Formerly SMF 302A)

SMF 308 F,J 3C 0.5
Introduction to Marriage and Family Therapy
This course will examine the clinical treatment of marriages and families by adopting a structural frame of reference and using a family life cycle perspective. The objective is to develop a useful model for intervention in marriages and families.
Prereq: SMF 206 or consent of instructor
Also taught in the J term
(Formerly SMF 303A)

SMF 404 F,W,S 3C 0.5
Independent Study: Special Topics in Sexuality
An independent, in-depth study, based on empirical research and/or extensive reading, of a topic in the area of sexuality. The project must be approved by the academic supervisor of the course prior to registration. Open to students in the SMF Honours option.
Prereq: SMF 304 and 305 or consent of instructor
(Formerly SMF 402)

SMF 408 F,W,S 3C 0.5
Independent Study: Special Topics in Marriage and Family Therapy
An independent, in-depth study, based on empirical research and/or extensive reading, of a topic in the area of marriage and family therapy. The project must be approved by the academic supervisor of the course prior to registration. Open to students in the SMF Honours option.
Prereq: SMF 308 and 309 or consent of instructor
(Formerly SMF 403)

SMF 305 Advanced Study of Sexuality and Sex Education

SMF 307 Advanced Study of Marriage and the Family

SMF 309 Introduction to Marriage and Family Therapy

COURSES NOT OFFERED 1996-97
SMF 305 Advanced Study of Sexuality and Sex Education
SMF 307 Advanced Study of Marriage and the Family
SMF 309 Introduction to Marriage and Family Therapy

Social Development Studies

Undergraduate Office
L. Baker, Renison College, RM 2, 884-4404, ext. 627

Courses not offered in the current academic year are listed at the end of this section.

Note
Depending upon demand, courses may be subject to priority enrolment. First priority will be given to Social Development Studies majors.

INTERDISCIPLINARY SOCIAL SCIENCE

ISS 131R W 3C 0.5
Social Ideas, Social Policy and Political Practice 1
An introduction to some of the major social and political ideas of Western civilization. Attention is given to the influence and applicability of these ideas to social policy and political practice in contemporary Canada.
Priority enrolment for Social Development Studies majors

ISS 150R F,W 3C 0.5
Lifespan Processes: The Normal Events
An examination of the significant psychosocial events during the lifespan with consideration of the impact of crises. Topics may include attachment, loss, stress, identity crisis, role change, mid-life transition.

ISS 202R F,S 3C 0.5
Changing Concepts of Childhood
Childhood has changed as a social and cultural concept. This course will trace these changes, examining sociological, psychological, cross-cultural, historical and political factors. Art and literature will also be used to reflect attitudes about childhood.

ISS 256R F 3C 0.5
Social Statistics
This introductory level statistics course will emphasize the collection, manipulation, descriptive presentation and statistical analysis of social research data using a variety of qualitative and quantitative methods.
Prereq: Second-year standing and at least two term courses in the social sciences or consent of instructor
Refer to overlapping content note under Grading Systems in Examinations and Standings section of the Faculty of Arts chapter
Priority enrolment for Social Development Studies majors

ISS 251R W 3C 0.5
Social Research
Introduction to the philosophy and methodology of applied social science research including treatment of the problems and strategies of research design and execution.
Prereq: Second-year standing and at least two term courses in the social sciences or consent of instructor
ISS 250R or its equivalent also recommended
Refer to overlapping content note under Grading Systems in Examinations and Standings section of the Faculty of Arts chapter
Priority enrolment for Social Development Studies majors

ISS 210R F 3C 0.5
Critical Encounter with Human Nature
An attempt to increase students' understanding of human nature and deepen their awareness of some fundamental issues in 20th-century life. The approach is interdisciplinary with emphasis on such themes as the meaning of self-knowledge, loneliness and anxiety, freedom and purpose in human life, and the nature of human happiness.
Prereq: Courses in at least one of the Social Sciences or Philosophy, or consent of instructor
SS 350D W 3C 0.5
Adult Life Crises and Events
A study of normal events occurring during the adult years, why they happen and how we cope with them. Relying on research, popular literature, and life experiences, students examine social change, the future, adult development and adjustment.
Prereq: ISS 150R or consent of instructor

ISS 350E W 3C 0.5
Family Law and Social Work
Consideration of the court system; investigation of divorce mediation, court mandated custody, access and juvenile predisposition assessment, child welfare, psychiatric advocacy, corrections, and highlighting of professional, ethical, confidentiality, civil and criminal liability issues for social workers.
Prereq: Second-year standing

ISS 350H S 3C 0.5
Values and the Contemporary Family
An exploration of how religious, economic, political and other social institutions shape values in our society, and what impact society’s changing values are having upon marriage and the family.
Prereq: At least two social science courses
Cross-listed as SOCWK 350H

ISS 398R/399R F, W, S R 0.5/0.5
Independent Study
Interdisciplinary focus, in greater depth than is available in other courses, on a selected area of concern to the student. Available to individuals or small groups of third- or fourth-year Social Development Studies students and arranged with one of the program’s faculty members. Consent of instructor.
Prereq: Permission of Associate Dean

SSC 499A/B F, W, S R 0.5/0.5
Senior Honours Essay
The essay will normally be related to the student’s chosen theme area, supervised by one faculty member, and critically examined by faculty from all areas of the program.
Prereq: Open to senior honours students only
A letter grade for ISS 499A will be submitted only after the completion of ISS 488B

Course Descriptions
Social Development Studies

PSYCHOLOGY

PSYCH 120R F 3C 0.5
Introductory Psychology
Basic concepts and techniques of modern psychology as a behavioural science, with special emphasis on social aspects of behaviour. Topics may include the nervous system, perception, learning, memory, cognition, motivation, emotion, development, personality, social influences, psychopathology and psychotherapy.
Prereq: PSYCH 101

PSYCH 121R W 3C 0.5
Introductory Psychology (Special Topics)
A continuation of PSYCH 120R with in-depth study of some selected topics.
Prereq: PSYCH 120R

PSYCH 322R F 3C 0.5
Personality Theory
An examination of the major theories of personality including consideration of the psychoanalytic, dispositional, humanistic, and behaviouralistic models.
Prereq: An introductory Psychology course
Cross-listed as PSYCH 355
Priority enrolment for Social Development Studies majors

PSYCH 323R W 3C 0.5
Abnormal Psychology
A survey of concepts, theory, and research dealing with the nature and etiology of behavioural abnormality. Topics include neurosis, schizophrenia, depression, psychopathological and behavioural disorders.
Prereq: An introductory Psychology course
Cross-listed as PSYCH 257 (formerly PSYCH 357)
Priority enrolment for Social Development Studies majors

PSYCH 334(R) F, W 3C 0.5
Theories of Individual Counselling Psychology
An introduction to the methods, theories and problems in individual counselling psychology.
Prereq: An introductory Psychology course
Antireq: PSYCH 336 and PSYCH 344

PSYCH 367R-369R 0.5
Special Topics in Psychology
One or more term courses will be offered from time to time as announced by the Social Development Studies Program. Subjects will be dependent upon special research and/or instructional interests of faculty.

SOCIAL WORK

SOCWK 201R W 3S 0.0
Social Work Practicum Seminar
A required non-credit seminar in which opportunity is provided for integration of theory and practice through the students’ own practicum case presentations and discussion.

SOCWK 220R F, W, S 3C 0.5
Introduction to Social Work
Presentation of the value, knowledge, and skill base, principles and purposes of the profession, and an examination of methods of practice. Traditional and innovative social work settings are discussed. Historic development of Social Work and its influence on contemporary practice is reviewed.

SOCWK 221R F, W, S 3C 0.5
Social Group Work
Presentation of some of the theoretical constructs necessary for an understanding of the individual in the casework relationship, as well as an introduction to some appropriate casework interventions. Emphasis in the course will be theoretical.
Prereq: SOCWK 120R or consent of instructor

SOCWK 222R F, W, S 3C 0.5
Community Organization 1
An examination of social work practice as it relates to functional and geographical communities. The course will explore the theoretical foundations of organization practice as well as a variety of models.
Prereq: SOCWK 120R or consent of instructor

SOCWK 223R F, W, S 3C 0.5
Community Organization 2
SOCWK 240R F 3C 0.5
Palliative Care
An introduction to the concepts and practices in palliative care. Topics include historical and philosophical background, the hospice movement, current approaches in palliative care, the multi-discipline team, stress factors, suicide and cross-cultural beliefs of death, illness and loss as they affect the terminally ill and their families.
Prereq: SOCWK 120R or consent of instructor

SOCWK 320R W 3C 0.5
Social Casework 2
Considers some of the intellectual components of the social work skills necessary for working with individuals. Social work theories of the individual will be examined in order for the student to learn some clinical applications relevant to the casework relationship.
Prereq: SOCWK 220R or consent of instructor

SOCWK 321R F,W,S 3C 0.5
Social Work with Families
Presentation of some of the theoretical constructs necessary for an understanding of the family in the social work relationship as well as an introduction to methodology and interventions.
Prereq: SOCWK 120R or consent of instructor

SOCWK 322R W 3C 0.5
Community Organization 2
An investigation of methods and models of social work intervention used in the process of change as it affects functional and geographic communities. Canadian examples of organizational processes and collective action of citizen groups, neighbourhoods, welfare recipients, ethnic minorities, employees, political parties and public housing tenants.
Prereq: SOCWK 222R

SOCWK 328R F 3C 0.5
Philosophy and History of Social Welfare
Social welfare from early civilization to the present. The effects of religious, political, economic, and cultural factors on social welfare development and the continuing influence of inherent attitudes, philosophies and values on this complex institution. Focus on the Canadian social welfare system.
Prereq: SOCWK 120R or consent of instructor

SOCWK 350D F 3C 0.5
Social Casework 3
Casework treatment issues categorized according to the character styles of clients will be examined in depth. The client's mode of functioning and symptom presentation and appropriate treatment strategies will be assessed through readings, clinical example and process recordings.
Prereq: SOCWK 320R and consent of instructor
Social Work Diploma students only

SOCWK 350E F 3C 0.5
Social Casework Techniques
Theoretical and practical consideration of conceptual and interpersonal techniques relevant to the practice of clinical social work. Topics may include formation and use of case histories, interviewing, treatment plans, therapist-client contracts, process-recording, client disengagement.
Social Work Diploma students only

SOCWK 350F F 3C 0.5
School Social Work
The history, theory and practice of school social work in North America, particularly in Ontario. Applying theories to cases, students learn how the school social worker helps children confront problems like family breakdown and school phobia.
Prereq: SOCWK 120R

SOCWK 350H S 3C 0.5
Values and the Contemporary Family
An exploration of how religious, economic, political and other social institutions shape values in our society, and what impact society's changing values are having upon marriage and the family.
Prereq: At least two social science courses
Cross-listed as ISS 350H

SOCWK 355R F,J 3C 0.5
Child Maltreatment: Identification and Prevention
The objectives of this course are to provide an understanding of the dimensions and causes of child maltreatment, to develop skills identifying cases of this social problem and to explore current methods of management and treatment of persons involved in child maltreatment situations.
Prereq: SOCWK 120R or consent of instructor

SOCWK 356R F 3C 0.5
Mental Retardation and the Family
A critical application of social work theory to real situations involving the social, emotional and physical functioning of the family that has a mentally retarded member. Will also include consideration of the impact of current social policies.
Prereq: SOCWK 120R or consent of instructor

SOCWK 357R W,J 3C 0.5
Family Violence
An application of the principles and models of medical, psychogenic, and sociogenic adjustment to an understanding of family violence. The treatment of victims of family violence, the prevention of such violence, and social policies affecting family welfare are considered.
Prereq: SOCWK 120R or consent of instructor
Antrreq: SOCWK 350B

SOCWK 358R 3C 0.5
Social Work in Health Care
Analysis of social work in the medical setting, concentrating on identification and treatment of emotional, family, and community aspects of illness. Emphasis is on the concrete application of professional social work to health care while comparing medical and social work values and concepts of illness.
Prereq: SOCWK 120R or consent of instructor
Prereq: At least two social science courses

SOCWK 367R W 3C 0.5
Social Work with the Elderly
An examination of social work theory and practice concerning the needs of the elderly. Social work strategies of Intervention with the healthy and frail aged will be considered from the individual, group, family, community, and bureaucratic perspectives.
Prereq: SOCWK 120R or consent of instructor

SOCWK 390A/B JJ 3C/3C 0.5/0.5
Family Violence: An Advanced Seminar
Social Work concepts and practices introduced in preceding family violence courses will be considered in depth. Over the course of two terms a seminar format will be used to explore etiological and intervention issues pertaining to the various forms of family violence.
Prereq: SOCWK 355R and 357R or consent of instructor
A letter grade for SOCWK 390A will be submitted only after the completion of SOCWK 390B
SOCWK 398R/399R F,W,S R 0.5/0.5
Independent Study
An independent in-depth study of a selected area of concern to the student within
the discipline of Social Work. Available to individuals or small groups of third- or
fourth-year Social Development Studies students and arranged with one of the
faculty members from the program.
Prereq: Permission of Associate Dean

SOC 120R W 3C 0.5
Fundamentals of Sociology
An examination of the fundamental concepts of Sociology and their application
in seeking to understand the changing patterns and life-styles taking place specif-
ically in Canada, and in general, within North American society.
Prereq: SOC 101

SOC 223(R) W 3C 0.5
Deviance: Perspectives and Processes
The deviance-making process is examined in a variety of social contexts.
Examines the emergence of rules and control agencies, the processes by which
persons become involved in deviant activities, and the contingencies affecting their
careers as deviants.
Prereq: An introductory Sociology course or consent of instructor

SOC 328R F 3C 0.5
Canadian Ethnic and Cultural Minorities
An examination of the adjustment of
Native people, French Canadians, Orientals and other minorities within the
Canadian mosaic. The course will analyze modernization, constitutional debates and
historical events in terms of their impact on minority adjustments.
Prereq: an introductory Sociology course and second-year standing or consent of instructor

SOC 368R F 3C 0.5
The Sociology of Disability
Examination of the social adaptations of
the disabled. Particular attention is given to the theoretical tradition which considers
disability as a form of involuntary deviance which stigmatizes the individual.
Prereq: An introductory Sociology course

SOC 368R W 3C 0.5
The Sociology of Spoiled Identity
Spoiled identity resulting from deviant status inhibits if not prevents acceptance and
social mobility. Consequences of spoiled identity, lowered status positions and
deviant criminal and "social" adaptations are examined from a symbolic
interactionist perspective.
Prereq: An introductory Sociology course

SOC 369R F 3C 0.5
Custodial and Rehabilitative Institutions
"Total institutions" are concerned with resocialization of "inmates". This course
considers the structure of maximum security prisons, mental hospitals, isolated
work environments and concentration camps, emphasizing their philosophies,
their organization, their goals, and their effectiveness in modifying and controlling
behaviour.
Prereq: An introductory Sociology course

SOC 395R/399R F,W,S R 0.5/0.5
Independent Study
An independent in-depth study of a selected area of concern to the student within
the discipline of Sociology. Available to individuals or small groups of third- or
fourth-year Social Development Studies majors and arranged with one of the
faculty members from the program.
Prereq: Permission of Associate Dean

COURSES NOT OFFERED 1996-97
ISS 240R Art and Society
PSYCH 220R Social Psychology
PSYCH 221R Interpersonal interaction
SOC 327R Minority Status in Canadian Society
SOCWK 121R Contemporary Social Problems
SOCWK 241R Psycho Social Factors in Palliative Care

Social Work

For courses in Social Work see Social Development Studies.
STV 204  W,S  0.5
Society, Technology and Risk
Risk is unavoidable. However, there are choices in the types and amounts of risks that are acceptable to an individual, institution or society. Whether it is electronic information systems, food and water quality, hazardous waste sitings or biotechnology, professionals and managers are increasingly required to make choices about risk and, more importantly, to explain these decisions to diverse audiences. But not everyone looks at risk in the same way. Students will be introduced to a conceptual understanding of risk assessment methodologies and limitations, risk management and risk communication, and will examine how and why such decisions are made and perceived.
Prereq: A previous STV course or consent of instructor

STV 303  F 0.5
Cross-Cultural Change, Design and Technology
The course will examine the concept of cross-cultural change as more than a consequence of contact between ethnic and national groupings. Technological change and the mutual interaction between technology and culture produce new cross-cultural change and challenges. The purpose of the course is to help students understand and identify the complex interaction between technology and culture and its impact on design and the choice of technology. Students will be expected to use this knowledge as a decision-making tool.
Prereq: A previous STV course or consent of instructor

STV 400  F,W,S  0.5
Society, Technology and Values: Senior Project
An independent, supervised research project related to the interaction of society, technology and values. Projects may take any format that demonstrates scholarly merit. Formats may include essays, impact studies, designs, computer software, or other media. Students are responsible for proposing suitable projects and are encouraged to seek faculty advice on plausible topics.
Prereq: STV 100, 202 or 204 and registration in the STV Option, normally at the fourth-year level

STV 401A-Z  0.5
Society, Technology and Values: Advanced Topics
Advanced study of the interaction of society, technology and values in a particular topic area under tutorial guidance by visiting or adjunct faculty.
Prereq: A previous STV course or consent of instructor

COURSES NOT OFFERED IN 1996-97
STV 404  Design and Technological Choice in Canada

Sociology

Undergraduate Officer
L. Dawson, PAS 2028, ext. 5340

Notes
1. Not all the courses listed in this section are available in the current year. Please consult the Course Offerings List of the Department for current course information.
2. Sociology courses offered at Renison College are listed in the Social Development Studies section.

SOC 101  2C  0.5
Introduction to Sociology
An introduction to the basic concepts and frames of reference of sociological investigation and interpretation. Topics for analysis will include communities, associations and institutions, classes and status groups, crowds and publics, social processes, and social change. Special attention is given to Canadian society.
Prereq: SOC 120R
Also offered at Conrad Grebel and St. Jerome's Colleges

SOC 102  2C  0.5
Social Problems
An examination of cultural forces that create social problems and failures in personal and institutional adjustments. Specific attention is paid to the problems of poverty, delinquency and ethnic relations in Canadian society.

SOC 200  2C  0.5
An Introduction to the Sociology of Marriage and the Family
An introduction to the sociological perspectives on marriage and the family in urban-industrial societies. Special attention is given to marriage and the family in Canada. Comparisons with U.S. and Britain will be undertaken.
Prereq: SOC 101 or consent of instructor
Also offered at St. Jerome's College

SOC 201  2C  0.5
Victims and Society
The course will examine the substance of victimization: the scientific study of victims, the process, etiology and consequences of victimization. Topics will include victims and politics, the victims movement, "Victim-prefacement", the victimization of women and family violence.
Prereq: SOC 101 or consent of instructor

SOC 204  2C  0.5
Sociology of Adolescence
The social definitions of adolescence in cross-cultural and historical perspective. Social roles of adolescents in the institutional structures of urban-industrial societies with special emphasis on the family, education, and the economy. The relationship of adolescents' social roles to processes of social change and stability.
Prereq: SOC 101 or consent of instructor

SOC 206  2C  0.5
Gender Relations
An examination of gender relations in Canadian society, including historical changes and the contemporary situation. Emphasis is placed on a consideration of the social construction of gender, the gender structure of institutions and gender inequality. The course also examines selected issues in contemporary gender relations.
Prereq: SOC 101 or consent of instructor

SOC 207  2C  0.5
Sociology of Education
Attention will be focused on the concepts and theories of sociology as they apply especially to the educational system. This course is designed for Co-op and Regular students who plan to enter the teaching field.
Prereq: SOC 101 or consent of instructor

SOC 208  2C  0.5
Ancestry, History and Personal Identity
In this course each student analyses his or her own family history in light of social, cultural, and economic trends over the past century as a means of understanding the basis of his or her own identity. The analysis is reported in an essay of about 25 pages.
Prereq: SOC 101 or consent of instructor
SOC 210 2C 0.5
Sociology of Sport
This course examines sport in modern society and the distinctive features of Canadian sport. Attention is directed to the relationship between sport and other institutions, including the economy and political system. Contemporary issues, including racial and gender inequality and controversies over violence and drugs are also considered.
Prereq: SOC 101 or consent of instructor

SOC 214 2C 0.5
Class, Status and Power
Analysis of social classes in society including their basis for development, composition and consequences for society. Special attention is given to social stratification in Canada.
Prereq: SOC 101 or consent of instructor

SOC 221 2C 0.5
Social Change in Canadian Society
This course examines issues both in the socio-historical development of Canadian society and its present social structure, organizations, ideologies, and problems of identity.
Prereq: SOC 101 or consent of instructor

SOC 222 2C 0.5
Juvenile Delinquency
A systematic analysis and criticism is presented of biological, psychological, psychoanalytical and sociological theories of juvenile delinquency. Attention is given to statistics and contemporary research with special emphasis on the distribution and types of delinquent subcultures.
Prereq: SOC 101 or consent of instructor

SOC 223 2C 0.5
Deviance: Perspectives and Processes
The deviance-making process is examined in a variety of social contexts. Examines the emergence of rules and control agencies, the processes by which people become involved in deviant activities, and the contingencies affecting their careers as deviants.
Prereq: SOC 101 or consent of instructor
Also offered at Renison College

SOC 224 2C 0.5
Law and Order: Regulating Deviance
Focusing on the "processes and problematics of social control", this course examines: the conditions affecting the emergence of legal norms; the enforcement of criminal law; and the processing of offenders.
Prereq: SOC 101 or consent of instructor

SOC 226 2C 0.5
Juvenile Justice
An examination of theories of juvenile justice, juvenile law, and the structure and operations of juvenile systems, especially in Canada.
Prereq: SOC 222 or consent of instructor

SOC 227 2C 0.5
Criminology
An analysis and criticism of the major theories of criminal behaviour. Emphasis is given to the relationship between social structure and criminal behaviour; types of criminal behaviour such as drug addiction, burglary and homicide in contemporary society. Special attention is given to Canadian data.
Prereq: SOC 101 or consent of instructor
Offered at St. Jerome's College

SOC 228 2C 0.5
Sociology of Corrections
Decisions to process offenders and the role of social factors in the Canadian criminal justice system are critically examined. Focal issues include police discretion, the legal profession and prison systems.
Prereq: SOC 101
Offered at St. Jerome's College

SOC 231 2C 0.5
Sociology of Science
An examination of the social character of the development of science and the production of scientific knowledge. Specific topics will include defining science, cultural influences on the rise of science, the social nature of scientific institutions, selective bias in scientific procedures, and the social "construction" of scientific "facts."
Prereq: SOC 101 or consent of instructor

SOC 232 2C 0.5
Technology and Social Change
This course relates the prospect of social change to issues such as the division of labour; automation, technology and sociology, "post-industrial" society, small scale technology, workers' control and the domination of nature.
Prereq: SOC 101

SOC 234 2C 0.5
Social Psychology and Everyday Life
Introducing students to symbolic interaction, a sociological social psychology, this course examines: the impact of culture on socialization experience; the development of self-identities and social reputations; and interaction patterns in a variety of casual, occupational and deviance contexts.
Prereq: SOC 101 or consent of instructor

SOC 235 2C 0.5
Individual and Society
Introduction to social psychology through selected topics in the study of the self, social interaction, groups and intergroup relations, and social organization.
Prereq: SOC 101

SOC 236 2C 0.5
Social Movements
The analysis of varieties of social movements and their relationships to social organization and social change.
Prereq: SOC 101 or consent of instructor

SOC 237 2C 0.5
Collective Behaviour
The sociological analysis of the behaviour of crowds, mobs, publics and related phenomena and their relationships to social organization and social change.
Prereq: SOC 101 or consent of instructor

SOC 238 2C 0.5
Sociology of Marketing and Sales
This course considers the (social) processes by which people "do business". Focusing on day to day exchanges, ongoing relationships within the business and consumer community are examined from an interactionist perspective.
Prereq: SOC 101 or consent of instructor

SOC 241 3C 0.5
Introduction to the Sociology of Work
A survey of the changing nature and ideology of work, as well as the impact of different kinds of work organizations on other institutions and on individual works. Canadian emphasis but some comparative material included. Examines the relationship between formal and domestic economies. Some discussion of alternative forms of work (co-ops, industrial democracy).
Prereq: SOC 101 or consent of instructor
SOC 242 2C 0.5
Industrial Sociology
Special emphasis is given in lectures, reading and assignments to the particular problems facing industrial Canada, especially in reference to regionalism, elitism, the multinational enterprise and the problem of foreign ownership.
Prereq: SOC 101 or consent of instructor

SOC 243 2C 0.5
Occupational Sociology
An introduction to the study of work and occupations; the problems of occupational choice, occupational socialization and identification; the concept of career and career mobility; the professionalization process, the nature of professions; the impact of occupation on life styles, leisure and retirement.
Prereq: SOC 101 or consent of instructor

SOC 245 2C 0.5
Interpersonal Communication
An introduction to the process of work and occupations; the problems of occupational choice, occupational socialization and identification; the concept of career and career mobility; the professionalization process, the nature of professions; the impact of occupation on life styles, leisure and retirement.
Prereq: SOC 101 or consent of instructor

SOC 246 2C 0.5
Mass Communication
This course provides an introduction to the social processes and functions of mass media communication - with particular reference to the Canadian context. Emphasis is focused on the relationship between mass communication and the ongoing reconstruction of social reality.
Prereq: SOC 101 or consent of instructor

SOC 247 2C 0.5
Death and Society
The course deals with the current literature on death and dying. Patterns of mortality as affecting different social groups and as reflecting differential life chances of individuals in society are described. North American issues of death and dying are considered against an historical background.
Prereq: SOC 101 or consent of instructor

SOC 248 2C 0.5
Health, Illness and Society
This course focuses on the social aspects of health and illness, including social causes of illness, the social process of becoming ill, and the social consequences of being defined as ill.
Prereq: SOC 101 or consent of instructor

SOC 249 3C 0.5
Sociology of Mental Disorder
An examination of sociological research and theory in the field of mental disorder, especially as it relates to the family. Such topics as psychiatric hospitals, public attitudes and social stigma, aftercare and rehabilitation, and the epidemiology of mental illness will be examined.
Prereq: SOC 101 or consent of instructor
Offered at St. Jerome's College

SOC 250 3C 0.5
Contemporary Japanese Society
An introduction to the basic institutions and cultural values in contemporary Japanese society. Topics will include family, community, religion, education, work, social stratification, ethos, and the economic behaviour of Japan overseas.

SOC 252 2C 0.5
Migration and Society
An overview of international migration, particularly during this century; a survey of statistical sources and theoretical explanations of migration. A section of the course will be on the history of immigration to Canada, migration within Canada, and Canadian immigration policies in the context of world migration.
Prereq: SOC 101 or consent of instructor

SOC 253 2C 0.5
Demographic Change in Canada
An introduction to the study of human population, with a focus on mortality, fertility, migration and spatial distribution in Canada. Basic methods and measures used in demographic research, sources of demographic data, and social implications of the major demographic trends are discussed.
Prereq: SOC 101 or consent of instructor

SOC 256 2C 0.5
Ethnic and Racial Relations
Relations between different racial and cultural groups, analysis of majority-minority group status with special reference to Canada.
Prereq: SOC 101 or consent of instructor

SOC 260 2C 0.5
Religion in Sociological Perspective
An examination of the nature of religious experience, the elements of religious group life, the ways in which religions are a source of social stability and peace as well as of social change and conflict.
Prereq: SOC 101 or consent of instructor
Cross-listed as RS 218
(Formerly SOC 264)

SOC 261 2C 0.5
Religion in America
The course examines religion in the American context regarding issues like secularization, the nature and influence of sects (e.g., Mormonism, Pentecostalism), Protestant revivalism and televangelism, and the impact of non-Christian traditions (e.g., Buddhism, Islam).
Prereq: SOC 101 or consent of instructor
Cross-listed as RS 219

SOC 262 3C 0.5
Cults and New Religious Movements
The course examines various cults and new religious movements (e.g., Scientology, Krishna Consciousness, Neopaganism) and places them within the context of our sociological knowledge of their emergence, who joins and why, and other issues.
Prereq: SOC 101 or consent of instructor
Cross-listed as RS 221
(Formerly SOC 263)

SOC 265 2C 0.5
Political Sociology
The sociological analysis of the institutionalization of power, political movements, parties, conflict and its accommodation.
Prereq: SOC 101 or consent of instructor

SOC 280 2C, 2L 0.5
Social Statistics
A basic course in sociological statistics, sampling, central tendency, probability, covariance, as illustrated in specifically sociological data.
Prereq: SOC 101 or consent of instructor
Refer to overlapping content note under Grading Systems

SOC 298 2C 0.5
Environment and Behaviour
A study of the interaction between social organization and ecological factors such as pollution, energy and land resources.
Prereq: SOC 101 or consent of instructor
SOC 305 2C 0.5
Introduction to Sociological Theory
An examination of the object and function of sociological theory in social research. Types of sociological theories. Discussion of selected classics of 19th- and early 20th-century sociological theory.
Prereq: SOC 101 or consent of instructor

SOC 307 2C 0.5
Problems in Contemporary Education
A study of problems arising from the interplay between institutionalized education and the forces of rapid social change in the contemporary society. It emphasizes the changing roles of the learners and instructors and social dimensions of newer learning theories and programs. Themes will be selected and studied in depth on a seminar basis.
Prereq: SOC 101 and 207
Offered at Conrad Grebel College

SOC 310 2S 0.5
Seminar in Group Dynamics
An analysis of naturally occurring and experimental groups from a social structural perspective. The study of processes of internal differentiation, integration, authority, etc.; and the relationships between small groups and their environments.
Prereq: SOC 101 or consent of instructor

SOC 311 2C 0.5
Sociology of the Body
This course examines institutional influences on bodily practices, including practices of regulation and control. Examples of topics examined include the body in consumer culture; exercise, dieting and fitness as social practice; professional dominance; regulation of bodies, and forms of cultural embodiment in gender, race and social class.
Prereq: SOC 101 or consent of instructor

SOC 321 F, W, C 0.5
Methods I
An introductory survey of the research techniques employed by sociologists. The formulation of research designs appropriate to various kinds of intellectual problems in social science is stressed.
Prereq: SOC 101 or consent of instructor. Students are encouraged to take SOC 280 before, or concurrently with SOC 321, although this is not required.
Refer to overlapping content note under Grading Systems

SOC 322 2C 0.5
Methods II
Continuation of Methods I. The course involves seminar meetings emphasizing the critical evaluation of research techniques.
Prereq: SOC 280 and 321 or consent of instructor

SOC 325 2C 0.5
Female Sexuality and the Law
The treatment of women by the law, as victims or offenders, reflects attitudes towards female sexuality that have influenced legal thinking since 1800. The course investigates how the law has been used as an instrument of social control over women and their sexual behaviour.
Prereq: SOC 206 or consent of instructor

SOC 328 3C 0.5
Sentencing as a Social Process
Examines in depth the process and results of criminal sentencing. Topics include types of sentences for criminal and quasi-criminal offences; objectives of sentences; factors affecting sentences; the process of sentencing; the administration and effectiveness of sentences; and unresolved debates in sentencing.
Prereq: Third- or fourth-year standing in Honours Sociology or Legal Studies, and SOC 224 or 228 or 370; or permission of instructor

SOC 333 2C 0.5
Canadian Multiculturalism
A seminar dealing with multicultural attitudes and beliefs in Canadian society, especially within the majority English and French Canadian populations.
Prereq: An introductory course in a Social Science

SOC 336 2C 0.5
Sociology of Professions
An examination of the distinctive nature of professions; professional recruitment; socialization and identification; professional careers; the professionalization of occupations; relationship to government; professional specialization; status, power and mobility of professionals.
Prereq: SOC 101 or consent of instructor

SOC 340 2C 0.5
Complex Organizations
Examines the role of large-scale organizations in industrial society, and their impact and influence. Illustrations will be drawn from commerce and industry, as well as education, health services, and government.
Prereq: SOC 101 or consent of instructor

SOC 342 2C 0.5
Sociology of Industrial Relations
Using sociological concepts and theories, the course will examine the nature of the relationship between employers and employees, current issues facing unions and management, and the character of accommodation which may be realized between the two.
Prereq: SOC 101 and 242

SOC 347 3C 0.5
Sociology of Leisure
Nature and extent of leisure phenomena in contemporary society. Examination of institutional and formal organization aspects, social role, social research strategies employed in the study of leisure.
Prereq: SOC 101 or consent of instructor
Cross-listed as REC 201

SOC 352 3C 0.5
Sociology of Aging
An introduction to individual and population aging. Topics discussed include: aging from a historical and comparative perspective; aging in subcultures; aging and the social structure; aging and social processes; aging and the environment; work and retirement; and aging and leisure patterns.
Prereq: SOC 101 and one other Sociology course
Cross-listed as GERN 352, HLTH 352, KIN 352
(Formally SOC 344)

SOC 364 2C 0.5
Social Change
A systematic review and analysis of sources, patterns, processes, and consequences of social change in developing countries, the role of ideas, and the breakdown and reorganization of social structure.
Prereq: SOC 101 and one other Sociology course
SOC 365 2C 0.5
Urban Life and Culture
Using a symbolic interactionist approach, this course examines central features of urban community life. Particular attention is given to the corporate, commercial, consumptive and communications aspects of urban society as well as residential practices and street life.
Prereq: SOC 234 or 235 or consent of instructor

SOC 366 2C 0.5
Urban Sociology
The comparative study of urbanization as a process; the culture and organization of cities, urban problems; special attention is given to industrial cities of Canada, with comparative reference to the principal cities of Western societies.
Prereq: SOC 101 and one other Sociology course

SOC 370 2C 0.5
Sociology of Law
Special attention will be paid to the growing public awareness of the failure of law to provide justice or social control in a number of situations. Local judges, lawyers, and police officials are invited to discuss such issues as the jury system, police and violence, civil rights and mass media.
Prereq: Third-year standing or by permission
Offered at Conrad Grebel College

SOC 371 3C 0.5
Philosophy of Social Science
Problems about the fundamental methods and aims of the social sciences generally, the problems specific to Psychology, Sociology, Political Science, etc., and their relations to one another will be considered.
Prereq: Some previous work in a Social Science or in Philosophy
Cross-listed as PHIL 362

SOC 377 0.5
Studies in the Sociology of the Mennonites
This seminar will devote attention to research methods, sociological theory, and interdisciplinary approaches to the study of Mennonite communities and culture.
Prereq: Permission of instructor
Offered at Conrad Grebel College

SOC 378 3C 0.5
Sociology of Women
An examination of the growing sociological literature on women’s roles, experiences, realities, problems and challenges. Particular emphasis is placed on critiques of traditional sociological theory and methodology and the emergence of new theories and methodologies which better reflect women's experiences.
Prereq: SOC 101 and 206, or consent of instructor

SOC 382 3C 0.5
Survey Methodology
The design of sample surveys. Survey procedures from the conceptual level through sampling, measurement, questionnaire design, administration and analysis of responses are illustrated within the context of practical examples and student projects.
Prereq: SOC 321 or consent of instructor

SOC 401 2S 0.5
Theoretical Perspectives on Gender
An examination of sociological theories of gender and gender relations. Emphasis is placed on tracing historical changes in interpretations of gender, with a particular consideration of contemporary theoretical debates. Approaches to be considered include feminist theories as well as political economy and cultural studies.
Prereq: SOC 101 and 206 or consent of instructor

SOC 404 2S 0.5
Sociology of Knowledge
The seminar undertakes to develop a general theory of the relation of social thought to social action, comparative value systems and the role of the scientist, artist and intellectual in society.
Prereq: SOC 101 or consent of instructor; SOC 231 is recommended

SOC 405 2C 0.5
The Development of Sociological Theory
Analysis of selected original writings by the major figures in the classical sociological tradition of the 19th- and 20th-centuries; in particular, Marx, Durkheim and Weber. Also includes discussions of pertinent critical literature.
Prereq: SOC 101 and 305

SOC 406 2C 0.5
Contemporary Sociological Theory
Development of sociological theory in the 20th century. Included is discussion of current theoretical work.
Prereq: SOC 305

SOC 407 2S 0.5
Canadian Social Thought
We examine the development of sociological theory in Canada by focusing on major historical and contemporary figures and theories representative of English-language sociology. We examine, in addition, sociologically important scholars and schools of thought in history and political economy as well as selected developments in French-language Canadian sociology.
Prereq: SOC 305 or consent of instructor

SOC 408 2S 0.5
Contemporary Debates in Sociological Theory
Deals with recent controversies in sociological theory; e.g. Giddens' theories of structuration and the state; critical theory, including the works of Habermas on communicative action; postmodernist theory; the positivist/interpretive debate and varieties of psychoanalytic theory.
Prereq: SOC 101 and 305

SOC 410 2C 0.5
Qualitative Methods: Field Research
An application of symbolic interactionist theory, this course examines the contingencies affecting data collection and analysis of ongoing group life. While doing field work, students have an opportunity to examine basic features of interactionist thought.
Prereq: SOC 101

SOC 415 2C 0.5
Social Networks
A survey of applications of the concept of the network in studying social structures. Examples will be drawn from diverse areas, such as interpersonal relations, community studies, social support, interorganizational relations, elites, deviant groups, etc.
Prereq: SOC 101 or consent of instructor

SOC 421 2C 0.5
Quantitative Methods
Design and data analysis in contemporary sociological research, with an emphasis on the analysis of secondary data and computer applications.
Prereq: SOC 280 and 321

SOC 430 2S 0.5
Political Participation
An examination of the social psychological foundations of Canadian participation, broadly conceived, in the political system.
Prereq: Third- or fourth-year social science or consent of instructor
Course Descriptions
Sociology
Spanish and Latin American Studies

SOC 435 3S 0.5
Environmental Sociology
Inquiry into the relationship between the natural environment and society. Review of issues relating to technology, social change, politics of environmental reform, factors that contribute to environmental-resource conflict and policy.
Prereq: SOC 286, plus third- or fourth-year standing or permission of instructor

SOC 459 2S 0.5
Sociology of Work and Occupations
This seminar examines major theoretical perspectives and issues in the sociology of work.
Prereq: One of SOC 241, 242, 243, 336, 342 or consent of instructor

SOC 498A-X 0.5
Directed Studies
Selected study and assignments under the direction of a faculty member.
Prereq: Fourth-year standing in Sociology

SOC 498A 0.5
Directed Studies in Deviance, Criminology, and Corrections

SOC 498B 0.5
Directed Studies in Social Psychology

SOC 498C 0.5
Directed Studies in Social Inequality

SOC 498D 0.5
Directed Studies in Quantitative Methods and Statistics

SOC 498E 0.5
Directed Studies in Social Theory

SOC 498H 0.5
Directed Studies in the Family

SOC 498J 0.5
Directed Studies in the Marketplace

SOC 498K 0.5
Directed Studies in Industry, Work and Complex Organizations

SOC 498M 0.5
Directed Studies in Religion

SOC 498N 0.5
Directed Studies in Demography

SOC 498S 0.5
Directed Studies in Developing Nations

SOC 498V 0.5
Directed Studies in Gender Relations

SOC 498X 0.5
Directed Studies in Medical Sociology

SOC 499A/B 0.5/0.5
Senior Honours Essay
Required of all Honours students in Sociology or by election by Joint Honours and General Sociology students in their fourth year. For students electing Honours Sociology (Canadian Studies), the essay should bear on some topic of particular sociological significance for Canadian society.
Prereq: Fourth-year Sociology General or Honours
A letter grade for SOC 499A will be submitted only after the completion of SOC 499B

Note
Sociology courses offered at Renison College are listed in the Social Development Studies section.

Spanish and Latin American Studies

Undergraduate Officer
M. Gutiérrez, ML 209, ext. 3558

Courses not offered in the current academic year are listed at the end of this section.

Note
Students with a knowledge of Spanish not acquired in an academic institution must write a placement test before registering in a language course.

SPAN 101 F,W 3C,1L 0.5
Introduction to Spanish 1
Intensive drill in the fundamentals of grammar, comprehension and speaking. Some reading, translation and composition. The language laboratory is used as an integral part of the course.
For students with no previous knowledge of Spanish Cannot be taken concurrently with SPAN 111
(WLU SP101)

SPAN 102 F,W 3C,1L 0.5
Introduction to Spanish 2
A continuation of SPAN 101.
Prereq: SPAN 101 or consent of Department
(WLU SP102)

SPAN 201A F 3C,1L 0.5
Intermediate Spanish 1
For students with some knowledge of Spanish. Seeks to reinforce the language, both oral and written, through selected texts and grammar review. Language laboratory also used to increase understanding and speaking skills.
Prereq: SPAN 102 or consent of Department
(WLU SP201)

SPAN 201B W 3C,1L 0.5
Intermediate Spanish 2
A continuation of SPAN 201A.
Prereq: SPAN 201A or consent of Department
(WLU SP202)

SPAN 203 F 3C 0.5
Spanish Civilization 1
Development of Spanish civilization and literature from the earliest times to the 18th century.
Taught in English
Offered at WLU
(WLU SP203)

SPAN 204 W 3C 0.5
Spanish Civilization 2
A continuation of SPAN 203.
Taught in English
Offered at WLU
(WLU SP213)

SPAN 205 F 3C 0.5
Survey of Spanish Literature 1
Readings of major authors and study of the main literary trends from the middle ages to the 18th century.
Offered at WLU
Prereq: SPAN 201B
(WLU SP205)

SPAN 206 W 3C 0.5
Survey of Spanish Literature 2
A continuation of SPAN 205 from the 18th century to the present.
Offered at WLU
Prereq: SPAN 205
(WLU SP206)

SPAN 218 W 3C 0.5
Latin American Civilization 2
A survey of the literature, art and music of Latin America from pre-Columbian times to the present.
Taught in English
(WLU SP218)
SPAN 221 F 3C 0.5
The Civilization of Mexico
A survey of Mexican civilization from the Aztecs to the present. The course will deal with such topics as history and politics, social and economic issues, architecture, literature, music, etc.
Taught in English
This course may be used toward the All requirement.
(Formerly LATAM 221)

SPAN 227 F 3C 0.5
Survey of Latin American Literature 1
This course is an introduction to Latin American literature and will cover the most significant works from the conquest to the 19th century. The course also aims to introduce the student to literary analysis and, therefore, particular attention will be paid to the question of genre, terminology, literary movements and textual analysis.
Prereq: SPAN 201B
(WLU SP 227)

SPAN 228 W 3C 0.5
Survey of Latin American Literature 2
This course is a continuation of SPAN 227 and will study the period beginning with Modernismo (c. 1890) to the present day. Works of such renowned authors as Neruda, Borges and Garcia Marquez will form part of the material taught in this course. The approach will be similar to SPAN 227 with special emphasis on textual analysis.
Prereq: SPAN 227
(WLU SP 228)

SPAN 251A F 3C 0.5
Composition and Conversation 1
Intensive language study with the following objectives: to reinforce the study of oral and grammatical skills, with emphasis on creative compositions, oral presentations, class discussions and skilful translations.
Prereq: SPAN 201B or consent of Department
(WLU SP251)

SPAN 251B W 3C 0.5
Composition and Conversation 2
A continuation of SPAN 251A.
Prereq: SPAN 251A
(WLU SP262)

SPAN 266 W 3C 0.5
The Latin American Short Story
A study of selected stories by Latin American writers. The chosen stories are part of a literature in which the themes of "magical-realism", exile, national identity, history, metaphysical fantasy and social struggle never stop flourishing. Some of the authors studied in this course are Juan Ruflo, Jorge L. Borges, Carlos Fuentes, G. Garcia Marquez, Isabel Allende.
(WLU SP 266)

SPAN 324 F 3C 0.5
Contemporary Spanish Theatre and Poetry
An in-depth analysis of the works of Lopez-Rubio, Casarosa, Mihura, J.R. Jimenez, Salinas, D. Alonso, Alexandre, et al., with emphasis on the works of Buero, Sastre and Garcia Lorca.
Offered at WLU
Prereq: SPAN 206
(WLU SP 324)

SPAN 325 W 3C 0.5
Contemporary Spanish Novel
Influence on the novel and literary tendencies, with stress on Cela, Matute, Laforet, Angel de Lara and Carlos Rojas.
Offered at WLU
Prereq: SPAN 206
(WLU SP 325)

SPAN 326 F 2C 0.5
The Spanish Golden Age: Theatre & Poetry
A general introduction to 16th- and 17th-century Spanish literature, with detailed study of representative works by Cervantes, Lope de Vega, Tirso de Molina, Ruiz de Alarcón and Calderón.
Prereq: SPAN 206
(WLU SP 326)

SPAN 333 F 2C 0.5
Modern Latin American Poetry
A study in-depth of major poets and movements from Modernism to Vanguardism, post-Vanguardism and Surrealism. Examples of the poets studied in this course are Rubén Darío, Ramón López Velarde, Gabriela Mistral, César Vallejo, Nicolás Guillén, Pablo Neruda, Octavio Paz, among others.
Prereq: SPAN 228
(WLU SP 333)

SPAN 344 F,W 2T 0.5
Special Topics in Hispanic Studies
By special arrangements, an individual student or a small group of students will follow a course from study under the supervision of a faculty member.

SPAN 351A F 2C 0.5
Advanced Composition and Conversation 1
This course is aimed at intensive development of written and oral skills. Written assignments emphasize grammatical style and structure; oral class conversations are based on selected themes or topics relating to Spain and Latin America.
Offered at WLU
Prereq: SPAN 251B
(WLU SP 351)

SPAN 351B W 2C 0.5
Advanced Composition and Conversation 2
A continuation of SPAN 351A.
Offered at WLU
Prereq: SPAN 351A
(WLU SP 352)

SPAN 388 F 2C 0.5
Contemporary Spanish American Theatre
A study of the most important dramatists of Latin America. Particular attention will be paid to the political, historical, cultural and aesthetic context which inform the works studied.
Prereq: SPAN 206 or 228
(WLU SP 388)

SPAN 445 W 2C 0.5
History of the Spanish Language
Origin and development from pre-Roman times through vulgar Latin to old Spanish and thence to modern Spanish. Basic sound and grammatical changes as well as word order and vocabulary.
Prereq: SPAN 315B
(WLU SP 445)

SPAN 495 W 2C 0.5
The Novel in Mexico
This course will trace the development of the novel in Mexico through its most prominent and representative authors. Azuela's Los de abajo, Ruflo's Pedro Paramo and Fuentes' La muerte de Artemio Cruz will be analysed. These works will be approached both as an art form and as a social document, and will be examined within a broad cultural context.
Prereq: SPAN 228
(WLU SP 495)

COURSES NOT OFFERED 1996-97
SPAN 111 Conversational Spanish
SPAN 217 Latin American Civilization 1
SPAN 304 Romanticism in Spain
SPAN 305 The Spanish Realist Novel
SPAN 311A Applied Spanish Stylistics 1
SPAN 311B Applied Spanish Stylistics 2
SPAN 322 The Generation of '31: Fiction
SPAN 327 The Spanish Golden Age: Don Quijote
### Statistics

#### Statistics Undergraduate Officers
- J.C. Robinson, MC 6030, ext. 5538

Courses not offered in the current academic year are listed at the end of this section.

**Note**
More detailed course descriptions and course outlines are available in the Statistics Undergraduate Studies Handbook.

#### Course Descriptions

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<tr>
<th>Course Code</th>
<th>Course Title</th>
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<tr>
<td>STAT 202 F</td>
<td>Elementary Statistics for Biologists</td>
</tr>
<tr>
<td>3C,1L</td>
<td>0.5</td>
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<tr>
<td>STAT 202 W</td>
<td>Elementary Statistics for Biologists</td>
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<tr>
<td>3C,1T</td>
<td>0.5</td>
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<tr>
<td>STAT 211 F,S</td>
<td>Introductory Statistics and Sampling for Accounting</td>
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<tr>
<td>3C,1T</td>
<td>0.5</td>
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<tr>
<td>STAT 220 F</td>
<td>Introduction to Statistical Methods 1</td>
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<tr>
<td>3C,1T</td>
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<tr>
<td>STAT 221 W</td>
<td>Introduction to Statistical Methods 2</td>
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<tr>
<td>3C,1T</td>
<td>0.5</td>
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<tr>
<td>STAT 230 F,W,S</td>
<td>Probability</td>
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<tr>
<td>STAT 231 F,W</td>
<td>Statistics</td>
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<td>STAT 240 F,W</td>
<td>Probability</td>
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<td>STAT 241 W,S</td>
<td>Statistics</td>
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<tr>
<td>STAT 304 W</td>
<td>Statistics for the Physical Sciences 2</td>
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<td>0.5</td>
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<tr>
<td>STAT 311 F,W</td>
<td>Regression and Forecasting for Accounting</td>
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<tr>
<td>3C,1T</td>
<td>0.5</td>
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<tr>
<td>STAT 321 W</td>
<td>Applied Regression Analysis</td>
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<tr>
<td>3C,1T</td>
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<tr>
<td>STAT 330 F,W</td>
<td>Statistical Theory and Methods</td>
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<tr>
<td>STAT 331 F,W,S</td>
<td>Applied Linear Models</td>
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**STAT 202 F**
3C,1L 0.5

**Elementary Statistics for Biologists**

- Elementary probability, populations, samples and distributions with biological examples, methods for data summary and presentation, estimation, hypothesis testing, two-sample techniques and paired comparisons, regression, correlation.
- For Science students only

**STAT 202 W**
3C,1T 0.5

**Elementary Statistics for Biologists**

- Elementary probability, populations, samples and distributions with biological examples, methods for data summary and presentation, estimation, hypothesis testing, two-sample techniques and paired comparisons, regression, correlation.
- For Science students only

**STAT 211 F,S**
3C,1T 0.5

**Introductory Statistics and Sampling for Accounting**

- Descriptive statistics, probability, discrete and continuous random variables. Sampling distributions and simple hypothesis testing, introduction to survey sampling.
- Prereq: MATH 108 or equivalent
- Not open to Honours Mathematics students
- Antireq: STAT 230, 240

**STAT 220 F**
3C,1T 0.5

**Introduction to Statistical Methods 1**

- Introduction to design of experiments; descriptive statistics (histograms, summary statistics, stem and leaf plots, correlation); probability (the normal and binomial distributions, other continuous and discrete distributions); chance variability (linear combinations of random variables, the central limit theorem).
- Prereq: MATH 108 or equivalent
- Not open to Honours Mathematics students
- Antireq: STAT 230, 240

**STAT 221 W**
3C,1T 0.5

**Introduction to Statistical Methods 2**

- Chance models applied to measurement error and genetics; tests of significance (one- and two-sample z- and t-tests); simple linear regression (including analysis of variance and parameter estimation); survey sampling (including estimation of means, totals and proportions in simple random sampling).
- Prereq: STAT 220
- Not open to Honours Mathematics students
- Antireq: STAT 230, 240

**STAT 230 F,W,S**
3C,1T 0.5

**Probability**

- The laws of probability, discrete and continuous random variables, expectation, central limit theorem.
- Prereq: MATH 137 and second-year standing
- Also offered at St. Jerome's College in the Fall term

**STAT 231 F,W**
4C 0.5

**Statistics**

- Empirical problem solving, measurement systems, causal relationships, statistical models, estimation, confidence intervals, tests of significance.
- Prereq: STAT 230 or STAT 240
- Coreq: MATH 237 or MATH 247
- Antireq: STAT 221, STAT 241
- Also offered at St. Jerome's College in the Winter term

**STAT 240 F,W**
3C 0.5

**Probability**

- STAT 240 is an advanced-level enriched version of STAT 230.
- Prereq: MATH 138
- Antireq: STAT 220, 230

**STAT 241 W,S**
3C 0.5

**Statistics**

- STAT 241 is an advanced-level enriched version of STAT 231.
- Prereq: MATH 237 and STAT 230
- Antireq: STAT 221, 231

**STAT 304 W**
3C,1L 0.5

**Statistics for the Physical Sciences 2**

- Linear regression, introduction to the design of experiments. Completely randomized and randomized block designs. Analysis of variance.
- Prereq: STAT 202 or 204
- For Science students only

**STAT 311 F,W**
3C,1T 0.5

**Regression and Forecasting for Accounting**

- Prereq: STAT 211
- Open only to students from the School of Accountancy

**STAT 321 W**
3C,1T 0.5

**Applied Regression Analysis**

- Prereq: STAT 221
- Not open to Honours Mathematics students
- Antireq: STAT 331

**STAT 330 F,W**
3C 0.5

**Statistical Theory and Methods**

- Prereq: MATH 237, and STAT 231
- Also offered at St. Jerome's College in the Fall term

**STAT 331 F,W,S**
3C 0.5

**Applied Linear Models**

- Prereq: MATH 237, and STAT 231
- Antireq: STAT 321
Course Descriptions

Statistics

Statistics

Systems Design Engineering

STAT 332 F, S 3C 0.5
Sampling
Introduction to survey sampling of populations. Elementary sampling designs. Efficiency comparisons for sampling designs and estimation procedures.
Prereq: STAT 231 or equivalent
Antireq: STAT 232

STAT 333 F, W, S 3C 0.5
Applied Probability
Prereq: STAT 230, and third-year standing

STAT 335 F, W 3C 0.5
Statistical Process Control
Prereq: One of STAT 231, M E 202, M SCI 251, SY DE 214, or consent of instructor

STAT 371 W 3C 0.5
Stochastic OR Models
An introduction to the use of probabilistic models in operations research. Techniques and applications of queueing theory, inventory theory and reliability theory.
Prereq: STAT 333

STAT 430 F, S 3C 0.5
Experimental Design
Introduction to designed experiments. Basic experimental designs. Factorial arrangement of treatments. Confounding and fractional replication. Selected topics.
Prereq: STAT 331 or consent of instructor

STAT 431 W 3C 0.5
Advanced Regression Models and their Application
Review of the normal linear model and maximum likelihood estimation; regression models for binomial, Poisson and multinomial data; generalized linear models; and other topics in regression modelling.
Prereq: STAT 331 or consent of instructor

STAT 433 F 3C 0.5
Stochastic Processes
Point processes. Renewal theory. Stationary processes. Selected topics.
Prereq: STAT 333 or consent of instructor

STAT 440 F 3C 0.5
Statistical Computing
Problems associated with the analysis of stochastic systems and statistical data by computer; simulation techniques, numerical algorithms, programming for statistical problems and statistical packages.
Prereq: STAT 331

STAT 443 F, W 3C 0.5
Forecasting
Prereq: STAT 331 or consent of instructor

STAT 450 W 3C 0.5
Estimation and Hypothesis Testing
Discussion of general inference problems under the headings of point and interval estimation, hypothesis testing and decision theory. Large sample normal likelihoods, maximum likelihood estimation, theory of U MV estimation, least squares, Neyman-Pearson theory of hypothesis testing.
Prereq: STAT 330

STAT 484 0.5
Topics in Probability Theory
Prereq: STAT 333 or consent of instructor
May not be offered 1996-97

STAT 486 0.5
Topics in Statistics
Prereq: STAT 330 and 331, or consent of instructor
May not be offered 1996-97

COURSES NOT OFFERED

169597

STAT 444 An Introduction to Econometrics

STAT 454 Sampling Theory and Practice

STAT 467 Topics in Statistics

STAT 468 Readings in Statistics

Systems Design Engineering

Associate Chair for Undergraduate Studies
G. R. Heppler, ext. 5566

Note:
1. The numbering of Systems Design Engineering courses is as follows:
   o If the course is given in the “A” term, the number in the units place is odd; otherwise, it is even.
   o The number in the 10’s place refers to the field of the subject matter of the course, according to the following codes:
     □ 1 topics in applied mathematics
     □ 2 computer systems
     □ 3 socio-economic systems
     □ 4 human systems
     □ 5 physical systems
     □ 6 the design of engineering systems
     □ 7 communication and information systems
     □ 8 engineering sciences
     □ 9 laboratories
   o The number in the 100’s place generally refers to the year in the program in which the student will encounter the course.

2. The majority of Systems Design courses are given on the basis of 3 formal lectures and 1 tutorial hour each week. The department endeavours to ensure that the formal course schedule remains below 30 hours per week in each term. Beyond this, other, less formally scheduled, meetings between students and faculty are required. It is expected that the average student will spend, in total, between 45 and 55 hours per week on her/his studies.

SY DE 101/102 F, S 1C 0.0
Seminar
Systems Design first year students will meet with a faculty member designated as their class professor. Performance in assignments, conceptual difficulties with courses, interrelation of coursework, later work and engineering practice will be discussed. Non-credit courses.
Course Descriptions
Systems Design Engineering

SY DE 111 F 3C,1T 0.5
Calculus 1
The limit, continuity, and inverse functions. Integral calculus: fundamental theorems, integral as an area, indefinite integrals, methods of integration. Areas, volume, work, impulse and energy; polar coordinates; sequences and convergence.

SY DE 112 S 3C,1T 0.5
Calculus 2
Intermediate and mean value theorems, L'Hopital's rule. Taylor/Maclaurin and other power series, convergence and applications. Functions of two variables, partial derivatives, Jacobian, gradient, extrema, series.

SY DE 114 S 3C,1T 0.5
Linear Algebra

SY DE 121 F 3C,1T 0.5
Digital Computation
Computer systems, problem solving, data and programs, structured programming, arrays, matrices and pointers, correct and efficient algorithms, data structures.

SY DE 142 S 3C,1T,3L (alt. weeks) 0.5
Introduction to Human Systems

SY DE 161 F 3C,1T,3L 0.5
Introduction to Systems Design
Engineering

SY DE 181 F 3C,1T 0.5
Physics 1 (Statics)

SY DE 182 S 3C,1T 0.5
Physics 2 (Dynamics)

SY DE 183 F 3C,1T 0.5
Chemistry

SY DE 192 S 3C,1T,2L 0.5
Digital Systems
Digital technology, combinatorial logic, binary arithmetic, synchronous sequential circuits, design methodology, algorithmic state machines, microcomputer interfacing.

SY DE 201/202 F,W 1C 0.0
Seminar
Systems Design second-year students will meet a faculty member designated as their class professor. Performance in assignments, conceptual difficulties with courses, interpretation of coursework, later work and engineering practice will be discussed. Non-credit courses.

SY DE 211 W 3C,1T 0.5
Differential Equations

SY DE 213 W 3C,1T 0.5
Probability
Probability models, random sampling, distribution functions, independent experiments, conditional probability, Bayes Theorem. Discrete and continuous variables; mean and variance, covariance and correlation.

SY DE 214 F 3C,1T 0.5
Statistics
Likelihood methods, two parameter likelihoods, frequency properties, tests of significance. Analysis of Normal measurements. Applications to statistical quality and process control.

SY DE 221 W 3C,1L 0.5
Software Design
Structured software design, overview of programming systems and computer organization; data structures; hashing, sorting and searching; algorithm complexity, evaluation and design; event-driven and object-oriented programming; concurrency. Laboratories devoted to implementing a medium-sized programming project.

SY DE 252 F 3C,1T 0.5
Linear Systems and Signals
Models and analysis of linear systems. Discrete time systems, continuous time systems; difference and differential equations; impulse and frequency response. Complex frequency, functions of complex variables, transform domain techniques: Z transforms; Fourier analysis. Laplace transform. Transfer functions and frequency response, frequency domain analysis of linear systems; sampling theory, stability, and linear filters.

SY DE 261 W 3C,2T 0.5
Mechanics of Deformable Solids

SY DE 282 F 3C,1T 0.5
Fluid Mechanics
Course Descriptions

Systems Design Engineering

**SY DE 293 W 3C,1T 0.5**
*Physics 3 (Electricity, Magnetism and Optics)*
Introduction to the fundamental laws of electricity, magnetism and optics; electric fields, voltage, resistance, current, properties of conductors and semiconductors, capacitance, properties of dielectrics, magnetic fields, Faraday's Law and induction, properties of magnetic materials; electromagnetic waves and the nature of light, geometrical optics: reflection and refraction, physical optics: interference and diffraction.

**SY DE 292 F 3C,1T,3L 0.5**
*Circuits, Instrumentation, and Measurements*
Active and passive circuit elements, Kirchhoff's laws, mesh and nodal circuit analysis, principle of superposition; step response of first and second order networks; sinusoidal steady state analysis using complex impedance phasors; input-output relationships, transfer functions and frequency response of linear systems; operational amplifiers, operational amplifier circuits using negative or positive feedback; diodes, operational amplifier circuits using diodes; analog signal detection, conditioning and conversion systems; transducers, difference and instrumentation amplifiers, active filters, A/D and D/A conversion.

**SY DE 301/302 W,S 1C 0.0**
*Seminar*
Systems Design Third year students will meet with a faculty member designated as their class professor. Performance in assignments, conceptual difficulties with courses, interrelation of coursework, later work and engineering practice will be discussed. Non-credit courses.

**SY DE 311 S 3C,1T 0.5**
*Engineering Optimization*

**SY DE 312 W 3C,1T 0.5**
*Numerical Methods*
Introduction to numerical techniques for engineering problems. Topics covered include: source of computational error; solutions to linear and non-linear equations; matrix factorization; eigenvalues; numerical interpolation and approximation; numerical integration, solution of ordinary and partial differential equations. Introduction to data structures and their application.

**SY DE 324 W 3C 0.5**
*Data Structures and Algorithms*
Data structures techniques and their role in the design of algorithms, arrays, lists, trees and graphs, sorting and searching algorithms, evaluation and analysis of algorithms, application to engineering problems.

**SY DE 331 S 3C,1T 0.5**
*Engineering Economics*
This course is designed to satisfy Engineering Economics requirements of the Canadian Accreditation Board. Price and output decisions. Choosing among alternative inputs and production processes. Evaluating alternative investments, equipment service life, and new products.

**SY DE 334 W 3C 0.5**
*Applied Statistics*

**SY DE 342 W 3C,1L 0.5**
*Industrial Ergonomics*

**SY DE 351 S 3C,1T 0.5**
*Systems Models 1*
Introduction to systems modelling and analysis. Graph theoretic models and formulation of system equations. State space formulation and solution. Time and frequency domain solutions. Application to engineering systems.

**SY DE 352 W 3C,1T,3L (alt. weeks) 0.5**
*Introduction to Control Systems*

**SY DE 353 W 3C,1T 0.5**
*Systems Models 2*
The subject matter is similar to SY DE 351 except the development is based on other physical systems such as mechanical and hydraulic systems. Mixed nodal, state formulation and solution. Relationship to classical approaches to modeling systems for other physical systems.

**SY DE 361 S 3C,1T,3L 0.5**
*Introduction to Design*
The methodology of design: defects, needs and the problem definition; criteria and generation of alternative solutions; feasibility analysis; optimization; selection, implementation and solution. The lecture material is supplemented by a term long design project done in small groups.

**SY DE 362 W 1C,3L 0.5**
*Systems Design Workshop 1*
Engineering design project course where students work in small groups applying the principles of engineering problem solving, systems analysis, simulation, optimization and design to a problem of their own choosing. Students have individual project supervisors as well as an overall coordinator who provides the framework for the term projects.

**SY DE 364 W 3C,1T 0.5**
*Manufacturing Science*

**SY DE 372 W 3C,1T 0.5**
*Introduction to Pattern Recognition*
Pattern recognition as a process of data analysis. Pattern features as components in a random vector representation. Classification techniques: distance measures in feature space, probabilistic (Bayesian) decision theory, linear discriminants. Clustering and feature extraction. Applications: optical character recognition, speech recognition, industrial robot vision, medical diagnosis, remote sensing and satellite image analysis, fault detection and diagnosis in complex systems such as nuclear reactors.
Thermodynamics
An introductory course in engineering ther- modynamics structured for students in Systems Design. Classical thermodynamics is presented as the systematic study of energy; its use, degradation, and waste. Applications focus on problems of energy and environment. The concepts of statistical thermodynamics are introduced briefly and their connections with information theory are described.

Modelling and Simulation of Mechanical Systems
Introduction to dynamic analysis of mechanical systems; review of planar kinematics and dynamics; basic concepts in kinematics of mechanical systems; position, velocity, and acceleration analysis of two-dimensional linkages and machines; dynamics of rigid body systems; solution of equations of motion to obtain time response and reaction forces; application to planar mechanisms, robots, and vehicles; extension to three-dimensional systems; computer-aided simulation and animation; introduction to advanced concepts in multibody dynamics.

Materials Engineering
An introduction to the understanding of the properties and applications of engineering materials. Atomic bonding and packing, crystal defects and microstructure; elasticity, plasticity, strength and fracture; strengthening methods and transformations; fast fracture, toughness, fatigue and creep; oxidation and corrosion; case studies of materials in design.

Seminar
Systems Design fourth-year students will meet with a faculty member designated as their class professor. Conceptual difficulties, the interrelation of course work and engineering practice will be discussed. Non-credit courses.

Machine Intelligence
The objective of this course is to introduce the students to current intelligent system concepts. Artificial intelligence systems in areas such as natural language understanding, speech understanding, machine vision and learning will be discussed. Methods and tools for building expert systems will be introduced. Prerequisite: SY DE 304 or equivalent.

Computer Algorithm Design and Analysis
Design of efficient algorithms and methods for their analysis, mathematical algorithms, string processing algorithms, geometrical algorithms, exhaustive search and traversal techniques, introduction to a lower bound theory and NP-completeness, examples from engineering problems. Prerequisite: SY DE 324 or equivalent.

Occupational and Environmental Systems Safety

Biomedical Engineering: Human Function and Its Measurement
This course develops an understanding of the fundamental concepts of biomedical engineering through the review of the basic functioning aspects of several major physiological systems, through the analysis of mathematical models used to represent the systems and through the study of techniques used to measure pertinent parameters of these systems. In addition, a number of current clinically used medical imaging techniques are covered. The major physiological systems covered include the neuromuscular, cardiovascular and respiratory systems. Imaging techniques analyzed include X-ray, CT Scan, ultrasound, magnetic resonance imaging and positive emission tomography.

Analysis of Large Systems
Topics include decomposition techniques, graph theoretic methods of analysis, tearing of large systems into subsystems, multiport and multiterminal component representations; examples are drawn from practical large-scale systems.

Computer Simulation of Systems
System modeling, simulation techniques for continuous and discrete systems; special purpose computer languages for systems simulation; examples and applications in a variety of areas.
Course Descriptions
Systems Design Engineering - Women's Studies

SY DE 548 W 3C 0.5
Design of Human-Machine Systems
This course introduces the key rules for interface design, and the theory on which these rules are based. The focus is on human-computer interaction, but results about display and control devices and human performance are discussed and illustrated in the context of machines in general. Design strengths, weaknesses, compromises and tradeoffs are explored for a variety of representative user interfaces. Major topics: role of the user interface, relevant results in human cognition, devices for input and output, models for system users, interaction styles and techniques, design principles for user interface software and graphic displays.

SY DE 551 F 3C,1T 0.5
Stability of Systems

SY DE 553 F 3C,1T 0.5
Advanced Dynamics
Review of particle dynamics; variational methods; Hamilton's Principle; Lagrange's equations. Dynamics of rigid bodies; gyroscopic motion. Simple and multiple degree of freedom vibratory systems; modal analysis for discrete systems; extension to continuous systems.

SY DE 555 F 3C,1T 0.5
Modelling of Continuum Systems
Finite difference methods as they are applied to boundary value problems in solid mechanics and heat transfer analysis. Use of the finite difference method in the solutions of systems of higher order differential equations. The finite element method as it is applied to problems from structural and thermal analysis. Foundations and important principles of the finite element methods.

SY DE 575 F 3C,1T,3L(alt. weeks) 0.5
Image Processing
Beginning with a discussion of quantitative models of imaging systems, this course moves on to apply methods of linear systems theory and signal processing to image processing. Simple spatial domain techniques as well as spatial frequency domain methods and digital filter design for image enhancement and restoration are discussed. Special topics in application areas of machine vision (segmentation and feature extraction), remote sensing, medical imaging and vision models are presented throughout the term. Prereq: SY DE 252 or equivalent

COURSES NOT OFFERED 1996-97
SY DE 511 Optimization Methods for Stochastic Systems
SY DE 521 Computer Aided Design
SY DE 536 Environmental Systems Modelling

Ukrainian
For courses in Ukrainian see Germanic and Slavic Languages and Literatures.

Women's Studies
Undergraduate Officer
H.D. Lyons, PAS 3010, ext. 2880

WS 200 F 3C 0.5
Introduction to Women's Studies
An interdisciplinary survey introducing students to the questions which have been posed concerning the nature, roles, problems and accomplishments of women. The diversity as well as the commonalities of women's experience in Canada and elsewhere will be explored. Special attention will be given to changes in women's roles and expectations and the reflection of these changes in scholarship and the creative arts. Students will be introduced to the theoretical frameworks, methodologies and resources available for research in Women's Studies.
Prereq: none
WS 200 is the core course of the Option, Diploma and Major Programs

WS 300 W 3S 0.5
Seminar in Women's Studies
An examination of readings in Women's Studies from an interdisciplinary perspective. Special emphasis will be given to the principal concerns of feminism in Canada.
Prereq: WS 200 or consent of Director

WS 385A-D F,W,S 0.5
Special Topics in Women's Studies
A reading course permitting a student to work with any member of the faculty participating in Women's Studies at UW. To be arranged with the W S Director and the respective W S faculty member.
Prereq: Consent of Director of Women's Studies

WS 475A-D F,W,S R 0.5
Directed Readings in Women's Studies
This course would offer the opportunity for independent study of specialized areas, theory and methodology, texts, discourses and writers of interest in the context of women's history, status and condition. The students would be under tutorial guidance by a faculty member(s) involved in the Women's Studies Option.
Prereq: Consent of Director of Women's Studies
Women's Studies approved courses are listed in the Interdisciplinary Options.
Professor Jean Andrey, Geography Department, receives Distinguished Teacher Award.
## Academic Courses by Department and Faculty

University faculty members are listed by their academic course or discipline areas as follows:

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<td>Russian</td>
<td>Department of Germanic and Slavic Languages and Literatures</td>
<td>Arts</td>
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<td>Russian and East European Studies</td>
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<td>Social Work</td>
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<td>Society, Technology and Values</td>
<td>Department of Sociology</td>
<td>Arts</td>
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<td>Spanish</td>
<td>Department of Spanish and Latin American Studies</td>
<td>Arts</td>
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<td>Speech Communication</td>
<td>Department of Drama and Speech Communication</td>
<td>Arts</td>
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<td>Statistics and Actuarial Science</td>
<td>Department of Statistics and Actuarial Science</td>
<td>Mathematics</td>
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<td>Systems Design Engineering</td>
<td>Department of Systems Design Engineering</td>
<td>Engineering</td>
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<tr>
<td>Ukrainian</td>
<td>Department of Germanic and Slavic Languages and Literatures</td>
<td>Arts</td>
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<td>Women's Studies</td>
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<td>Arts and Interdisciplinary Program</td>
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Accounting

Professor, Director, School of Accountancy
J.H. Waterhouse, BSc, MBA (Alberta), PhD (Washington, Seattle)

Associate Professor, Associate Director, Director, Professional Programs
H.M. Armitage, BSc (McGill), MBA (Alberta), PhD (Michigan State), CMA

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Professor, Gordon H. Cowperthwaite Professor of Accounting
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Professor, Peat Marwick Thorne Professor in Accounting
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Assistant Professor, David C. Higinbotham-Price Waterloo Fellow in Accounting
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Adjunct Faculty
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H.M. Harefa, BComm (Saskatchewan), MBA (Michigan), CA

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For faculty listing consult Statistics and Actuarial Science.

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Associate Professor, Associate Chair, Graduate Officer
S. Sivaloganathan, BSc, MSc, PhD (Oxford)

Professors
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1 Women’s Studies
University Faculty
Applied Mathematics - Architecture

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M.A. McKenna, MA (Loyola), PhD (Illinois Institute of Technology) (Professor Emeritus)
H. Nakamura, PhD (Tokyo)
L. Skala, DNDr (Charles University, Prague)
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C. Tricot, Doct. D’Etat (U. de Paris-Sud, Orsay)

Faculty Members of Applied Mathematics holding cross appointments to:
1. Chemistry
2. Physics
3. Mechanical Engineering

Faculty Members holding cross appointments to Applied Mathematics from:
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5. Civil Engineering
6. Chemistry
7. Physics

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R.J. van Pelt, Cand.Lit., Drs.Lit., D.Lit. (Leiden)
T. Seebohm, BEng, MEng, PhD (McGill), MArch (California, Berkeley), OAA, PEng
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D. Revington, AA Dip (London)
V. Ryninimeri, BES, BArch (Waterloo)

Arabic
For faculty listing consult Religious Studies.

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R.J. Ch’ara-Hines,9 BA (New Brunswick, MA (Queen’s), MMath, PhD (Waterloo)

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B. Stok,3 BPT (McGill), MSc, PhD (Waterloo)

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T.D. Rutherford, BA, MA (Queen's), PhD (Wales)

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K. Burke, BA, (McMaster) MA, PhD (Waterloo)
C. Cooper, BA (Witold Laurier), MA, PhD (Waterloo)
M. Epp, BA, (Manitoba) MA, (Waterloo)
J.C.P. Howe, BA (McMaster), MA (Guelph)
J. Kargar, BA, MA (Waterloo)
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"P" refers to faculty members at St Paul's College
"R" refers to faculty members at Renison College

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I. Chatzis, BSc, MASC, PhD (Waterloo)
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University Faculty
Chemistry

Chemistry

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T. Viswanatha,2 MSc, PhD (Mysore), Recipient of the Distinguished Teacher Award

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V.A. Eriekus, BSc (Alberta), MS (California, Berkeley), PhD (Oregon), FRSC, FCIC

Associate Professor, NSERC/Supelco/Varian Industrial Research Chair in New Catalytic Methods and Technologies
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G.I. Dmitrienko, BSc, PhD (Toronto)
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Biology

Civil Engineering

Mechanical Engineering

Faculty Members holding cross appointments to Chemical Engineering from:
Civil Engineering

Biology

* Also has Adjunct appointment
Adjunct Faculty
B.D. Aguda, BSc (Philippines), PhD (Alberta), Laurentian University
G.F. Atkinson, MA, PhD (Toronto), Chemistry, FRSC(UK), FCIIC, (Professor Emeritus)
D.A. Briston, BSc (Alberta), PhD (Toronto), (Professor Emeritus)
D.D. Frantzi, BA, BSc (Alberta), PhD (Harvard), Hypercure, Waterloo
I. Hamilton, BSc, PhD (Toronto), Wilfrid Laurier University
S. Hawthorne, BS, MS (South Dakota), PhD (Colorado), University of North Dakota
R.E. March, BSc (Leeds), PhD (Toronto), Trent University
H.G. McLeod, MA, PhD (Toronto), (Professor Emeritus)
N.C. Norman, BSc, PhD (Bristol), University of Bristol
A.J. Painé, BSc (Saskatchewan), PhD (McMaster), Xerox Research Centre of Canada
M. Pariani, BSc, PhD (Waterloo), McGill University
R.G.A. Rodrigo, BA (Ceylon), PhD (Nottingham), Wilfrid Laurier University
H.D. Sharma, BSc (Delhi), PhD (Califomia), FCIC, (Professor Emeritus)
V. Spirko, BA, MSc (Technical University of Prague), PhD (Czechoslovak Academy of Sciences, Prague)
N.J. Taylor, BSc, PhD (Surrey)
J.D. Williams, BSc, PhD (Bristol), Pennsylvania State University

Senior Demonstrators
S.O. de Silva, BSc (Ceylon), PhD (Waterloo)
J.J. Fisher, BSc, MSc, PhD (Waterloo)
S. Forsey, BSc, MSc (Waterloo)
S.M. Harvey, BSc (Olivet Nazarene University, Illinois)
I. Rudalkski, BSc, PhD (Waterloo)

Faculty Members of Chemistry holding cross appointments to:

1. Applied Mathematics
2. Biology

Faculty Members holding cross appointments to Chemistry from:

1. Applied Mathematics
2. Biology
3. Chemistry
4. Civil Engineering

Chinese
For faculty listing consult East Asian Studies.

Civil Engineering

Professor, Department Chair
J. Roorda, BASc (Waterloo), PhD (London), PEng

Associate Professor, Associate Chair, Undergraduate Studies
G.W. Broodland, BASc, MSc, PhD (Manitoba), PEng

Professor, Associate Chair, Graduate Studies
E.L. Matyas,3 BASc (Toronto), DIC, PhD (London), PEng

Distinguished Professors Emeriti
N.C. Lind, MSc (Technical University of Denmark), PhD (Illinois), FRSC, FCAE*
J.T. Pinder, MSc (Warsaw and Lodz), PhD (Polish Academy of Science, Warsaw), DSc (Cracow), PEng, FCSME, FISEM

Professors
S.T. Arulanan,1 BSc (Eng) (Ceylon), BSc, MSc, DSc (London), PhD (Cambridge)
E.F.P. Burnett, BSc (Capetown), DIC, MSc, PhD (London), FACS, FCSCE, PEng, (on leave)
M.Z. Cohn, CSc (Bucharest), PEng, (Professor Emeritus)*
M.B. Duusseault,6 BASc, MSc, PhD (Alberta), PEng
G.J. Fanger,7 BASc, MSc, PhD (Waterloo), PEng, Research Fellow, University of Waterloo
H.G. McLeod,8 BASc, MSc, PhD (Waterloo), PEng, Member of the Distinguished Teacher Award

Associate Professors
R.W. Cockfield, BASc, MSc (Queen's), PhD (Waterloo), PEng
R.L. Legge,7 BASc (Calgary), PhD (Waterloo), NSERC University Research Fellow
E.D. Souls, BASc (Waterloo), MEng (Memorial), PhD (Waterloo)
J.C. Thompson, BASc (Toronto), MS, PhD (Illinois), PEng

Assistant Professors
W.A. Anderson,6 BASc, MSc, PhD (Memorial), PEng
S.A. Andrew,7 BASc (Alberta), PhD (Waterloo), PEng

Research Assistant Professor
S.A. Andrews, BSc, MSc, PhD (Alberta)
Adjunct Faculty
D.W. Gillen, PhD (Toronto), PEng
S.G. Krishnasamy, BEng, MASc (India), PhD (Waterloo), PEng
K.L. Murphy, BASc (Toronto), MSc, PhD (Wisconsin), PEng
B.N. Persaud, BS (Iowa State), MEng, PhD (Toronto)

Faculty Members of Civil Engineering holding cross appointments to:
1. Applied Mathematics
2. Chemical Engineering
3. Earth Sciences
4. Biology

Faculty Members holding cross appointments to Civil Engineering from:
5. Architecture
6. Earth Sciences
7. Chemical Engineering
8. Also has Adjunct appointment

Classical Studies

Professor, Department Chair
R.L. Fowler, BA, MA (Toronto). DPhil (Oxford)

Associate Professor and Undergraduate Officer
S.L. Ager, BA, MA (Queen's), PhD (British Columbia)

Professor
P.Y. Forsyth,1 AB (Mount Holyoke), MA, PhD (Toronto), Recipient of the Distinguished Teacher Award

Associate Professors
L.A. Curoch, BA (Western Ontario), MA (Carleton), PhD (Ottawa)
L.L. Neuru, BA (San Francisco), MA (Oregon), PhD (McMaster)

Assistant Professors
S.B.P. Haag, BA (Queen's), MA (Waterloo), MPhil (Toronto), Recipient of the Distinguished Teacher Award
R.L. Porter, BA (McMaster), MA, PhD (Princeton)

Participating Faculty in Classics at Wilfrid Laurier University
J. Freed, BA (Goshen), MA, PhD (Alberta)
H.A. MacLean, BA (McMaster), MA, PhD (Wisconsin)
G.P. Schea, BA, MA (Dalhousie), PhD (Pennsylvania)
C.J. Simpson, BA, MPhil (Nottingham), PhD (Alberta)

University Faculty
Classical Studies - Combinatorics and Optimization

J. Zeyl, BA, MA (Toronto), PhD (McMaster)

Faculty Member of Classical Studies holding cross appointment to:
1. Fine Arts

Cognitive Science

Professor, Director
P. Thagard, BA (Saskatchewan), BA, MA (Cambridge), MS (Michigan, Ann Arbor), MA, PhD (Toronto)

Participating Faculty
Professors
P. Jollcoeur, BSc (McGill), PhD (Harvard)
A. Wong, BSc, MSc (Hong Kong), PhD (Carnegie), PEng

Associate Professors
F. Bauchus, BSc (Alberta), MSc (Toronto), PhD (Alberta)
R. Harris, BA (Queen's), MA (Dalhousie), MSci (Alberta), MSci, PhD (Rensselaer)

Combinatorics and Optimization

Professor, Department Chair
I.P. Gouldef, BMath, MMath, PhD (Waterloo)

Associate Professor and Associate Chair for Undergraduate Affairs
W.H. Cunningham, BMath, MMath, PhD (Waterloo)

Professor and Associate Chair for Graduate Affairs
R.C. Mullin,1 BA (Western Ontario), MA, PhD (Waterloo)

Lecturer, Associate Dean Faculty Programs
R.G. Dunkley, BA (Western Ontario)

Distinguished Professor Emeritus
W.T. Tutle, BA, MA, PhD (Cambridge), DMath (Waterloo), FRSC, FRSC

Professors
M.J. Best, BMath, MMath (Waterloo), MSc, PhD (California, Berkeley)
I.F. Blake,4 MSc (Queen's, Kingston), PhD (Princeton), Fellow IEEE, PEng

C.J. Coiboum,1 BSc (Toronto), MMath (Waterloo), PhD (Toronto)
J. Edmonds, BA (George Washington), MS (Maryland)
C.D. Godsil, BSc, MSc, PhD (Melbourne)
D.M. Jackson, BA, MA, PhD (Cambridge)
L.B. Richmond, BSc, MSc (Manitoba), PhD (Alberta)
P.J. Schellenberg, BSc, MA, PhD (Waterloo)
S.A. Varstone,1 BMath, MMath, PhD (Waterloo)
H. Wolkowicz, BSc, MSc, PhD (McGill)
D.H. Younger, AB, BS, MS, PhD (Columbia)

Associate Professors
L.J. Dickey,2 BSc, MA (Arizona), PhD (Wisconsin)
S.C. Furino, BA, MMath, PhD (Waterloo)
C.E. Haff, BS (Stanford), PhD (Waterloo)
A.S. Lewis, BA, MA, PhD (Cambridge)
A. Lubiw,3 MMath (Waterloo), PhD (Toronto)
U.S.R. Murty, BA (Andhra), MA (Osmania), PhD (Indian Statistical Institute)

Assistant Professors
J. Cherlyan, BTech, MTech, PhD (IIT, Kanpur)
P. Haxoll, BMath (Waterloo), PhD (Cambridge)
H. Hind, BSc (Natal), PhD (Cambridge)
L. Tuniel, BSc (Dokuz Eylul), MSc (Middle East Tech. U.), MSc, PhD (Cornell)
D.G. Wagner, BSc (Simon Fraser), PhD (Massachusetts Institute of Technology)

Adjunct Faculty
R. Honsberger, BA (Toronto), MA (Waterloo)
D. Jungnickel, PhD (Freie Universität Berlin)
A.M. Odlyzko, MS (California Institute of Technology), PhD (MIT)
J.S. Pang, BS (National Taiwan), PhD (Stanford)
R.C. Read, MA (Cambridge), PhD (London)
C. Thomassen, Cand. Scient. (Aarhus), PhD (Waterloo)

Faculty Members of Combinatorics and Optimization holding cross appointments to:
1. Computer Science

Faculty Members holding cross appointments to Combinatorics and Optimization from:
2. Pure Mathematics
3. Computer Science
4. Electrical and Computer Engineering

1 refers to Faculty members at St. Jerome's College
Croatian

For faculty listing consult Germanic and Slavic Languages and Literatures.

Dutch

For faculty listing consult Germanic and Slavic Languages and Literatures.

Earth Sciences

Professor, Department Chair
R.W. Gillham, BSA (Toronto), MSc (Guelph), PhD (Illinois)

Associate Professor, Undergraduate Officer
H.G. Roberts, BA (Cambridge), MSc, PhD (McGill)

Associate Professor, Undergraduate Advisor
S. Schilt, BSc (McMaster), MA, MPhil, PhD (Columbia)

Associate Professor, Undergraduate Advisor
J.F. Barker, BSc, MSc (McMaster), PhD (Waterloo)

Assistant Professor, Graduate Officer
D.E. Lawson, BSc, MSc (New Brunswick), PhD (Reading)

Professors
J.A. Cherry, BE (Saskatchewan), MS (California, Berkeley), PhD (Illinois), PEng, FRSC

M.B. Dusseauet,1 BSc, PhD (Alberta), PEng

P. Forsyth,2 BSc (Western), MSc (Australia National), PhD (Western)

S.K. Frape, BSc, MSc, PhD (Queen’s)

E.O. Frind, BASc, MASC, PhD (Toronto), PEng

I.L. Gibson, BSc, PhD (Imperial College, London)

P.F. Karrow, BSc (Queen’s), PhD (Illinois)

E.L. Matyas,3 BASc (Toronto), DIC, PhD (London), PEng

A.V. Morgan,2 BSc (Leicester), MSc (Cambridge), PhD (Birmingham), PEng

E.J. Reardon, BA (St. Francis Xavier), PhD (Pennsylvania State)

L. Rothenburg,2 Dipl Phys (Moscow), PhD (Carleton), PEng

E.A. Sudicky, BSc, MSc, PhD (Waterloo), PEng

Associate Professors
E.C. Applebyard, BSc (Western Ontario), MSc (Queen’s), PhD (Cambridge)

D.W. Bloues, BSc, Msc, PhD (Waterloo)

M. Coniglio, BSc (McGill), MSc (Manitoba), PhD (Memorial)

T.W.D. Edwards, BSc, MSc (Queen’s), PhD (Waterloo)

J.P. Greenhouse, BSc, MSc (British Columbia), PhD (California, San Diego)

Recipient of the Distinguished Teacher Award
J.A. Legault, BSc, MSc (Ottawa), PhD (Oklahoma)

B.G. Warner,4 BES, MSc (Waterloo), PhD (Simon Fraser)

Assistant Professors
D.L. Rudolph, BScE (Manitoba), MSc, PhD (Waterloo)

Research Associate Professors
M. Gelitkin, MSc, PhD (Moscow)

E.C. Jowett, BASc, MSc, PhD (Toronto), PEng

D.L. McKay, BS, PhD (Stanford)

R.V. Nicholson, BSc (Concordia), MSc, PhD (Waterloo)

Research Assistant Professors
R. Ariaver, Licentiate in Chemistry (Universidad Catolica de Santiago), MSc, PhD (Waterloo)

J.F. Devlin, BSc, MSc (Queen’s), PhD (Waterloo)

A.L. Endres, BSc (Michigan Tech), MSc (Texas A&M), PhD (British Columbia)

P.A. Nawrocki, MSc (Queen’s), PhD (Acad. Sci., Warsaw)

W.D. Robertson, BSc, MSc, PhD (Waterloo)

C.J. Warren, BSc (Guelph), MSc, PhD (Alberta)

Adjunct Faculty
A.P. Annan, BASc, MSc (Toronto), PhD (Memorial)

R.K. Brummer, BSc, MSc (Mittwasserand, Johannesburg), PhD (Rand Afrikaans, Johannesburg)

R.W. Cleary, BS (Massachusetts, Lowell), MS, PhD (Massachusetts, Amherst)

L.D. Delorme, BSc (Saskatchewan), MSc (Alberta), PhD (Saskatchewan)

D.E. Elrick, BSc (Guelph), MS, PhD (Wisconsin)

D. Elsworth, BSc (Portsmouth Polytechnical College), MSc, DIC (Imperial College, London)

D.C. Ford, BA, PhD (Oxford, England)

J.A. Franklin,1 BSc (Eng)(London), MSc, DIC, PhD (Imperial College, London), PEng

P. Fritz, DiplGeol, Dr. rer. nat. (Stuttgart) FRSC

D.J. Gregor, BA (McMaster), BSc (Univ, Geneva, Switzerland), MSc (Queen’s)

J.L. Jambor, BA, MSc (British Columbia), PhD (Carleton)

Dance

Associate Professors
R. Priddle, BPHE (Toronto), MSc (Springfield), MA, PhD (Waterloo)

R. Ryman, BA, MA (York), Al Chor (London)

Guest Artists
S. Cash, BFA (York), Recipient of the Distinguished Teacher Award

C. Parker, BA (Waterloo), RAD Teaching Diploma (London)

L. Prada, BSc (Waterloo), ARAD (Adv. and ATC), (London)

Drama and Speech Communication

Associate Professor, Chair
J.S. Greenberg, BA (Sir George Williams), BEd (Toronto)

Assistant Professor, Undergraduate Officer
M.G. van Dijk, BA, MA (Wellington), PhD (Toronto)

Assistant Professor, Co-ordinator, Speech Communication
J. Tomasson Goodwin, BA (British Columbia), MA, PhD (Toronto)

Associate Professors
W.R. Chadwick, BA, MA (Toronto), PhD (London)

W.K. Chesney

Assistant Professor
M. Westley, BA (Bishop’s), MA, PhD (Toronto), (part-time)

Adjunct Lecturer, Arts Administration
W.D. Poole, BA (Toronto), MBA (York), MSc (London)

Professor, Department Chair
R.W. Gillham, BSA (Toronto), MSc (Guelph), PhD (Illinois)

Associate Professor, Undergraduate Officer
H.G. Roberts, BA (Cambridge), MSc, PhD (McGill)

Associate Professor, Undergraduate Advisor
S. Schilt, BSc (McMaster), MA, MPhil, PhD (Columbia)

Associate Professor, Undergraduate Advisor
J.F. Barker, BSc, MSc (McMaster), PhD (Waterloo)

Assistant Professor, Graduate Officer
D.E. Lawson, BSc, MSc (New Brunswick), PhD (Reading)

Professors
J.A. Cherry, BE (Saskatchewan), MS (California, Berkeley), PhD (Illinois), PEng, FRSC

M.B. Dusseauet,1 BSc, PhD (Alberta), PEng

P. Forsyth,2 BSc (Western), MSc (Australia National), PhD (Western)

S.K. Frape, BSc, MSc, PhD (Queen’s)

E.O. Frind, BASc, MASC, PhD (Toronto), PEng

I.L. Gibson, BSc, PhD (Imperial College, London)

P.F. Karrow, BSc (Queen’s), PhD (Illinois)

E.L. Matyas,3 BASc (Toronto), DIC, PhD (London), PEng

A.V. Morgan,2 BSc (Leicester), MSc (Cambridge), PhD (Birmingham), PEng

E.J. Reardon, BA (St. Francis Xavier), PhD (Pennsylvania State)

L. Rothenburg,2 Dipl Phys (Moscow), PhD (Carleton), PEng

E.A. Sudicky, BSc, MSc, PhD (Waterloo), PEng

Associate Professors
E.C. Applebyard, BSc (Western Ontario), MSc (Queen’s), PhD (Cambridge)

D.W. Bloues, BSc, Msc, PhD (Waterloo)

M. Coniglio, BSc (McGill), MSc (Manitoba), PhD (Memorial)

T.W.D. Edwards, BSc, MSc (Queen’s), PhD (Waterloo)

J.P. Greenhouse, BSc, MSc (British Columbia), PhD (California, San Diego)

Recipient of the Distinguished Teacher Award
J.A. Legault, BSc, MSc (Ottawa), PhD (Oklahoma)

B.G. Warner,4 BES, MSc (Waterloo), PhD (Simon Fraser)

Assistant Professors
D.L. Rudolph, BScE (Manitoba), MSc, PhD (Waterloo)

Research Associate Professors
M. Gelitkin, MSc, PhD (Moscow)

E.C. Jowett, BASc, MSc, PhD (Toronto), PEng

D.L. McKay, BS, PhD (Stanford)

R.V. Nicholson, BSc (Concordia), MSc, PhD (Waterloo)

Research Assistant Professors
R. Ariaver, Licentiate in Chemistry (Universidad Catolica de Santiago), MSc, PhD (Waterloo)

J.F. Devlin, BSc, MSc (Queen’s), PhD (Waterloo)

A.L. Endres, BSc (Michigan Tech), MSc (Texas A&M), PhD (British Columbia)

P.A. Nawrocki, MSc (Tech. Univ., Lodz), PhD (Acad. Sci., Warsaw)

W.D. Robertson, BSc, MSc, PhD (Waterloo)

C.J. Warren, BSc (Guelph), MSc, PhD (Alberta)

Adjunct Faculty
A.P. Annan, BASc, MSc (Toronto), PhD (Memorial)

R.K. Brummer, BSc, MSc (Mittwasserand, Johannesburg), PhD (Rand Afrikaans, Johannesburg)

R.W. Cleary, BS (Massachusetts, Lowell), MS, PhD (Massachusetts, Amherst)

L.D. Delorme, BSc (Saskatchewan), MSc (Alberta), PhD (Saskatchewan)

D.E. Elrick, BSc (Guelph), MS, PhD (Wisconsin)

D. Elsworth, BSc (Portsmouth Polytechnical College), MSc, DIC (Imperial College, London)

D.C. Ford, BA, PhD (Oxford, England)

J.A. Franklin,1 BSc (Eng)(London), MSc, DIC, PhD (Imperial College, London), PEng

P. Fritz, DiplGeol, Dr. rer. nat. (Stuttgart) FRSC

D.J. Gregor, BA (McMaster), BSc (Univ, Geneva, Switzerland), MSc (Queen’s)

J.L. Jambor, BA, MSc (British Columbia), PhD (Carleton)
University Faculty
East Asian Studies - Electrical and Computer Engineering

P.K. Kaiser, Dipl. Ing. (ETH, Zurich, Switzerland), PhD (Alberta)
D.R. Lee, BSc, MSc (North Dakota), PhD (Virginia Polytechnic Institute)
S. Lesage, BSc (Ottawa), PhD (McGill)
D.E. McWhorter, BSc (Colorado School of Mines), MS, PhD (Colorado State)
D. Nobes, BSc, MSc, PhD (Toronto)
K.S. Novakowski, BSc (Brock), MSc, PhD (Waterloo)
J.O. Nriagu, BSc (Ibadan), MSc (Wisconsin), PhD (Toronto)
C.J. Ptacek, BA (Wisconsin), MSc, PhD (Waterloo)
R. Samson, BSc, MSc, PhD (Laval)
A. Smith, BSc (Durham), MSc (Oxford), PhD (London)
L.H. Snowden, BSc (Calgary), PhD (Toronto)
D.K. Solomon, BS, MSc (Utah), PhD (Waterloo)
R.L. Thomas, BSc, PhD, DS (Swansea)
G. van der Kamp, BSc, MSc (British Columbia), PhD (Amsterdam)
O.I. White, BSc (Melbourne), MSc (Toronto), PhD (Illinois), PEng
N. Yassin, BSc, PhD (London)

Senior Demonstrators
J.L. Lang, BSc, MBA (Queen's)
K. LeHew, BSc, MSc (Queens)

Faculty Members of Earth Sciences holding cross appointments to:
1 Civil Engineering
2 Environment and Resource Studies

Faculty Members holding cross appointment to Earth Sciences from:
3 Civil Engineering
4 Geography
5 Computer Science

*Also has Adjunct appointment

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East Asian Studies

Professor, Director
G. Cuthbert Brandt, BA (Toronto), MA (Carleton), PhD (York), R

Professor Emeritus
P. Swann, BA, MA (Oxford), LLB (Queen's), LLB (Brock), LLB (WLU), LLB (Waterloo), R (Retired)

Adjunct Assistant Professor
A. Maruoka, BA (Kyonitsu, Tokyo), MEd (OISE), R

Sessional Lecturers
K. Belair
M. Hunsberger, BA (Goshen), MA (Indiana), PhD (Temple)
Y. Kim, BA (Seoul), MA (Toronto), MEd, EdD (OISE), R
K. Niu, BA (Beijing Institute of Foreign Languages), MA (Peking), R

*R' refers to Faculty members at Renison College

Economics

Professor, Department Chair
J.R. Malvin, BSc (Manitoba), MA (Alberta), PhD (Minnesota)

Associate Professor, Associate Chair, Undergraduate Affairs
E. Carvalho, BA, MA, PhD (Waterloo)

Assistant Professor, Associate Chair, Graduate Affairs
E. Nosal, BA (Queen's), MA (McMaster), PhD (Queen's)

Professors
J.A. Brox, BA (Toronto), MA, PhD (McMaster)
J.E. Cuenca, LIC (Madrid), MA (Western Michigan), PhD (Toronto)
S.K. Ghosh, BSc, MSc (Calcutta), MS, PhD (Wisconsin)
M.C. Howard, BA, MA (Lancaster), PhD (Leicester)
R.R. Kerton, BComm (Toronto), MA (Carleton), PhD (Leeds)
K.R. Stoller, BA (Southern California), MA, PhD (Queen's)
W.R. Thirsk, BA (British Columbia), MA, PhD (Yale)
D. Wilton, BComm (McMaster), PhD (MIT)

Associate Professors
K.M. Bennett, BA, MA (Queen's), PhD (McGill)
R.W. Bodel, BSc, Dip Ed (Sydney), MA, PhD (York)
W.M. Bosser, Diplom (Karlruhe), MA (UBC), PhD (Karlruhe)
S.W. Kardasz, BA (Loyola), PhD (Queen's)
R.C. Kumar, BStat, MStat (Indian Statistical Institute), MA, PhD (Toronto)
G.M. Myers, BA (Queen's), MA, PhD (McMaster)
F.M. Naqib, DSc (Washington), MSc (Oregon), PhD (Queen's)
W.R. Needham, BComm (Carleton), MA, PhD (Queen's)

T.T. Nguyen, BSc, ChE (California, Berkeley), MA (Simon Fraser), PhD (Western Ontario)

Assistant Professors
D. Andolfatto, BBA, MA (Simon Fraser), PhD (Western Ontario)
L.A. Busch, BSc (Victoria), MA, PhD (Western Ontario)
W.M. Ho, BSSc (Chinese University of Hong Kong), MA, PhD (Western Ontario)
J. Radek, BSc (Victoria), MA, PhD (Toronto)
T. Wang, BSc (Beijing), MSc (Chinese Academy of Sciences), MA, PhD (Toronto)
T.S. Wirjanto, BA (Toronto), MA, PhD (Queen's)

Adjunct Assistant Professor
L. Smith, BA, MA (Waterloo), Recipient of the Distinguished Teacher Award

Faculty Members of Economics holding cross appointment to:
1 Faculty of Environmental Studies
2 Director, Canadian Studies Program

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Electrical and Computer Engineering

Professor, Department Chair
S.K. Chaudhuri, BE (Hons), MTech (Indian Institute of Technology, Delhi), MSc, PhD (Manitoba)

Associate Professor, Associate Chair for Undergraduate Studies, Computer Engineering
W.M. Loucks, BSc (Waterloo), MSc, PhD (Toronto), PEng

Professor, Associate Chair for Undergraduate Studies, Electrical Engineering
M.M.A. Sulaiman, BSc, MSc (Calgary), PhD (Waterloo)

Associate Professor, Associate Chair for Graduate Studies
A. Vannelli, BSc, MSc (Concordia), PhD (Waterloo)

Professor, BNNSERC Industrial Research Chair in Very Large Scale Integrated Circuits, ITAC/NSERC Research Award
M.I. Elmasry, BSc (Cairo), MSc, PhD (Ottawa), PEng, Fellow IEEE
University Faculty

English

Environment and Resource Studies

Demonstrators
D.A. Fraser, BASc, MASc, BEd (Toronto), PhD (Waterloo)
J. Lowe, BSc (Carleton), Recipient of the Distinguished Teacher Award
K. Riepert, BASc (Waterloo)

Adjunct Faculty
C.F.A. Beaumont, BA (McMaster), MA (Toronto), (Professor Emeritus)
L.E. Bodnar, BA, MA (Saskatchewan), PhD (McMaster), (Professor Emeritus)
R.H. Grasley
H.G.H. Lawrence, OC, Recipient of the Distinguished Teacher Award
D.W. Schnurr, BASc (Toronto), LLB (Toronto), PEng

Faculty Members holding administrative appointments in the Engineering Undergraduate Office from:
1. Mechanical Engineering
2. Systems Design Engineering
3. Also has Adjunct appointment

Associate Professor, Department Chair
W.R. Macnaughton, BA (Toronto), MA, PhD (Wisconsin)

Assistant Professor, Associate Dean, Arts Undergraduate Affairs
M.A. Gernadstein, BA, MA (Montana), PhD (Iowa)

Associate Professor, Associate Chair and Undergraduate Officer
J. Downey, BA, BEd, MA (Memorial), PhD (London), DPhil (Maine), DLit (Memorial), LLB (New Brunswick)

Associate Professor, Associate Chair and Graduate Officer
B. Cartar, BA, MA (Carleton), PhD (Queen's)

Associate Professor and Co-operative Education Officer
N.F. Randall, BA (Guelph), MA (Waterloo), PhD (York)

Distinguished Professors Emeriti
W.R. Martin, BA, DLitt at Phil (South Africa), Recipient of the Distinguished Teacher Award

W.U. Ober, BA (Washington and Lee), PhD (Indiana), Recipient of the Distinguished Teacher Award

W.K. Thomas, MA, PhD (Toronto)

Professors
S. Foley, BA (Carleton), MA (British Columbia), PhD (Purdue), J
M.W. Higgins,1 BA (St. Francis Xavier), MA, PhD (York), J
D.R. Leibson, BA (Waterloo), MA (McMaster), PhD (Toronto), J Recipient of the Distinguished Teacher Award
J.S. North, BA, MA (British Columbia), PhD (Alberta)
G.E. Slaethaug, BA (Pacific Lutheran), MA, PhD (Nebraska)

Associate Professors
P.D. Beam, BA (Waterloo), MA (McMaster), PhD (Toronto)
R.R. Dubinski, BA, MA, PhD (Western Ontario), PhD (Toronto)
D.G. Goodwin, BA, MA, PhD (Toronto)
R.N. Gosselin, BA (Kansai), MA, PhD (Colorado)
R. Harris, BA (Queen's), MA (Dalhousie), MSci (Alberta), MSci, PhD (Rensselaer)
D.M. Hinchcliffe, BA (British Columbia), MA, PhD (Toronto), J
N.C. Hultin, BA (Concordia), MA (Chicago), PhD (Johns Hopkins)
C. Lister, BA, MA, PhD (Toronto)
H.M. Logan, AB (Franklin and Marshall), PhD (Pennsylvania)
E.P. McCormack, MA (Glasgow), PhD (Manitoba)
C.E. McGee, MA, BA, PhD (Toronto), J
J.H. Miller, BA, BLS (McGill), MPhil (Waterloo), PhD (York), R
E.F. Sheldrick, AB (Waterloo), MA (Villanova), PhD (Essa's)
H. Froese Tiessen, BA (Winnipeg), MA, PhD (Alberta), G

Assistant Professors
B. Cantar, BA, MA (Carleton), PhD (Queen's)
C. Dieth-Jones, BSc (Brandon), MA, PhD (Manitoba)
J. Easton, BA, MA (British Columbia), MA, PhD (Princeton)
G. Siller, BA, MA, PhD (York)
L. Warley, BA, MA (Guelph), PhD (Alberta)
J. Wright, BA, MA, PhD (Western Ontario)

Adjunct Faculty
A.L. Dust, MA, PhD (Illinois), (Professor Emeritus)

Faculty Members holding cross appointments to English from:
1. Religious Studies

Associate Professor, Department Chair
S.C. Lernov, BA (Ohio State), MA (Columbia), Recipient of the Distinguished Teacher Award

Associate Professor, Undergraduate Officer
P.A. Kay, BSc (Toronto), MS, PhD (Wisconsin-Madison)

Professors
M. Chandrasekhar, BTech (Indian Institute of Technology, Kanpur), MASc, PhD (Waterloo), PEng
G.R. Francis, BA (Toronto), BA (McGill), MA (British Columbia), PhD (Michigan)
S. Kumar, BSc, MSc (Punjab), MA, PhD (Toronto)
A.V. Morgan,1 BSc (Leicester), MSc (Calgary), PhD (Birmingham), Recipient of the Distinguished Teacher Award

Associate Professors
R.B. Gibson, BA (York), MA, PhD (Toronto)
J.J. Kay,2 BASc (McGill), MASc, PhD (Waterloo)
R.F. Keith, BSA (Guelph), MA, PhD (Michigan State)
G.B. Priddle,1 BA, (Western Ontario), MA, PhD (Clark)
J.E. Robinson,3 BSc (Waterloo), MES (York), PhD (Michigan)

Assistant Professors
O.O. Michalenko, BA, PhD (Saskatchewan)
S. Wismar, BA (Western Ontario), MEd (OISE), PhD (Waterloo)

Adjunct Faculty
F. Glew, BA (Waterloo Lutheran), BEd (Toronto), MScEd (Niagara), PhD (Columbia)
J. Jackson, BA (Windsor)
R. Knapton, BSc (Lakehead), MA, Sc (British Columbia), PhD (Manitoba)

* Also has Adjunct appointment
'G' refers to Faculty members at Conrad Grebel College
'J' refers to Faculty members at St. Jerome's College
'R' refers to Faculty members at Renison College

Environment and Resource Studies

Associate Professor, Department Chair
S.C. Lernov, BA (Ohio State), MA (Columbia), Recipient of the Distinguished Teacher Award

Associate Professor, Undergraduate Officer
P.A. Kay, BSc (Toronto), MS, PhD (Wisconsin-Madison)

Professors
M. Chandrasekhar, BTech (Indian Institute of Technology, Kanpur), MASc, PhD (Waterloo), PEng
G.R. Francis, BA (Toronto), BA (McGill), MA (British Columbia), PhD (Michigan)
S. Kumar, BSc, MSc (Punjab), MA, PhD (Toronto)
A.V. Morgan,1 BSc (Leicester), MSc (Calgary), PhD (Birmingham), Recipient of the Distinguished Teacher Award

Associate Professors
R.B. Gibson, BA (York), MA, PhD (Toronto)
J.J. Kay,2 BASc (McGill), MASc, PhD (Waterloo)
R.F. Keith, BSA (Guelph), MA, PhD (Michigan State)
G.B. Priddle,1 BA, (Western Ontario), MA, PhD (Clark)
J.E. Robinson,3 BSc (Waterloo), MES (York), PhD (Michigan)

Assistant Professors
O.O. Michalenko, BA, PhD (Saskatchewan)
S. Wismar, BA (Western Ontario), MEd (OISE), PhD (Waterloo)

Adjunct Faculty
F. Glew, BA (Waterloo Lutheran), BEd (Toronto), MScEd (Niagara), PhD (Columbia)
J. Jackson, BA (Windsor)
R. Knapton, BSc (Lakehead), MA, Sc (British Columbia), PhD (Manitoba)
University Faculty
Environmental Engineering - Fine Arts

T. Schrecker, BA (Trant), MA (York)
B. Savan, BSc (Toronto), PhD (London)

Faculty Members of Environment and Resource Studies holding cross and/or joint appointments to:
1. Geography
2. Systems Design Engineering

Faculty Members holding cross and/or joint appointments to Environment and Resource Studies from:
3. Systems Design Engineering
4. Earth Sciences

Environmental Engineering Board

Chair of the Environmental Engineering Board
Professor, Associate Dean of Engineering, Department of Mechanical Engineering
G.E. Schneider, BASc, MASC, PhD (Waterloo)

Members of the Environmental Engineering Board

Faculty of Engineering
Professor, Dean of the Faculty of Engineering, Department of Mechanical Engineering
D.J. Burns, BSc, PhD (Bristol), PEng, CEng

Chemical Branch
Professor, Department of Chemical Engineering
G.L. Rempel, BSc, PhD (British Columbia), FCIC, FRSC

Professor, Department of Chemical Engineering
I.F. Macdonald, BEng (Technical University of Nova Scotia), PhD (Wisconsin)

Associate Professor, Department of Chemical Engineering
J.M. Scharer, BSc, PhD (Pennsylvania)

Civil Branch
Professor, Department of Civil Engineering
J. Roorda, BASc (Waterloo), PhD (London), PEng

Professor, Department of Civil Engineering
W.C. Lennox, BASc, MSc (Waterloo), PhD (Lehigh), PEng

Professor, Department of Civil Engineering
J.F. Sykes, BASc, MASC, PhD (Waterloo), PEng

Associate Professor, Department of Management Sciences Chair
J.D. Fuller, BSc (Queen’s), MSc, PhD (British Columbia)

Assistant Professor, Department of Systems Design Engineering
K. Ponnambalam, BE (Madras), MSc (National University of Ireland), PhD (Toronto)

Professor, Department of Earth Sciences
J.F. Barker, BSc (McMaster), PhD (Waterloo)

Assistant Professor, Associate Dean of Environmental Studies, Undergraduate Studies, Department of Environment and Resource Studies
G.O. Michaelenko, BA, PhD (Saskatchewan)

Fine Arts

Professor, Department Chair
A.M. Urquhart, BFA (Buffalo) (term to July 96)

Associate Professor, Department Chair
D.I. MacKay, BFA (Mt. Allison), MFA (Cornell) (effective July 96)

Assistant Professor, Undergraduate Officer
S.B. Taylor, MFA (Rhode Island)

Associate Professor, Graduate Officer
A.N. Green, BFA (Art Institute of Chicago), Recipient of the Distinguished Teacher Award

Distinguished Professor Emerita
N.-L. Patterson, BA (Washington), DLitt (Hons.) (WLU)

Professors
P.Y. Forsyth,1 AB (Mount Holyoke), MA, PhD (Toronto), Recipient of the Distinguished Teacher Award
A. Roberta, BA (Guelph), MA (Claremont)

Associate Professors
M.S. Bird,1 BA, MA, PhD (Iowa), R W.B. Cowan,2 BSc (Waterloo), PhD (McGill)
E. Kliman,1 MA, PhD (Toronto)

Assistant Professors
J.G. Buyers,1 BA (York), MEd (UWaterloo)
T. Seabohm,2 BEng, MEng, PhD (McGill), MArch (California, Berkeley), OAA, PEng

Adjunct Professor
V. Burnett, BS (Columbia), MA (Berkeley), (Professor Emeritus)

Faculty Members holding cross appointments to Fine Arts from:
1. Classical Studies
2. Architecture
3. Computer Science
4. Religious Studies

1R refers to Faculty member at Renison College

Environmental Studies

The following persons have wide ranging interests and hence have been appointed to the Faculty of Environmental Studies rather than to a specific Department and/or School:

Environmental Studies

The following persons have wide ranging interests and hence have been appointed to the Faculty of Environmental Studies rather than to a specific Department and/or School:

Associate Professors
E. Carvalho,2 BA, MA, PhD (Waterloo)
R.T. Newkirk,3 BA, MSc, PhD (Western Ontario)

Assistant Professors
M.C. dell'acqua,1 BEcon (Amsterdam)
R. T. Newkirk,3 BA, MSc, PhD (Western Ontario)

Adjunct Faculty
K. Elliott, Diploma Creative Arts
S. Garrod,1 BA (McMaster), LLB, MES (York)

P. Pickfield,1 BA (Western Ontario), LLB (Queen’s), LLM (Osgoode Hall)

L. Smith, BA, MA (Waterloo)
S. Snider,1 BES (Waterloo), LLB (Osgoode Hall)

Faculty Members of Environmental Studies holding cross and/or joint appointments to:
1. Planning
2. Economics
3. Planning

1R refers to Faculty member at Renison College
French Studies/Études françaises

Associate Professor, Department Chair
P.G. Sockan, BA (Toronto), MA (Iowa), PhD (Toronto)

Assistant Professor, Undergraduate Officer
A.M. Miraglia, BA, MA, PhD (Toronto)

Associate Professor, Graduate Officer
W.D. Wilson, MA, PhD (Trinity College, Dublin)

Professors
A. Ages, BA (Carleton), MA, PhD (Ohio State)
D.W. Russell, BA, MA, PhD (Toronto)

Associate Professors
C.A. Abbott, BA, MA, PhD (Ohio State), J.P.H. Dubé, BA, MA (Toronto), PhD (Ohio State)
J.R. Dugan, BA, MA (Toronto), PhD (Yale)
H.S. Fournier, BA (Toronto), MA, PhD (Western Ontario)
R.J. Fournier, BA, MA, PhD (Western Ontario)
R.W. Ryan, BA, MA (Dalhousie), Doctorat de 3e cycle (Université de Provence)

Language Instructors
P. Aplevich, BA, MA (Waterloo)
H. McLenaghan, Licence en Phil. Rom. (Brussels), MA (Waterloo), PhD (Western Ontario)
T. Sabarny, Licence ès lettres (Toulouse), Recipient of the Distinguished Teacher Award

*J* refers to Faculty members at St. Jerome's College

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Geography

Professor, Department Chair
P.J. Howarth, BA (Cambridge), PhD (Glasgow)

President Emeritus
B.C. Matthews, BSA (Toronto), AM (Missouri), PhD (Cornell), DU (Sherbrooke), LL.D., FUG, PAng

Professor, Associate Chair Undergraduate Studies
E.F. LeDrew, BA (Toronto), MA, PhD (Colorado)

Associate Professor, Associate Chair Graduate Studies
B.G. Warner, BES, MSc (Waterloo), PhD (Simon Fraser)

Distinguished Professors Emeriti
R.R. Krueger, BA, MA (Western Ontario), PhD (Indiana), Recipient of the Distinguished Teacher Award
P.H. Nash, BA, MA (California, L.A.), CE (Grenoble), MCP, MPA, PhD (Harvard), MCIIP, AICP

Professors
J.H. Bater, BA, MA (British Columbia), PhD (London)
A. Diern, BA (Wayne State), MA (Clark), PhD (Michigan)
L.T. Guerke, BSc (Cape Town), MA (York), PhD (Toronto)
J. Kay, BA (Mount Holyoke College), MS, PhD (Wisconsin-Madison)
G.R. McBoyle, BSc, PhD (Aberdeen), Recipient of the Distinguished Teacher Award
A.G. McLeitan, BSc, PhD (Glasgow)
W.B. Mitchell, BA, MA (British Columbia), PhD (Liverpool)
G.G. Mlamumoodii, BSc (Mysore), MSc (Bombay), PhD (Delhi)
J.G. Nelson, 1BA (McMaster), MA (Colorado), PhD (Johns Hopkins)
R.E. Preston, BA (Central Washington), MA (Washington), Ph.D (Clark)
J.B. Theberge, BScA (Guelph), MSc (Toronto), PhD (British Columbia)
G. Wall, BA (Leeds), MA (Toronto), PhD (Hull)

Associate Professors
R.A. Bullock, BA, MA (Belfast), PhD (London)
T.E. Bunting, BA (York), MA (Western Ontario), PhD (Toronto)
D. Dudyche, BA (Waterloo Lutheran), MA (Waterloo), PhD (London)
C. Dufournaud, BA (Sir George Williams), MA (Laval), PhD (Toronto)

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University Faculty

French Studies/Études françaises
Geography

G.B. Hall, 1BA Hong (Otago, New Zealand), MA, PhD (McMaster)
B. Hyma, BSc, MSc (Madras), MA (Sheffield), PhD (Pittsburgh)
P.A. Kay, BSc (Toronto), MS, PhD (Wisconsin-Madison)
A. Keshk, MSc, PhD (UMCS – Lublin, Poland)
C.J.A. Mitchell, BA (Guelph), MA, PhD (Waterloo)
P.K. Parker, BSc, BA (Mount Allison), MA, GDInt.L (ANU), PhD (London)
J.S. Price, BSc (Trant), MSc (Saskatchewan), PhD (McMaster)
G.B. Priddle, BA (Western Ontario), MA, PhD (Clark)

Assistant Professors
J. Andreu, BA (Wilfrid Laurier), MA (Calgary), PhD (Waterloo), Recipient of the Distinguished Teacher Award
J. Law, BA (Sheffield), MSc (McMaster), PhD (Waterloo)
T.D. Rutherford, BA, MA (Queen's), PhD (Wales)
M. Stone, BSc (Waterloo), MA (Laurier), PhD (Waterloo)

Adjunct Faculty
G. Brannon, CC
D.J. McKenzie, BES, MA (Waterloo), PhD (Western Ontario)
M.E. Sanderson, BA (Toronto), MA (Maryland), PhD (Michigan)

Faculty Members of Geography holding cross and/or joint appointments to:
1 Planning
2 Recreation and Leisure Studies
3 Earth Sciences
4 Biology
5 History

Faculty Members holding cross and/or joint appointments to Geography from:
6 Environment and Resource Studies
7 Planning
Geological Engineering

Professor, Chair of the Geological Engineering Board
M.B. Dusseault, BSc, MSc, PhD (Alberta), PEng

Members of the Board of Geological Engineering

Professor, Dean of the Faculty of Engineering, Department of Mechanical Engineering
D.J. Burns, BSc, PhD (Bristol), PEng, CEng

Professor, Department of Civil Engineering Chair
J. Roorda, BASc (Waterloo), PhD (London), PEng

Professor, Department of Earth Sciences Chair
R.W. Gillham, BSA (Toronto), MSc (Guelph), PhD (Illinois)

Professors, Department of Civil Engineering
E.L. Malyas, BASc (Toronto), DIC, PhD (London), PEng
L. Rothenburg, Dipl Phy (Moscow), PhD (Carleton), PEng
J.F. Syska, BASc, MASC, PhD (Waterloo), PEng

Professors, Department of Earth Sciences
J.A. Cherry, BE (Saskatchewan), MS (California, Berkeley), PhD (Illinois), PEng, FRSC
P.F. Karrow, BSc (Queen's), PhD (Illinois)

Assistant Professor, Department of Earth Sciences
D.L. Rudolph, BScE (Manitoba), MSc, PhD (Waterloo), PEng

Germanic and Slavic Languages and Literatures

Associate Professor, Department Chair
M. Richter, Statistexamin (Berlin and Bonn), MA, PhD (Toronto)

Assistant Professor, Associate Chair Undergraduate Studies
I. Szarycz, MA (Poznan), PhD (Ottawa)

Professor, Associate Chair Graduate Studies
D.G. John, BA, MA, PhD (Toronto)

Distinguished Professors Emeritus
J.W. Dyck, AB (Bethel), MA (Missouri), PhD (Michigan)
E. Heier, BA, MA (British Columbia), PhD (Michigan), Recipient of the Distinguished Teacher Award

Professors
G. Brude-Firmau, Statistexamin (Berlin), PhD (Yale), Recipient of the Distinguished Teacher Award
M. Kudos, BA, MA (Waterloo), PhD (Alberta)
H.W. Panthel, BA (Waterloo), MA (Cincinnati), PhD (Waterloo)
J. Whiton, BA, MA, PhD (Minnesota)

Associate Professors
V. Grubisic, MA (Fribourg), PhD (Aix-en-Provence)
F.K. Jakobsh, BA, MA (Manitoba), PhD (Waterloo)
R. Karpiak, BA, MA (Manitoba), PhD (Ottawa)
H. Nabbs, BA, MA, PhD (Toronto)
A. Zweers, Doctorandus (Amsterdam), DI.lit (Groningen)

Assistant Professors
Z. Gimpelovich, MA (Minsk), PhD (Ottawa)

Greekg

For faculty listing consult Classical Studies.

Health Studies and Gerontology

Professor, Interim Department Chair
A.J.R. Cameron, BA, MA, PhD (Waterloo)

Professor, Associate Chair, Graduate Studies
M.J. Stones, BEng (Brunel), Ph.D. (Sheffield)

Professor, Associate Dean, Graduate Studies and Research, Faculty of Applied Health Sciences
A. Boren, BA (Western Ontario), MSc, PhD (Illinois)

Assistant Professor, Associate Chair, Undergraduate Studies
J.A. Hustad, BScH, MSc (British Columbia), PhD (Columbia)

Distinguished Professor Emeritus
W.F. Forbes, BSc, PhD, DSc (London), DIC, ARCS G

Professors
L.R. Brawley, BPE (Calgary), MSc (Oregon), PhD (Penn State)
K.S. Brown, BMath, PhD (Waterloo)
J.C. Carlson, BSc, MSc, PhD (Massachusetts)
J.E. Curtis, BA (Sir George Williams), MA (Central Michigan), MA (Cornell) G
L. Hoffman-Goetz, BA (SUNY, Binghamton), MA, PhD (Michigan)
M.E. Houston, BSc (Toronto), PhD (Waterloo)
R.C. Manell, BA (McMaster), MPE, PhD (Windsor)
M.T. Sherratt, BA, MA (Western Ontario), PhD (Wisconsin)
R.E. Wainwright, BSc (Rhodes, S.A.), MA, PhD (Waterloo)
M.P. Zanna, BA, PhD (Yale)

Associate Professors
R.S. McColl, BSc (McGill), PhD (Purdue)
A.M. Myers, BA (Winnipeg), MA, PhD (York)

Assistant Professors
R.C. Bell, BSc, MSc (Waterloo), PhD (Cornell)
J.P. Hildes, BSc, MA, Dipl. in Gerontology, PhD (Waterloo)

Research Associate and Lecturer
R. Walker, BSc, MSc (Western Ontario)

Research Assistant Professor
O.W. Malott, BA, MA, PhD (Windsor)

For faculty listing consult Classical Studies.
Adjunct Faculty
R.W. Brecher, BSc (Carleton), PhD (Sussex)
G.P. Brown, BA, MA, (Queen's, Kingston), PhD (McGill)
N.H. Charness, BA (McGill), MS, PhD (Cambridge-Mellon) G
H.S. Coblenz, BA (Durham), MRP (North Carolina), MCIP, OPPI, AICP, MIES G
S. Evers, BSc (Ottawa), MS (Cornell), PhD (Western Ontario)
T. Hadjistavropoulos, BA (McGill), MA, PhD (Saskatchewan)
Y-S. Huang, BSc (National Taiwan University), MSc (Notre Dame), PhD (Fordham)
J.F. Hicks, BTech (Ryerson Polytechnical Institute), MSc, PhD (York)
J.A. Jackson, MA, MB, BChir (Cambridge)
C.G. MacGregor, BA (Waterloo), MASC, PhD (Toronto)
B.D. McPherson, BA, MA (Western Ontario), PhD (Wisconsin) G
D.E. Mills, BS Ag (Purdue), PhD (Indiana)
P. Naas, BA, PhD (Nijmegen) J, G
K.M. Prakashin, BA, MA, PhD (British Columbia)
R.J. Sax, BSc (Toronto), MSc (British Columbia), MD (Toronto)
R.E. Schabas, MD, MSHS (Toronto)
R.P. Schlegel, BA (Western Ontario), MSc (Illinois), PhD (Ohio State)
P. Seliase, DEC (College Marie Victorin), BSc (Waterloo), PhD (McGill)
S.E. Sykes, BA, MASC, PhD (Waterloo)
G.R. Ward, BSc (Lakehead), MA, PhD (Waterloo)
N.F. White, MD (McGill), FRCP
Adjunct Research Professor
J.A. Best, BA (Queen's, Kingston), PhD (Waterloo)

Faculty members of Health Studies and Gerontology holding cross/joint appointments to:
1 Kinesiology
2 Psychology
3 Biology and Psychology
4 Sociology

Faculty members holding cross appointments to Health Studies and Gerontology from:
5 Kinesiology
6 Statistics and Actuarial Science
7 Biology
8 Recreation and Leisure Studies
9 Kinesiology/Sociology
10 Psychology

* Also has Adjunct appointment

'G' refers to Adjunct Faculty

'J' refers to Faculty members at St. Jerome's College

History

Associate Professor, Department Chair
D.E. Wright, BA (Cambridge), PhD (McMaster)

Associate Professor, Undergraduate Officer
K.D. Eagles, BA (Cambridge), MA, PhD (Washington)

Professor, Graduate Officer
R.C. MacGillivray, BA (Queen's) AM, PhD (Harvard)

Professors
M.J. Craton, BA (London), MA, PhD (McMaster) FRHistS
G. Cuthbert Brandon, BA (Toronto), MA (Carleton), PhD (York), R
J.R. English, BA (Waterloo), AM, PhD (Harvard), FRSC
P.J. Harrigan, BA (Detroit), AM, PhD (Michigan)

Associate Professors
D.A. Davies, BA, PhD (Washington), Recipient of the Distinguished Teacher Award
D.J. Horton, BA (Waterloo Lutheran), MA (Waterloo), PhD (McGill)
S.K. Johannesen, BA (Evangel College), MA, PhD (Missouri)
H.A. MacDougall, BA, MA, PhD (Toronto)
K.J. MacHardy, BA, MA (Western Ontario), PhD (Berkeley)
M.T. Malone, 1 BA (University College, Dublin), MA, PhD (Toronto), J, Recipient of the Distinguished Teacher Award
C.A. Snyder, BA (Waterloo), MA, PhD (McMaster), G
G.J. Stortz, BA, MA (Waterloo), PhD (Guelph), J
J.A. Wahl, CR, BA (Western Ontario), MA, PhD (St. Louis), J
J.W. Walker, BA (Toronto), MA (Waterloo), PhD (Dalhousie)

Assistant Professors
G.W. Hayes, BA, MA (Wilfrid Laurier), PhD (Western Ontario)
L. Taylor, BA (Western Ontario), MA (London), PhD (McGill)

Faculty member holding cross appointment to History from:
1 Religious Studies

Human Resources Management

Associate Professor, Program Director
S.W. Kardasz, BA (Loyola), PhD (Queen's, Kingston)

Independent Studies

Associate Professor, Director
G.A. Griffin, BA (Colgate), MA, PhD (Wisconsin), Recipient of the Distinguished Teacher Award

Associate Professors
P.D. Beem, BA (Waterloo), MA, PhD (McMaster), PhD (Toronto)
M. Eimitt, National Diploma in Design (High Wycombe)
S.C. Lerner, BA (Ohio State), MA (Indiana), Recipient of the Distinguished Teacher Award

Academic Advisor
A.I. Dagg, BA, MA (Toronto), PhD (Waterloo)

Academic Board Members

Associate Professor, Academic Board Chair
R.H. Holmes, BA, MA (Montana), PhD (Washington), Recipient of the Distinguished Teacher Award

Associate Professors
S.D. Burt, BA, MA (Waterloo), PhD (York)
S.C. Lerner, BA (Ohio State), MA (Chicago), Recipient of the Distinguished Teacher Award
R.S. McColl, BSc (McGill), PhD (Purdue)
C.A. Struthers, BMath, MMath, PhD (Waterloo)
### Interdisciplinary Social Science

For faculty listing consult Social Development Studies.

### International Studies

**Assistant Professor, Director**
G.W. Haynes, BA, MA (Wilfrid Laurier), PhD (Western)

**Advisory Board**

**Professors**
- A.F. Cooper, BA, MA (Waterloo), DPhil (Oxford)
- J.R. English, BA (Waterloo), AM, PhD (Harvard)
- D.J. Sahas, BA (Athens), STM (Christian Theological Seminary), PhD (Hartford Seminary Foundation)

**Associate Professor**
- J.W. Walker, BA (Toronto), MA (Waterloo), PhD (Dalhousie)

**Assistant Professor**
- R.J.R. Mathews, BA (Waterloo), MA (Guelph), EdD (Toronto)

### Italian

**Associate Professor, Undergraduate Officer**
G.A. Niccoli, BA, MA, PhD (British Columbia), J

**Associate Professor**
- V.F. Golini, BA (McMaster), MA (California), PhD (California, Berkeley), J

*J" refers to Faculty members at St. Jerome's College

### Japanese

For faculty listing consult East Asian Studies.

### Kinesiology

**Associate Professor, Department Chair**
J.S. Frank, BSc, MSc (Waterloo), PhD (Southern California)

**Associate Professor, Associate Chair, Undergraduate Studies**
I.D. Williams, MS, PhD (Illinois)

**Professor, Associate Chair, Graduate Studies**
A.E. Patta, BTech (Indian Institute of Technology), MSc Eng (New Brunswick), PhD (Simon Fraser)

**Associate Professor, Head of School of Anatomy**
D.A. Runney, BA, MD (Toronto), FRCS (England)

**Distinguished Professor Emeritus**
D.A. Winter, BSc, MSc (Queen's), PhD (Dalhousie), PEng

**Professors**
- N.J. Ashton, BSc (McGill), MS (Michigan), (Professor Emeritus)
- P.J. Bishop, BSc, BPE (Waterloo), MSc (Western Illinois), PhD (Mississippi)
- A. Bonen, BA (Western Ontario), MSc, PhD (Illinois)
- I.R. Brawley, BPE (Calgary), MSc (Oregon), PhD (Pennsylvania State)
- J.E. Curtis, BA (Sir George Williams), MA (Central Michigan), MA (Cornell)
- H.J. Green, BA, BPE (Queen's), MA (Alberta), PhD (Wisconsin)
- M.E. Houston, BSc (Toronto), PhD (Waterloo)
- R.L. Hughson, BSc (Western Ontario), MSc (British Columbia), PhD (McMaster)
- R.W. Norman, BA, BPE (McMaster), MSc (Alberta), PhD (Pennsylvania State), Docteur H.C. (Jyväskylä)
- E.A. Roy, BSc (Waterloo), MFC (British Columbia), PhD (Waterloo)
- M.T. Sharratt, BA, MA (Western Ontario), PhD (Wisconsin)
- N. Theberge, BA (Massachusetts), MA (Boston), PhD (Massachusetts)

**Associate Professors**
- F. Allard, BA, BPE, PhD (Waterloo), Recipient of the Distinguished Teacher Award
- L. Hoffman-Goetz, BA (SUNY-Binghampton), MA, PhD (Michigan)
- S.M. McGill, BPE (Toronto), MSc (Ottawa), PhD (Waterloo)
- J.B. Medley, BASc, MASC (Waterloo), PhD (Leeds), PEng
- R. Pridde, BPE (Toronto), MSc (Springfield), PhD (Waterloo)
- J.A. Thomson, BA, MSc (McMaster), PhD (Waterloo)
- R.P. Wells, BSc (Manchester), MEng (McMaster), PhD (Manchester)
- W.N. Widmeyer, BA (Western Ontario), BPE (McMaster), MA (California), PhD (Illinois)

**Assistant Professor**
- H. Carnahan, BPE, MSc (McMaster), PhD (Waterloo)

**Research Assistant Professor**
- B. Sivak, BPT (McGill), MSc, PhD (Waterloo)

**Adjunct Faculty**
- P.A. Bright, MB, ChB (Bristol)
- F. Caldwell, MA (Toronto)
- A.V. Carron, PhD (University of California)
- D.A. Dainty, PhD (Pennsylvania State)
- E. Elliott, PhD (McMaster)
- T. Graham, PhD (Queen's)
- K.J. Ho, MD (Alberta)
- J. Kowalcik, PhD (McMaster)
- M. Lafortune, PhD (Penn State)
- G.H. Mann, MB, BS (London), DRCOG (London)
- C. McDonali, PhD (Wayne State)
- A. Nativ, BA (Tel Aviv), MS, PhD (Waterloo)
- D.H. Paterson, PhD (Toronto)
- J. Polvin, PhD (Waterloo)
- S. Prasad, BSc (Waterloo), MD (McMaster), FRCP (Canada)
- D. Richardson, MD (Western Ontario)
- J.P. Schaman, PhD (London)
- H. Shannon, MD (London)
- L. Spriet, PhD (McMaster)
- J. Sutton, DSc (Sydney)
- R. Webb, BS, PhD (London)

**Laboratory Demonstrators**
- L.L. Jones, BSc, MSc (Waterloo)
- J.S. Larkworthy, BSc (Waterloo)
- D.C. Painter, BA, BPE (Queen's), MSc (Waterloo)
- J.C. Pazzack, BSc, MSc (Waterloo)
- C. Russell, BSc, MSc (Waterloo)
- H.E. Scott, BA, MSc (Queen's)

**Faculty Members of Kinesiology holding cross and/or joint appointments to:**
1. Sociology
2. Psychology
3. Systems Design
4. Health Studies and Gerontology
5. Optometry
6. Mechanical Engineering
Management Sciences

Associate Professor, Department Chair
J.D. Fuller, BSc (Queen's), MSc, PhD (British Columbia)

Associate Professor, Associate Chair for Undergraduate Studies
F. Safayeni, BS (Idaho), MSc, PhD (Victoria)

Associate Professor, Associate Chair for Graduate Studies
N.M Fraser, BASc, MSc, PhD (Waterloo), PEng

Associate Professor, BNR-BC Tel-NSERC/SSHRC Chair in Management of Technological Change
P.D. Guild, BA (Waterloo), MA (Carleton), DPhil (Oxford)

Professors
J.H. Bookbinder, MBA (Toronto), MS, PhD (California, San Diego)
M.J. Magazine, BS (City College of New York), MS (New York University), MEng, PhD (Florida), PEng, (on leave)
S.D. Saleh, BA (Cairo), MA, PhD (Case Western Reserve) (Professor Emeritus)*
G.N. Souls, BASc (Toronto), PEng, (Professor Emeritus)*
R.G. Vickson, BSc (British Columbia), PhD (Massachusetts Institute of Technology)

Associate Professors
D.M. Dills, BS (California Polytechnic), MBA, PhD (Oregon)
Y. Gerchak, BA, MSc (Tel-Aviv), PhD (British Columbia)
E.M. Jewkes, BSc (St. Francis Xavier), MBA (Calgary), PhD (Waterloo)
J.B. Moore, BASc (Toronto), MMath, PhD (Waterloo), PEng
J. Webster, BSc (Guelph), MStat (North Carolina), MBA (Saint Mary's), PhD (New York)

Assistant Professors
T. Astebro, MSc (Chalmers Institute), PhD (Carnegie Mellon)
C.G. Blake, BASc (Waterloo), MS (Johns Hopkins), PhD (Waterloo), PEng
J.Y. Mao, BE (Renmin), MSc (McGill), PhD (UBC)

Adjunct Faculty
J.A. Buzacott, BSc, BE (Sydney), MSc, PhD (Birmingham)

Faculty Member of Management Sciences holding cross appointment to:
1 Systems Design Engineering
2 School of Optometry
*Also has Adjunct appointment

Management Studies

Associate Professor, Program Director
S.W. Kardasz, BA (Loyola), PhD (Queen's, Kingston)

Legal Studies

Committee Members
Associate Professors
C.G. Brunk, BA (Wheaton), MA, PhD (Northwestern), G
F. DeRuches, BA (Waterloo), MA (Toronto), PhD (Waterloo), J
S.P. Gunz, BA, LLB (Sydney), MBA (Manchester)
F.G. Reynolds, BSc, MSc (Manitoba), FSA, FCIA, MAAA
J.A. Wahl, CR, BA (Western Ontario), MA, PhD (St. Louis), J
R.P. Woolstencroft, BA, PhD (Alberta)

Assistant Professor
E. Nelson, BA (Manitoba), PhD (London School of Economics)

‘G’ refers to Faculty members at Conrad Grebel College
‘J’ refers to Faculty members at St. Jerome’s College

For faculty listing consult Classical Studies.

University Faculty
Korean - Mathematics

Faculty Members holding cross and/or joint appointments to Kinesiology from:
7 Sociology
8 Health Studies and Gerontology
9 Dance
10 Mechanical Engineering
*Also has Adjunct appointment

Latin

For faculty listing consult Classical Studies.

Mathematics

(See also Applied Mathematics, Combinatorics and Optimization, Computer Science, Pure Mathematics, Statistics and Actuarial Science.)

Associate Professor
P.C. Brillinger, BA (McMaster), MA (Waterloo)

Assistant Professor
C.G. Hewitt, BSc, MSc (Aberdeen), PhD (Waterloo)

Lecturers, Faculty of Mathematics
L.E. Davidson, BSc (Toronto)
R.G. Dunkley, BA (Western)
B.A. Ferguson, BMath, MMath (Waterloo), BEd (Western)
R. Malinowski, BEd (Western), BMath, MMath (Waterloo)
R.G. Sciona, BA (Western), MMath (Waterloo), (Director of Co-op Teaching)

Adjunct Lecturers
E. Anderson, BA (McMaster)
R.G.R. Lawrence, QC, LLB (Toronto), Recipient of the Distinguished Teacher Award
Mechanical Engineering

University Faculty
Mechanical Engineering - Music

Middle East Studies

Associate Professor, Director
L.A. Curchin, BA (Western Ontario), MA (Toronto), MA (Carleton), PhD (Ottawa), Classical Studies

Professors
A. Banerji, BArch (Calcutta), MArch (North Dakota State), Architecture
A.F. Cooper, BA, MA (Waterloo), DPhil (Oxford), Political Science
A. Diem, BA (Wayne State), MA (Clark), PhD (Michigan), Geography
M.I. Elmasry, BSc (Cairo), MSc, PhD (Ottawa), PEng, Electrical and Computer Engineering
J.S. North, BA, MA (British Columbia), PhD (Alberta), English
D.J. Sahas, BA (Athens), STM (Indiana), PhD (Harvard), Religious Studies

Associate Professor
F.M. Nagib, BSc (Washington), MSc (Oregon), PhD (Queen's), Economics

Resource Persons

Professors
V.K. Handa, BSc (Calcutta), BSc (Eng) (London), MSc (Queen's), MSc, PhD (Waterloo), PEng, Civil Engineering
W.C. Lennox, BSc, MSc (Waterloo), PhD (Lehigh), PEng, Civil Engineering
S.D. Saleh, BA (Cairo), MA, PhD (Case Western Reserve), Management Sciences

Music

Associate Professor, Department Chair
L.J. Enns, ARCT (Toronto), BSM (Canadian Mennonite Bible College), BMus (Wilfrid Laurier), MMus, PhD (Northwestern)

Associate Professors
K.R. Hull, ARCT (Toronto), BA (Waterloo), BMus, MMus (Western Ontario), PhD (Princeton)
D.B. Huron, BIS (Waterloo), MA (York), PhD (Nottingham)
W.R. Maust, BS (Eastern Mennonite College), BMus (Peabody Conservatory), MMus, PhD (Indiana)
C.A. Weaver, BMus, MMus, DMus (Indiana)
Native Studies

For faculty listing consult Anthropology.
University Faculty
Optometry - Personality and Religion, Studies in

D.B. Elliott, BSc (Optom), PhD (Bradford), MBCO, FAAO
E. Ellis, BSc, MSc, PhD (Massachusetts)
O. Feldsger, MAsC (Waterloo)
H.A. Green, BS, OD (Pennsylvania)
College of Optometry
B.A. Holden, BAppSc, LOSC (Melbourne), PhD (City University, London), DSc (SUNY), FAAO
C. Leahy, BA (Worchester), MS (Berkely), OD (New England College of Optometry)
T. Liu, BSc Med (Hons), MB, BS (Sydney), FRACP, FRCP(C)
R. Munger, BSc (Université du Québec a Chicoutimi), MSc, PhD (Waterloo)
G. Orsborn, MSc, OD (Ohio State University), FAAO
J. Pekar, BA (Pennsylvania), MS (Georgetown), PhD (North Carolina)
R. Potvin, BENG (Carleton), MAsC (UT), OD (Waterloo)
D. Pullman, PhD (Waterloo)
A. Remole, BFA (Manitoba), OD (College of Optometry of Ontario), MSc, PhD (Indiana), FAAO (Professor Emeritus)
B. Schumacher, MD (Toronto)
G. Trope, MD, Dch (S.A.), FRCS, PhD (Glasgow), FC Ophth (UK)
C.A. Westall, BSc (Optom) (City University), MSc (Indiana), PhD (Berkeley), FAAO
D. Whitaker, BSc (Optom), PhD (Bradford), MBCO
J. Wild, BSc (Optom) (City University, London), MSc, PhD (Aston), FBCO
B.P. Wilcock, DVM (Quebec), MS, PhD (Purdue)
L. Wright, BBA (Windsor)

Faculty Members of Optometry holding cross appointments to:
1. Biology
2. Dept. of Ophthalmology, U. of Toronto
3. Health Studies and Gerontology
4. Systems Design Engineering
5. Biology and Systems Design Engineering
6. Psychology
7. Physics

Faculty Members holding cross appointments to Optometry from:
8. Management Sciences
9. Kinesiology

* Part-time Definite Term Appointment

Clinical Faculty – Part-time
W.B. Andrews, BA, OD (Waterloo), FAAO
A. Bernardi, BSc, OD (Waterloo)
D.R. Bock, OD (Waterloo)
K. Burns, BSc (Western), OD (Waterloo)
C. Deasureult, OD (Waterloo)
P. Devenny, BSc, OD (Waterloo)
J.L. Dippel, OD (Waterloo)
P. Goemans, BSc (Hons), OD (Waterloo)
G.A. Grant, OD (College of Optometry of Ontario), FAAO
H. Kader, BSc, MSc (McGill), OD (Waterloo)
A. Karidas, BSc, OD (Waterloo)
R. Makaran, BSc (Western), OD (Waterloo)
S.J.P. Monteiro, BSc, OD (Waterloo)
J. Newman, OD (Waterloo)
R.J. Scheid, OD (Waterloo)
S. Taiz, OD (Waterloo)
R.J. Tarciani, OD (Waterloo), FAAO
V. Timpano, OD (Waterloo)
D. Williams-Lyn, BSc (Optom), MSc (UWIST, Cardiff), PhD (Aston), FAAO
R.L. Wilson, OD (Waterloo)
G. Young, OD (College of Optometry of Ontario)

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M. Smyth, BA (Toronto), MA, PhD (York), R
C.A. Snyder, BA (Waterloo), MA, PhD (McMaster), G
H. Froese Tiessen, BA (Winnipeg), MA, PhD (Alberta), G

Assistant Professors
G.O. Michalenko, BA, PhD (Saskatchewan)
L. Taylor, BA, MA (London), PhD (Michigan)

Adjunct Faculty
E.E. Regehr, BA (Waterloo), LLD (Wilfrid Laurier), G
D.E. Peachey, BA (Eastern Mennonite College), MA, PhD (Waterloo), G

Institute of Peace and Conflict Studies
Research Associates
E.E. Regehr, BA (Waterloo), LLD (Wilfrid Laurier), Funded by Project Ploughshares, G

'G' refers to Faculty members at Conrad Grebel College.
'U' refers to Faculty members at St. Jerome's College.
'R' refers to Faculty members at Renison College.

Peace and Conflict Studies

Associate Professor, PACS Faculty Group Chair
C.G. Brunk, BA (Wheaton), MA, PhD (Northwestern), G

Associate Professor, Undergraduate Officer
T.R. Yoder Neufeld, BA (Guelph), MS, PhD (Harvard), G

Members of the Peace and Conflict Studies Faculty Group

Professors
J.G. Holmes, BA, MA (Carleton), PhD (North Carolina)
K. Westhues, BA (Conception), MA, PhD (Vanderbilt)

Associate Professors
M.D. Bryant, BA (Concordia College), STB (Harvard), MA, PhD (St. Michael's), R
B. Hyma, BSc, MSc (Madras), MA (Sheffield), PhD (Pittsburgh)
W.B. Mou, BA, MA, PhD (British Columbia)

Personality and Religion, Studies in

Associate Professor, Director of the Program
J. Golnick, BA (Marquette), MA, PhD (Toronto)

SIPAR Advisory Committee
Professor
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P.J. Naus, BA, PhD (Nijmegen)
A.J. Reimer, BCHEd (Canadian Mennonite Bible College), BA (Manitoba), MA (Toronto), PhD (St. Michael's)

Participating Faculty
A.L. Evans, BA (Toronto), MDiv (Emmanuel), STM, DMn (Andover-Newton), NCC
R.D. Legge, BA (Transylvania), STB (Harvard), PhD (McMaster)
<table>
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<tr>
<th>University Faculty Philosophy</th>
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<tr>
<td>Associate Professor, Department Chair</td>
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<tr>
<td>R.H. Holmes, BA, MA (Montana), PhD (Washington), Recipient of the Distinguished Teacher Award</td>
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<tr>
<td>J. Wubnig, BA (Swarthmore), MA, PhD (Yale)</td>
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<tr>
<td>Faculty Member of Philosophy holding cross appointments to:</td>
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<tr>
<td>1. Computer Science and Psychology</td>
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<td>2. Pure Mathematics</td>
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<td>3. Political Science</td>
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<td>J.R. Lepock, BS, MS (West Virginia), PhD (Pennsylvania State)</td>
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| Associate Professor, Associate Chair of the Department, Undergraduate Officer |
| D. Hamming, BSc, PhD (Brussels), Recipient of the Distinguished Teacher Award |

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| Associate Professor, Director (GWF) |
| B.H. Torrle, BASc (Toronto), PhD (McMaster) |

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<td>W.K. Liu, BSc, MS, PhD (Illinois)</td>
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<td>F.R. Mann, BSc (McMaster), MSc, PhD (Toronto)</td>
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<td>F.R.W. McCourt, BSc, PhD (British Columbia)</td>
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<td>M.M. Pintar, BSc, MS, PhD (Ljubljana)</td>
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<td>J.J. Sloan, BSc, PhD (Queen's)</td>
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<td>H.J.T. Smith, BSc, PhD (London)</td>
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<td>J. Vanderkooy, BEng, PhD (McMaster)</td>
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<td>P.S. Wesson, BASc (London), PhD (Cambridge), FRAS</td>
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<td>K.T. Leung, BSc, PhD (British Columbia)</td>
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<td>C.C. Lim, BA (DePaul), BSc (Nebraska), PhD (Toronto), (Professor Emeritus)</td>
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<td>L.F. Nazar, BSc (British Columbia), PhD (Toronto)</td>
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<td>M.R. Moore, BA, MA (Western Ontario), PhD (London)</td>
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<td>R.A. Nutbrown, BA (Bishop's), MA, PhD (Carleton)</td>
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| Associate Professor, Associate Chair |
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<tr>
<td>H. Peemoeller, BSc (Winnipeg), MSc (Victoria), PhD (Waterloo)</td>
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<tr>
<th>Assistant Professors</th>
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<tbody>
<tr>
<td>M.R. Moore, BA, MA (Western Ontario), PhD (London)</td>
</tr>
<tr>
<td>R.A. Nutbrown, BA (Bishop's), MA, PhD (Carleton)</td>
</tr>
<tr>
<td>P.K. Vrimalitz, BA (Regina), MA (Dalhousie), PhD (Alberta)</td>
</tr>
</tbody>
</table>
Assistant Professors
Z.Y. Chen, BSc (China), PhD (Maryland)
G. Schoiz, BSc (Simon Fraser), MSc (McMaster), PhD (Simon Fraser)

Adjunct Faculty
J.A. Blackburn, BSc (Manitoba), MSc, PhD (Waterloo)
W.J. Buyers, BSc, PhD (Aberdeen)
J.J. Dubowski, BSc (Nottingham), MSc, PhD (Manitoba), National Research Council
P.A. Egelstaff, BSc, PhD (London), FRSC
W.E. Hartis, BSc, PhD (Alberta), MSc, PhD (Toronto)

Faculty Members of Physics holding cross appointments to:
1. Geography
2. Environmental Studies
3. Sociology

E.C. Svensson, BSc (New Brunswick), PhD (McMaster)
P. Tikuisis, BSc (Waterloo)

Demonitors
J.L. Gardiner, BSc (Waterloo)
C.R. Jayasundera, BSc (Waterloo)

Planning, Urban and Regional

Associate Professor, Director, The School of Urban and Regional Planning
R.T. Newkirk, BA, MSc, PhD (Western Ontario)

Associate Director and Graduate Officer
P.Filion, BA, MA (Laval), PhD (Kent, Canterbury)

Professor and Undergraduate Officer
N.E.P. Pressman, BArch (McGill), MArch, urb des (Cornell), Cert USP (Manchester), MCIP, OPPi, RPP, AICP, AIU

Distinguished Professor Emeritus
L.O. Gertler, BA (Queen’s, Kingston), MA (Toronto), PCIP*

Professors
G.B. Hall, BA Hons (Otago, New Zealand), MA, PhD (McMaster)
D.W. Hoffman, BSA, MSA (Toronto), PhD (Waterloo), (Professor Emeritus)*
L.R.G. Martin, BA (Queen’s, Kingston), MA, MRP, PhD (Syracuse), MCIP, OPPi
G.G. Mulamoottil, BSc (Mysore), MSc (Bombay), PhD (Delhi)
J.G. Nelson, BA (McMaster), MA (Colorado), PhD (Johns Hopkins)
J.B. Theberge, BSc (Guelph), MSc (Toronto), PhD (British Columbia)

Instructors
A.B. Haner, BSc, MSc (Waterloo)
D.S. McVicar, BSc (Waterloo)

Assistant Professors
M.C. Delfgauw, BSc (Amsterdam), MA, PhD (Waterloo)
I. Skelton, BA, MUP (McGill), PhD (York)
M. Stone, BSc (Waterloo), MA (Laurier), PhD (Waterloo)

Assistant Professors
M.C. Delfgauw, BSc (Amsterdam), MA, PhD (Waterloo)
I. Skelton, BA, MUP (McGill), PhD (York)
M. Stone, BSc (Waterloo), MA (Laurier), PhD (Waterloo)

Lecturer
K. Bowles Hammond, BLA (Guelph), MA (Waterloo)

Adjunct Faculty
G. Davidson, BA (Toronto), MA (Waterloo), PhD (Western Ontario), MCIP, OPPi

Polish

Polish

For faculty listing consult Germanic and Slavic Languages and Literatures.

Political Science

Associate Professor, Department Chair
W.B. Moul, BA, MA, PhD (British Columbia)

Associate Professor, Undergraduate Officer
R.J. Williams, BA, MA (McMaster), PhD (Toronto)

Associate Professor, Associate Dean, Special Programs
R.P. Woostencroft, BA, PhD (Alberta)

Professor, Graduate Officer
A.F. Cooper, BA, MA (Waterloo), DPhil (Oxford)

Distinguished Professor Emeritus
T.H. Quatter, BA (New Zealand), PhD (London)

Professors
A. Kapur, BA (Punjab), MA (George Washington), PhD (Carden)
J.E. Kersell, BA, MA (Queen’s, Kingston)

S. Garrod, BA (McMaster), LLB, MES (York)
W. Green, BES (Waterloo), MCIP, OPPi
P. Picklefield, BA (Western Ontario), LLB (Queen’s, Kingston), LLM (Osgoode Hall)
S. Snider, BES (Waterloo), LLB (Osgoode Hall)

Faculty Members of Planning holding cross and/or joint appointments to:
1. Geography
2. Environmental Studies
3. Sociology

Faculty Members holding cross and/or joint appointments to Planning from:
4. Environmental Studies
5. Geography

* Also has Adjunct appointment
Psychology

Professor, Department Chair
M.A. Ross, BA (Toronto), MA, PhD (North Carolina)

Associate Professor, Associate Chair, Undergraduate Affairs
J.A. Cheyne, BA (Waterloo Lutheran), MA, PhD (Waterloo)

Professor, Associate Chair, Graduate Affairs
J.G. Holmes, BA, MA (Carleton), PhD (North Carolina)

Distinguished Professors Emeriti
D.P. Crowne, BA (Antioch College), FM/M (Rochester), PhD (Purdue)*
M.J. Lerner, BA, MA (Ohio State), PhD (New York)*

Professors
R.K. Banks, BA, MA, PhD (Toronto)
D. Beaser, BA (Loyola College), MSc (Memorial), PhD (Reading), NSERC University Research Fellow
K.S. Bowers, BA, PhD (Illinois)
M.P. Bryden,2 BA (Massachusetts Institute of Technology), MSc, PhD (McGill), FRSC
A.J.R. Cameron,2 BA, MA, PhD (Waterloo)
W.C. Coming, BA (Heidelberg), PhD (Rochester)
P. Jolicoeur, BSc (McGill), PhD (Harvard)
H.M. Leftcourt, BA (Antioch College), MA, PhD (Ohio State)
D. Meichenbaum, AB (City College of New York), MA, PhD (Illinois), FRSC
P.M. Merkley, BA (Knox), MA, PhD (Virginia)
S. Reins, MD, Scs (Charles)
H. Ross, BA (Toronto), PhD (North Carolina)
P.M. Rowe, BA (Toronto), MA (Dalhousie), PhD (McGill)
E.A. Roy,3 BSc (Waterloo), MPE (British Columbia), PhD (Waterloo)
K.H. Rubin, BA (McGill), MS, PhD (Penn State)
D.A. Sprott,4 BA, MA, PhD (Toronto), FSS
R.A. Steffy, BA (Alberta), MA, PhD (Illinois)
P. Tragard,5 BA (Saskatchewan), BA, MA (Cambridge), PhD (Toronto), MS (Michigan)
J.A. Venn, BA (St. Joseph), MA (Bowling Green), PhD (Michigan State), J
M.D. Vogel-Sprott, BA (McMaster), MA, PhD (Toronto)
P. Wainwright,6 BSc (Rhodes, S.A.), MA, PhD (Waterloo)

T.G. Waite, BS, MS (Southern Mississippi), PhD (Vanderbilt)
M.P. Zanna,7 BA, PhD (Yale)

Associate Professors
J.M. Anglin, BA (Toronto), PhD (Harvard)
R.D. Beauchamp,8 BA (McMaster), MA, PhD (Brown)
K. Bloom, BSc (Loyola), MA, PhD (North Carolina)
P.E. Bowers, BA (Queen's), MA, PhD (Illinois)
J.M. Cornwall, BA, MS, PhD (Washington)
W.B. Cowan,8 BSc (Waterloo), PhD (McGill)
G.T. Fong, AB (Stanford), PhD (Michigan)
G.A. Griffith, BA (Colgate), MA, PhD (Wisconsin), Recipient of the Distinguished Teacher Award
D. Hurn,9 BIS (Waterloo), MA (York), PhD (Nottingham), G
Z. Kunda, BA (Hebrew University of Jerusalem), MA, PhD (Michigan)
R.H. Lahrue, BSc (Fordham), PhD (Waterloo), R
J.A. Loftus, AB, MA (Fordham), MDiv (Woodstock College), PhD (Boston University), J
G.E. MacKinnon, BA (Queen's), PhD (Johns Hopkins)
J. Michel, BS (Maryland), MA, PhD (California, Los Angeles)
P.J. Naus, BA, PhD (Nijmegen), J
J.E. Orlando, BA (Western Ontario), MA (Detro/), MA, PhD (Michigan), J
J.K. Remple, BA, MA, PhD (Waterloo), J
R.D. Seim, BA (Queen's), PhD (Waterloo)
J. Theis, BA (Western Ontario), MA (Notre Dame), PhD (Wisconsin), J
E.E. Ware, BA, MA (Richmond), PhD (Illinois)
J. Wood, BA (Wisconsin), MA, PhD (California, Los Angeles)
E.Z. Woody, BA (Reed), MS (Oxford), PhD (Duke)

Assistant Professors
B. Bobocel, BSc (Alberta), MA, PhD (Waterloo)
B. Bulman-Fleming, BSc (Queen's), PhD (Waterloo), Recipient of the Distinguished Teacher Award
C. Ellard, BSc (Toronto), MA, PhD (Western Ontario)
D.J. Koehler, BS (Wisconsin, Madison), PhD (Stanford)
D.K. O'Neill, BSc (Toronto), PhD (Stanford)
J.A. Stolz, BS (Union College), PhD (Albany)

Faculty Members of Psychology holding cross appointments to:
1 Health Studies and Gerontology
2 Systems Design Engineering

Print Journalism

Professor, Director
D.E. Irish, BSc (Western Ontario), MSc, (McMaster), PhD (Chicago), Recipient of the Distinguished Teacher Award

Academic Board
University of Waterloo
W.H. Cherry, BSc, PhD (Melbourne), Recipient of the Distinguished Teacher Award
B.R. Glick, BSc (City College of New York), MSC (Waterloo)
N.F. Randall, BA (Guelph), MA (Waterloo), PhD (York)

Conestoga College
F. Harris, DA (British Columbia), Registrar
A. Jankowski, BA (McMaster), BJ (Carleton, MA (McMaster)
J. Martin, BA (Concordia), MSSc (Niagara), Chair of Applied Arts and
Academic Support

University Faculty
Print Journalism
Psychology

1 Philosophy

Cross appointments to:
1 Health Studies and Gerontology
Faculty Members holding cross appointments to Psychology from:

3 Kinesiology
4 Statistics
5 Health Studies and Gerontology
6 Computer Science
7 Philosophy
8 Optometry
9 Music

‘G’ refers to Faculty members at Conrad Grebel College
‘J’ refers to Faculty members at St. Jerome’s College
‘Also has Adjunct appointment

Pure Mathematics

Professor, Department Chair
W.J. Gilbert, BA, MA (Cambridge), DPhil (Oxford)

Associate Professor, Associate Chair for Undergraduate Affairs
B.E. Forrest, BSc, MSc, PhD (Alberta)

Associate Professor, Associate Chair for Graduate Affairs
K.E. Hare, BMath (Waterloo), PhD (British Columbia)

Distinguished Professor Emeritus
J.D. Aczél, BA, MA, PhD (Budapest), Habil DSc (Hungarian Academy of Sciences). Dr. h.c. mult., FRSC

Professors
J.A. Baker, BA, MA, (Saskatchewan), PhD (Waterloo)
S.N. Burris, BSc, MA, PhD (Oklahoma)
L.J. Cummings, BSc (Roosevelt), MSc (de Paul), PhD (British Columbia)
K.R. Davidson, BMath (Waterloo), PhD (California, Berkeley), FRSC, Killam Fellow
D.Z. Djokovic, BSc, PhD (Belgrad)
H. Haruki, MSc, PhD (Osaka), (Professor Emeritus)
U.A. Higgs, BSc Hons (Witwatersrand), MA (Cambridge), PhD (McMaster), (on leave)
R.N. Hoffman, BA (Toronto), PhD (Manchester)
P.L. Kannappan, BSc Hons (Annamalai), PhD (Washington)
A. Ker-Lawson, BA (Toronto), MA (Chicago), PhD (McMaster)
J.W. Lawrence, BSc Hons (Carleton), MSc (McGill), PhD (Carleton)
C.T. Ng, BSc (Chinese University of Hong Kong), MMath, PhD (Waterloo)

University Faculty
Pure Mathematics - Religious Studies

V.P. Platonov, MSc, PhD (Minsk), DSc (Russian Academy of Sciences, Novosibirsk)
R.A. Stael, BA, MA, PhD (Toronto), (Professor Emeritus)
C.L. Stewart, BSc (British Columbia), MSc (McGill), PhD (Cambridge), FRSC
F.C.Y. Tang, BSc (Hong Kong), MS (South Carolina), PhD (Illinois)
P.A. Zorzitto, BSc (Windsor), MSc, PhD (Queen’s), Recipient of the Distinguished Teacher Award

Associate Professors
L.J. Dickey, BSc, MA (Arizona), PhD (Wisconsin)
E.M. Moskal, BA (Toronto), PhD (Illinois)
R.D. Willard, BA (Carleton, Minnesota), MA (Toronto), MMath, PhD (Waterloo)

Assistant Professors
A. Baragar, BSc (Alberta), PhD (Brown)
S.S.-Y. Lu, BA (McGill), MA (Harvard), PhD (Harvard)
X. Zhang, BSc (Nanjing) PhD (British Columbia)

Adjunct Faculty
J.E. Marsden, PhD (Princeton)

Faculty Members holding cross appointments to:
1 Philosophy
2 Combinatorics and Optimization
3 Computer Science
*Also has Adjunct Appointment

Recreation and Leisure Studies

Professor, Department Chair
R.C. Mannell, BA (McMaster), MPE, PhD (Windsor)

Lecturer, Associate Chair, Undergraduate Studies
A. Gilbert, BA, MA (Waterloo)

Associate Professor, Associate Chair, Graduate Studies
S.M. Shaw, BPE, MSc (Dalhousie), PhD (Carleton)

Professors
P. Eagles, BSc (Waterloo), MSc (Guelph), PhD (Waterloo), MCIP
J.J. Smith, BA (Wright State), MA (Ohio State), PhD (Texas A&M)

G. Wall, BA (Leeds), MA (Toronto), PhD (Hull)

Recreational and Leisure Studies

Professor, Department Chair
M.T. Malone, BA (University College, Dublin), MA, PhD (Toronto), J, Recipient of the Distinguished Teacher Award

Associate Professor and Undergraduate Officer
T. Yoder Neufeld, BA (Manitoba), MDiv, ThD (Harvard), G

Professors
M.S. Bird, BA, MA, PhD (Iowa), R
M.D. Bryant, BA (Concordia College), STB (Harvard), MA, PhD (St. Michael’s), R
M.W. Higgins, BA (St. Francis Xavier), MA, PhD (York), J
University Faculty
Russian - Social Development Studies

D.J. Sahas, BA (Athens), STM (Christian Theological Seminary), PhD (Hartford Seminary Foundation)

Associate Professors
J. Gollnick, BA (Marquette), MA, PhD (Toronto), P
R.D. Legge, BA (Transylvania), STB (Harvard), PhD (McMaster), P
A.J. Reimer, BChEd (Canadianennonite Bible College), BA (Manitoba), MA (Toronto), PhD (St. Michael's), G

Assistant Professors
J.Gollnick, WA(Maquette),MA, PhD (Toronto). P
R.D. Legge, R4 (%ansytvanfa), STB (Harvard), PhD (McMastw), P
A.J. Rein-w, WChEd (Car&km Mennonf?e Sibfe Cc&ge), SA (Manitoba), MA (fbmnto), PhD (St. Micfwfs), G

Assistant Professor
L. Dawson,4 BA (Queen's), MA, PhD (McMastter)

Lecturer
C. Varin-Bishop, R4 (Waterto), MDiv (Toronto), J

Adjunct Faculty
J. Fast, BA (Waterloo), MDiv (Mennonite Brethren Biblical Seminary), PhD (Boston University), G
P. Frick, BA (Waterloo), P

Faculty Members of Religious Studies holding cross appointments to:
1 Fine Arts
2 English
3 History

Faculty Members holding cross appointments to Religious Studies from:
4 Sociology

"G" refers to Faculty members at Conrad Grebel College
"J" refers to Faculty members at St. Jerome’s College
"P" refers to Faculty members at St. Paul's College
"R" refers to Faculty members at Renison College

Russian and East European Studies

Associate Professors, Director
R. Karpik, BA, MA (Manitoba), PhD (Ottawa)

Sexuality, Marriage and the Family (Studies in)

Associate Professor, Director
J.K. Rempel, BA, MA, PhD (Waterloo), J

Associate Professors
P.J. Naus, BA, PhD (Nijmegen), J
J.P. Theis, BA (Western), MA (Notre Dame), PhD (Windsor), J

"J" refers to Faculty members at St. Jerome’s College

Social Development Studies

Associate Professor, Associate Dean
M. Smyth, BA (Toronto), MA, PhD (York), R

Lecturer, Co-ordinator of Placements,
Diploma Program
D. Clark, BA, BSW (Western Ontario), MSW (Toronto), R

Professor Emeritus
D.G.S. M’Tirikulu, BA, MA (South Africa), MA (Yale), PhD (Natal), R

Professors
M.S. Bird,1,3 BA, MA, PhD (Iowa), R
M.D. Bryant,1 BA (Concordia College), STB (Harvard), MA, PhD (St. Michael's), FRSA, R
G. Cuthbert Brandt,4 BA (Toronto), MA (Carleton), PhD (York), R
J.O. Tuker, BA (Toronto), MEJ, PhD (Alberta), R

Associate Professors
R. Lahue,5 BSc (Fordham), PhD (Waterloo), R (on leave)

J. Miller,6 BA, BLS (McGill), MA, MPhil (Waterloo), PhD (York), FRSA, R
M.I. Nagler,7 BA (British Columbia), MA (Chicago), PhD (Stirling, UK), R
M. Zentner, BA (Temple), MSW (Kansas), R (on leave)

Assistant Professors
T. Brenner, BA (Waterloo), MSW (Wilfrid Laurier), R
J. Majoris, BA, MA (CUNY), MSW (SUNY, Albany), PhD (Toronto), R
K. Motz, BA (Wilfrid Laurier), BD (Union Theol., Vancouver), MSW (SUNY, Buffalo), R

Adjunct Assistant Professors
B. Abbott, BA (Waterloo), MSW (Wilfrid Laurier), R
J. Barnbrook, BA, MA (Guelph), PhD (Windsor), R
B. Bell-Rowotham, BA, MA (Western Ontario), R
H. d’Alilly, BA (Taiwan), MEd, PhD (Western)
L. Fusco, BA (Hofstra), MA (Chicago), R
D. Payne, BA (Sir George Williams), MSW (Wilfrid Laurier), R
M. Thompson, STh (Wycliffe), RN (Wellesley), BA (Waterloo), MSW (Wilfrid Laurier), R

Lecturers
J. Royl, BA (Guelph), MSW (Wilfrid Laurier), R
S. Campbell, BA (Waterloo), MSW (Wilfrid Laurier), R
P. Derry, BA, MA, PhD (Western Ontario), CPsych, R
R. Ennis, BA, MA (Waterloo)
R. Finch, BA (Waterloo), MSW (Wilfrid Laurier), R
C. Gillin-Garling, BSc (Pittsburgh), MA, PhD (Western), R
P. Gove, BA (Waterloo), MSW (Wilfrid Laurier), R
C. Hollidge, BA (Waterloo), MSW (Wilfrid Laurier), PhD (Smith College), R
V. Wall, BA, MSW (Toronto), R
A. Wilson, BA (Clarke), MA (Iowa), MSW (Wilfrid Laurier), R
J. Zinkann, BA (Toronto), LLB (Osgood), MSW (Wilfrid Laurier), R
L. Zinkann, BA, MSW (Wilfrid Laurier), R

Faculty Members of Renison College holding cross appointments to:
1 Religious Studies
2 Sociology
3 Fine Arts
4 History
5 Psychology
6 English

"R" refers to Faculty members at Renison College

For faculty listing consult Germanic and Slavic Languages and Literatures.
Social Work

For faculty listing consult Social Development Studies.

Society, Technology and Values

Associate Professor, Director
N.R. Ball, BA (McMaster), MA, PhD (Toronto), Systems Design Engineering, Northern Telecom Professor of Engineering Impact on Society

Associate Professor, Option Co-ordinator
S.C. Lerner, BA (Ohio State), MA (Columbia), Recipient of the Distinguished Teacher Award, Environment and Resource Studies

Lecturers
D. Powell, BSc (Guelph)
D. Pullman, BEd (Western Ontario), MDiv (Biola), MA, PhD (Waterloo)

Sociology

Professor, Department Chair
R.D. Lambert, BA, MA (McMaster), PhD (Michigan)

Assistant Professor, Associate Chair for Graduate Studies
L. Dawson, BA (Queen's), MA, PhD (McMaster)

Associate Professor, Associate Chair for Graduate Studies
R.D. Hiscott, BA (Carleton), MA (Queen's), PhD (Toronto)

Distinguished Professor Emeritus
H.J. Faliding, BA, BSc, MA (Sydney), PhD (Australian National), FRSC

Professors
J.E. Curtis, BA (Sir George Williams), MA (Central Michigan), MA (Cornell)
J. Goyder, BA (Bishop's), MA, PhD (McMaster)
R.C. Prus, BA (Manitoba), MA, PhD (Iowa)
N. Tinbergen, BA (Massachusetts), MA (Boston), PhD (Massachusetts)

K. Westphues, BA (Conception), MA, PhD (Vanderbilt), Recipient of the Distinguished Teacher Award
A. Wipper, BA, MA (McGill), PhD (California, Berkeley)
J. Zuzanek, MA (Moscow State University), CSc (Prague Institute of Sociology), PhD (Charles University, Prague)

Associate Professors
P.J. Garvinton, BA (Harvard), MA, PhD (Toronto)
F. Desroches, BA (Waterloo), MA (Toronto), PhD (Waterloo), J
F.A. Fasick, BA (Pennsylvania State), MA, PhD (Columbia)
A.J. Feras, BA (Waterloo), MA (McMaster), PhD (Victoria, New Zealand) (Part-time)
R. Helmes-Hayes, BA/BPHE, MA (Queen's), PhD (Toronto)
N.M. Lazarovich, BA (Saskatchewan), MA, MCP, PhD (Cincinnati)
A. Musynaik, BA (McGill), MA, PhD (British Columbia)
M.I. Nagler, BA (British Columbia), MA (Chicago), PhD (Stirling, UK), R
O.K. Warriner, BA (British Columbia), MSc (Wisconsin), PhD (British Columbia)

Assistant Professors
J.P. Hirdes, BSc, MA, PhD (Waterloo)
E. Nelson, BA (Manitoba), PhD (London School of Economics)

Adjunct Faculty
D. Kubat, MA (Kansas), PhD (L. Maximilian, Munich), (Professor Emeritus)
B.D. McPherson, BA, MA (Western Ontario), PhD (Wichita)
J. Nancarrow-Cjarke, BA (Windsor), MA (York), PhD (Waterloo)

Faculty Members of Sociology holding cross/joint appointments to:
1 Kinesiology/Health Studies and Gerontology
2 Religious Studies

Faculty Members holding cross/joint appointments to Sociology from:
3 Kinesiology
4 Recreation and Leisure Studies
5 Urban and Regional Planning
6 Health Studies and Gerontology

* Also has Adjunct appointment

'J' refers to Faculty members at St. Jerome's College

'S' refers to Faculty members at Renison College

Spanish and Latin American Studies

Associate Professor, Department Chair
A. Fama, BA (Brock), MA (Western Ontario), PhD (SUNY, Buffalo)

Associate Professor, Undergraduate Officer
M. Gutierrez, BA, MA (McGill), PhD (Laval), Recipient of the Distinguished Teacher Award

Assistant Professor
M.C. Sillato, Lic en Letras (UNR, Argentina), MA, PhD (Toronto)

Language Instructor
P. Graham, BA (McMaster)

Participating Adjunct Faculty at Wilfrid Laurier University

Professor
A.A. Bomba, BA (Kentucky), MA (Indiana), PhD (Pennsylvania State)

Statistics and Actuarial Science

Professor, Department Chair
K.S. Brown, BMath, PhD (Waterloo)

Associate Professor, Associate Chair, Statistics, Undergraduate Affairs
R.J. MacKay, BSc (Waterloo), MSc, PhD (Toronto)

Associate Professor, Associate Chair, Actuarial Science
G.E. Willmot, BMath, MMath, PhD (Waterloo), FSA, FCIA

Associate Professor, Associate Chair, Graduate Studies
J.B. Whitney, BA, MA (Western Ontario), PhD (Toronto)

Distinguished Professor Emeritus
V.P. Godambe, MSc (Bombay), PhD (London)

Professor, GM/NISERC Industrial Research Chair in Quality and Productivity
J.F. Lawless, BSc, MSc, PhD (Waterloo)
University Faculty
Statistics and Actuarial Science
Systems Design Engineering

Professors
B. Abraham, BSc (Kerala), MSc (Guelph), PhD (Wisconsin)
R.L. Brown, BMath, MA (Waterloo), FSA, FCIA, ACAS
P.P. Boyle, BSc (Queen’s, Belfast), MSc, PhD (Trinity College, Dublin), FIA, FCA
W.H. Cherry, BSc, PhD (Melbourne), Recipient of the Distinguished Teacher Award
K.W. Hipel, BASc, MASC, PhD (Waterloo)
J.D. Kaltfeiliech, BSc, MMath, PhD (Waterloo), FRSC
J.G. Kaltfeiliech, BSc (Toronto), MA, PhD (Waterloo)
D.L. McLellan, BSc (Queen’s), MSc (Toronto), PhD (McGill)
H.H. Panjkar, BA, MA, PhD (Western Ontario), FSA, FCIA
K.R. Shah, BA, MA (Bombay), PhD (Indian Statistical Institute)
C.G. Small, BSc (Regina), MSc (Alberta), PhD (Cambridge)
D.A. Sprott, BA, MA, PhD (Toronto), FRSC, FRPS
M.E. Thompson, BSc (Toronto), MSc, PhD (illinois)
W.J. Welch, BSc (Loughborough, England), MS, PhD (London)

Associate Professors
G.W. Bennett, BSc, BA, PhD (Adelaide)
M.A. Bennett, BA (Nottingham), FSA, FCA
C.D. Cutter, BSc (Manitoba), MSc, PhD (Carleton)
D.E. Matthews, BA, MA (Western Ontario), PhD (London), DIC
R.W. Oldford, BMath (Waterloo), MSc, PhD (Toronto)
F.G. Reynolds, BSc, MSc (Manitoba), EA, FSA, FCIA, MAAA
W.S. Rickett, BSc, PhD (Waterloo)
J.C. Robinson, BASc, MASC, PhD (Waterloo)
K.P. Sharp, BA (Cambridge), MA (California, Berkeley), PhD (Waterloo), FCIA, FIA, FSA
C.A. Struthers, BMath, MMath, PhD (Waterloo), J
J.C. Young, BASc (Toronto), MSc (Waterloo), PhD (Edinburgh)

Assistant Professors
J. Chen, BSc (Chinese Univ. of Science and Technology), MSc (Inst. of Systems Sci. Academia Sinica PRC), PhD (Wisconsin, Madison)
R.J. Cock, BSc (McMaster), MSc, PhD (Waterloo)
P.J. Farrell, BASc, MASC, MSc, PhD (McGill)
R.J. O’Hara Hines, 3 BA (New Brunswick), MA (Queen’s), MMath, PhD (Waterloo)
S.H. Steiner, BMath (Waterloo), MSc (British Columbia), PhD (McMaster)
S. Wang, BSc (Beijing), MSc (Beijing, Saskatchewan), PhD (Waterloo)
L.J. Wolston, BSc (Simon Fraser), M.S., PhD (Carnegie Mellon)

Adjunct Faculty
Sir D.R. Cox, FRs, PhD (Cambridge)
V.T. Farewell, PhD (Waterloo), PhD (London), DIC (Imperial College)
D.A.S. Fraser, BA, MA (Toronto), MA, PhD (Princeton)
C. Genest, BSc (Quebec), MSc (Montreal), PhD (British Columbia)
H. Ramlau-Hansen, MA, PhD (Copenhagen)
K. Ravindran, BSc (Simon Fraser), MSc (Calgary), PhD (Waterloo)
C.F.L. Wu, BSc (Taipei, Taiwan), PhD (California)

Faculty Members of Statistics and Actuarial Science holding cross appointments to:
1 Psychololgy
2 Health Studies and Gerontology
3 Biology
Faculty Members holding cross and/or joint appointments to Statistics and Actuarial Science from:
4 Health Studies and Gerontology
5 Systems Design Engineering
6 Accounting

'J' refers to Faculty members at St. Jerome's College

Associate Professor, Department Chair
K.W. Hipel, BASc, MASC, PhD (Waterloo), PEng

President Emeritus
D.T. Wright, OC, BASc (Toronto), MS (Illinois), PhD (Cambridge), DEng (Carleton), LLDB (Brook), DSc (Memorial), LLD (Concordia), LHD (Northeastern), DU (Strathclyde), Doctor H.C. (Compiène, France), Doctor H.C. (Sherbrooke), DSc (McMaster), DSc (Oueen's), FCAE, FEIC, FASCE, Life Member IAABSE, PEng, APEO Gold Medal, CCPE Gold Medal

Associate Professor, Associate Chair, Undergraduate Studies
G.R. Hepler, BASc, MASC, PhD (Toronto), PEng

Professor, Associate Chair, Graduate Studies
M. Kame!, BSc (Alexandria), MASC (McMaster), PhD (Toronto), PEng

Distinguished Professor Emeritus
H.K. Kasavan, BSc, BE (Mysore), MS (Illinois), PhD (Michigan State), PEng

Professors
M.P. Byrden, BASc, MASC, PhD (Waterloo)

M. Chandrashekar, BTech (Indian Institute of Technology, Kanpur), MASC, PhD (Waterloo), PEng

M.E. Jamilgan, SB, SM, PhD (Massachusetts Institute of Technology), PEng, Recipient of the Distinguished Teacher Award

J.F. Lewiessa, BSc, PhD (Waterloo)

K. Hahn, MASC (Waterloo), Recipient of the Distinguished Teacher Award

J.A. Robinson, BSc (Durham), MSc, PhD (Essex), PEng

G.J. Savage, BASc, MASC, PhD (Waterloo), PEng

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K. Hahn, MASC (Waterloo), Recipient of the Distinguished Teacher Award
J.A. Robinson, BSc (Durham), MSc, PhD (Essex), PEng

G.J. Savage, BASc, MASC, PhD (Waterloo), PEng

Assistant Professors
J.J. McPhee, CASc (Acadia), BEng (Technical University of Nova Scotia), MASC (Waterloo), PEng

K. Ponnambalam, BE (Madras), MSc (National University of Ireland), PhD (Toronto)

D.W. Stashuk, BASc (Waterloo), MEng, PhD (McMaster), PEng

Research Associate Professor
R. Mayorga, BASc, MASC (Monterrey Institute of Technology, Mexico), MASC (Toronto), PhD (Waterloo)

Systems Design Engineering

Professor, Department Chair
K.W. Hipel, BASc, MASC, PhD (Waterloo), PEng

President Emeritus
D.T. Wright, OC, BASc (Toronto), MS (Illinois), PhD (Cambridge), DEng (Carleton), LLDB (Brook), DSc (Memorial), LLD (Concordia), LHD (Northeastern), DU (Strathclyde), Doctor H.C. (Compiène, France), Doctor H.C. (Sherbrooke), DSc (McMaster), DSc (Oueen's), FCAE, FEIC, FASCE, Life Member IAABSE, PEng, APEO Gold Medal, CCPE Gold Medal

Assistant Professors
J.J. McPhee, CASc (Acadia), BEng (Technical University of Nova Scotia), MASC (Waterloo), PEng

K. Ponnambalam, BE (Madras), MSc (National University of Ireland), PhD (Toronto)

D.W. Stashuk, BASc (Waterloo), MEng, PhD (McMaster), PEng

Research Associate Professor
R. Mayorga, BASc, MASC (Monterrey Institute of Technology, Mexico), MASC (Toronto), PhD (Waterloo)
Research Assistant Professors
D. Thevenard, MSc (Ecole Nationale Supérieure de Techniques Avancées, Paris), MSc (Université de Paris 13), PhD (Institut de National Polytechnique de Grenoble)
P. Wanga, BMath, MMath (Waterloo), MS (California Institute of Technology), PhD (Waterloo)

Adjunct Faculty
W.K. Adrian, Dipl.-Ing, Dr.-Ing (TH Darmstadt), Dr. habil (Karlsruhe)
O. Basir, BSc (Al-Fateh University, Libya), MSc (Queen’s), PhD (Waterloo)
A.D. Bogobowicz, MSc (Warsaw), PhD (Polish Academy of Sciences, Warsaw)
K.C.C. Chan, BMath, MASc, PhD (Waterloo)
M. De, BSc (Madras), MSc (Indian Institute of Technology, Madras), AIChE (York), MASc, PhD (Waterloo)
L. Fang, BEng (Tianjin), MASc, PhD (Waterloo)
G.L. Greig, BSc (Queen’s), MASc (Western Ontario), PhD (Toronto), PEng
D.B. Huron, BIS (Waterloo), MA (Toronto), PhD (Nottingham)
J.J. Kay, BASc (McGill), MASc, PhD (Waterloo)
L.A. Logen, BASc (Israel Institute of Technology), MASc (Guelph), PhD (Waterloo), PEng
D.M. Kilgour, BASc, MSc, PhD (Toronto)
A.J. McLeod, BMath, MMath, PhD (Waterloo)
C. Nahmias, BASc (American University in Cairo), PhD (Surrey)
N. Okada, BASc, MASc, DEng (Kyoto), DEng (Waterloo)
K.J. Radford, BA, MA (Cambridge)
G. Roth, BMath (Waterloo), MSc (McGill), PhD (McGill)
H.C. Shen, BMath (Waterloo), MASc (Toronto), PhD (Waterloo)
E. Siddall, BSc (Eng) (London) PEng
G.N. Soulis, BASc (Toronto), PEng, (Professor Emeritus)
D.A. Stacey, BSc (Queens University), MASc, PhD (Waterloo)
J.J. Thoma, Dipl Phys, Dr. Sc Tech (Swiss Federal Institute of Technology)
P. Yu, BSc (Shanghai Jiao Tong University, China) MASc, PhD (Waterloo)*

Faculty Members holding cross appointments to Systems Design Engineering from:
* Psychology
* Statistics and Actuarial Science
* Environment and Resource Studies
* Optometry
* Also has Adjunct appointment

Women’s Studies

For faculty listing consult Germanic and Slavic Languages and Literatures.

University Faculty
Systems Design Engineering - Women’s Studies

Faculty Members holding cross appointments to Systems Design Engineering from:
* Statistics and Actuarial Science
* Environment and Resource Studies
* Earth Sciences
* Mechanical Engineering

Associate Professor, Director
H.D. Lyons, BA (Columbia), MLitt, DPhil (Oxford)

Members of the Women’s Studies Board
University of Waterloo

Professors
N. Theberge, BA (Massachusetts), MA (Boston College), PhD (Massachusetts)

Associate Professors
S. Vethamany-Globus, BSc, MA, MSc (Madras), PhD (Toronto)
M. Gültiemer, BA, MA (McGill), PhD (Laval), Recipient of the Distinguished Teacher Award
B. Hyma, BS, MS (Madras), MA (Sheffield), PhD (Pittsburgh)
P.J. Nauss, PhD (Nijmegen, The Netherlands)
C.A. Struthers, BMath, MMath, PhD (Waterloo)

Assistant Professor
F. Easton, BA (British Columbia), MA, PhD (Princeton)

Library
S. Bellingham, BA (Waterloo Lutheran), MLS (Western Ontario)

Faculty Member holding joint appointment with:
* Anthropology
Governing Bodies and University Offices

President James Downey confers a well-earned degree.
The Board of Governors

The Board of Governors acts as the governing body of the University and as such has the power to control UW's property and revenues, and the conduct of its business and affairs. Planning and implementation of the physical and operational development of the University, establishment and enforcement of rules and regulations with respect to University property, and designation of University funds are included under the jurisdiction of the Board of Governors.

The membership of the Board of Governors consists of representatives from the University faculty, staff and student bodies, and the community-at-large, as well as appointees from the Lieutenant-Governor-in-Council, and a number of ex officio members.

Officers
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Vice-Chair, P.D. Mitchell
Secretary, L.H.P. Claxton

Ex Officio
Chancellor, S. Ostry
President, J. Downey
Mayor of the City of Waterloo, W.B. Turnbull
Mayor of the City of Kitchener, R. Christy
Regional Chair, K. Seiling

From the Community-at-Large
J.T. Eyton, Toronto
R.J. Harding, Toronto
W.J. Harper, Waterloo
D.H. Haycock, Waterloo
R.J. Hunter, Toronto
C.J. Irwin, Toronto
P.D. Mitchell, Waterloo
P.H. Sims, Kitchener
P.B. Spafford, Toronto
G. Young, Toronto

Appointed by the Lieutenant-Governor-In-Council
M. Bales, Waterloo
K. Khan, Toronto
M. Kempston Darke, Toronto
R.R. Mahabir, Toronto
T. McQueen, Toronto
S. Sharzer, Ottawa
Vacancy

Staff
H. Hahn (Science)
B. Scott (Research)

From Senate
Faculty Members
G.J. Farquhar
P.Y. Forsyth
B.P. Hendley

Governing Bodies
Board of Governors
Senate

H.D. Lyons
D.J. Taylor
S. Vethamany-Globus
F.A. Zorzi

Undergraduate Students
M. Bellabarba
R. Farmer
J. Pak

Graduate Students
D. Bauer
D. Jewell

Senate

Senate establishes educational policies of the University including admission standards, policies concerning the qualifications of faculty members, curricula of all courses of instruction, and co-ordination of long-range academic planning.

In order to exercise these powers effectively, a number of Councils and Committees have been created which report to Senate directly. These include Senate Undergraduate Council, Senate Scholarships and Student Aid Committee, and Senate Long Range Planning Committee.

Officers
Chair J. Downey, BA, BEd, MA, PhD, DHL, DLitt, LLD
Vice-Chair, J.G. Kalbfleisch, BSc, MA, PhD
Secretary, L.H.P. Claxton, BA, BLS, MLS

Ex Officio Members
Chancellor, S. Ostry, CC, BA, MA, PhD, LLD, FRSC
Chair, Board of Governors, P.H. Sims, QC, LLB, BCmm
President, J. Downey, BA, BEd, MA, PhD, DHL, DLitt, LLD
Vice-President, Academic & Provost, J.G. Kalbfleisch, BSc, MA, PhD
Vice-President, University Research, C.M. Hansson, BSc, PhD, DIC, PEng
Associate Provost, Academic Affairs, R.K. Banks, BA, MA, PhD
Associate Provost, Finance, D.J. Battae
Librarian, M.C. Shepherd, BEd, MA (LS)
Registrar, TBA
President, Faculty Association, I.F. Macdonald, BEng, PhD
President, Federation of Students, J. Pak
President, Graduate Student Association, D. Jewell, BASc

The Principal or President of each Federated or Affiliated College
G. Cuthbert Brandt, BA, MA, PhD (Principal, Renison)
H. Mills, BA, MA, PhD (Principal, St. Paul's)
D.R. Letson, BA, MA, PhD (President, St. Jerome's)
J.E. Toews, BA, MA, PhD (President, Conrad Grebel)
The Dean of each Faculty
R.W. Norman, BA, BPE, MSc, PhD, Docteur H.C. (Applied Health Sciences)
B.P. Hendley, BA, MA, PhD (Arts)
D.J. Burns, BSc, PhD, PEng, CEng (Engineering)
J. Kay, BA, MS, PhD (Environmental Studies)
J.D. Kalbfleisch, BSc, MMath, PhD (Mathematics)
J.E. Thompson, BSA, PhD, FRSC (Science)

The Dean of Graduate Studies
P.M. Rowe, BA, MA, PhD

Elected Members

Faculty Representatives
To 1996
R.S. McColl, BSc, PhD (Applied Health Sciences)
D.G. John, BA, MA, PhD (Arts)
T.Z. Fahidy, BSc, MSc, PhD, PEng (Engineering)
A. Banerji, BArch, MArch (Environmental Studies)
J. Wainwright, BSc, PhD, Recipient of the Distinguished Teacher Award (Mathematics)
J.G. Strong, OD, MSc (Science)
M.W. Higgins, BA, BEd, MA, PhD (St Jerome's)
K. Mott, BA, BD, MSW (Renison)
G.C. Andrews, BArch, MASc, PhD, PEng (At large)
F.A. Zorzitto, BSc, MSc, PhD Recipient of the Distinguished Teacher Award (At large)
H.S. Fournier, BA, MA, PhD (At large)
L.T. Guelke, BSc, MA, PhD (At large)
H.D. Lyons, BA, MLitt, DPhil (At large)
F.W. Tompa, ScB, ScM, PhD (At large)
G.C. Woo, OD, MS, PhD, LOSc, FVCO, FAAC, DIPLV (At large)

To 1997
A.M. Pedlar, BA, MA, PhD (Applied Health Sciences)
R.H. Holmes, BA, MA, PhD (Arts), Recipient of the Distinguished Teacher Award (Arts)
G.J. Farquhar, BASc, MASc, PhD Recipient of the Distinguished Teacher Award (Engineering)
C. Dufournaud, BA, MA, PhD (Environmental Studies)
D.J. Taylor, BSc, MMath, PhD (Mathematics)
J.W. Hepburn, BSc, PhD, FCIC (Science)
K.M. McLaughlin, BA, MA, PhD (St Jerome's)
J. Gollnick, BA, MA, PhD (St. Paul's)
S.L. Ager, BA, MA, PhD (At large)
J. Goyder, BA, MA, PhD (At large)
D.M. Jackson, BA, MA, PhD (At large)
A.L. Magnusson, BA, MA, PhD (At large)
F.C. Reynolds, BSc, MSc, EA, FSA, FCI-A, MAAA (At large)
D.W. Russell, BA, MA, PhD (At large)
S. Vetehmany-Globus, BA, MSc, PhD (At large)

To 1998
J.S. Frank, BSc, MSc, PhD (Applied Health Sciences)
R.J. Williams, BA, MA, PhD (Arts)
J.D. Aplevich, BE, PhD, PEng (Engineering)

G.R. McBoyle, BSc, PhD, Recipient of the Distinguished Teacher Award (Environmental Studies)
E.R. Vrscey, BSc, MMath, PhD (Mathematics)
J. Vanderkooy, BEng, PhD (Science)
V.F. Golin, BA, MA, PhD (St. Jerome's)
H. Froese Tiessen, BA, MA, PhD (Conrad Grebel)
F.Y. Forsyth, AB, MA, PhD, Recipient of the Distinguished Teacher Award (At large)
P. Kannan, BSc Hons, PhD (At large)
A. Kapur, BA, MA, PhD (At large)
R.G. McLennan, MSc, PhD (At large)
D.A. Ranney, BA, MA, FRCS (At large)
S.M. Shaw, BPE, MSc, PhD (At large)
R.J. LeRoy, BSc, MSc, PhD, FCIC (At large)

Student Representatives
To 1996
Undergraduate
Vacant (Applied Health Sciences)
R. Farmer (Arts)
T. Clarke (Environmental Studies/Independent Studies)
J. Samson (Science)
N.K. Diep (At large)
Graduate
L. Young, BSc
S.M. GadelRab, BSc, MASc

To 1997
Undergraduate
M. Bellabarba (Engineering)
H. MacDonald (Mathematics)
C. Ronzio (At large)
Graduate
D.A. Bauer, BSc
E.S. Tony, BSc, MASc

Alumni Representatives
To 1996
A. Beynon, BA

To 1997
B.G. Rees, BMath

To 1998
M. Abate, BMath
J.L. Amann, BMath

Board of Governors Representatives
To 1996
Vacant

To 1997
Vacant

To 1998
Vacant
Vacant
Note
More information regarding the Senate and the Board of Governors, their Councils and Committees, may be obtained from the University Secretariat, NH 3060.
Most meetings are open to the University community and are normally announced in the Gazette the week prior to the scheduled meeting date. Senate meets the third Monday of every month, except July and August. Board of Governors meets the first Tuesday of February, April and June, and the last Tuesday of October.

University Offices

Chancellors Emeriti
J.F. Kates, BA, MA, PhD, PEng, FMCMC, FEIC, LL.D
J.P.R. Wadsworth, LL.D

Chancellor
S. Ostry, CC, BA, MA, PhD, LL.D, FRSC

Chair, Board of Governors
P.H. Sims, QC, LL.B, BComm

Presidents Emeriti
B.C. Matthews, BSA, AM, PhD, DU, LL.D, FUG, PAg
D.T. Wright, OC, BASc, MS, PhD, DEng, LL.D, DSc, LL.D, LHD, DU, DHC, DHC, DSc, DSc, FCAE, FEIC, FASCE, Life Member IABSE, PEng, APEO Gold Medal, CCPE

President and Vice-Chancellor
J. Downey, BA, BEd, MA, PhD, DHL, DLitt, LL.D

Vice-President, Academic & Provost
J.G. Kalbfleisch, BSc, MA, PhD

Advisors to the Vice-President, Academic
S.D. Burt, BA, MA, PhD
Advisor on Academic Human Resources
J.A. Legault, BSc, MSc, PhD
Advisor on Interdisciplinary Programs

Computing Services
TBA
Director
TBA
Associate Director, Operations
B.E. Uttley, BMath
Associate Director, Systems and Development

W.N. Futher, CMA
Administrative Assistant/Assistant to the Director
R.W. Watt, BSc, MMath
Associate Director, Distributed Computing

Data Processing
J.D. Walker, BA, MASc
Director
D.H. Mason, BMath
Associate Director, Student Course Systems
R. Wagler
Assistant Director, Technical Services

Institutional Analysis and Planning
R.D. Truman, BMath
Director

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Dean of Applied Health Sciences
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A. Bonen, BA, MSc, PhD
Associate Dean, Graduate Studies and Research
R. Wells, BSc, MEng, PhD
Associate Dean, Computing Applications and Special Projects
J.D. Carter, BA, CGA
Executive Assistant to the Dean

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B.P. Hendley, BA, MA, PhD
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M.A. Gerhardstein, BA, MA, PhD
Associate Dean, Undergraduate Affairs
TBA
Associate Dean, Graduate Studies and Research
R.P. Woolstencroft, BA, PhD
Associate Dean, Special Programs
D.B. Kennedy, BMath, MBA, MS, PhD, CMA
Associate Dean, Computing
TBA
Secretary and Administrative Officer
B.W. Zanna, BA, MAT
Arts Academic Counsellor
I. Mackay, BSc, MSc
Co-ordinator, Mature Student Services
J.J. Wyatt, RA
Curator, UW Art Gallery

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Dean of Engineering
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Associate Dean, Graduate Studies and Research
TBA
Associate Dean, Computing
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K. Boucher, BASc, BEd
Associate Director of Admissions

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Executive Assistant to the Dean
W. Hatch, BA, MA
Environmental Studies Counsellor

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K.R. Shah, BA, MA, PhD
Associate Dean, Graduate Studies and Research
J.P. Black, BSc, Dipl D'Ing, PhD
Associate Dean, Computing, Director, Mathematics Faculty Computing Facility
R.G. Scoula, BA, MMath
Associate Dean, External Relations
S.J. Thomson, BA, MA
Executive Assistant to the Dean

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Dean of Science
M.F. Tchir, BSc, PhD
Associate Dean, Undergraduate Affairs
TBA
Director of Admissions
TBA
Associate Dean, Graduate Studies and Research
TBA
Associate Dean, Computing
J.G. Sivak, LSCO, MS, PhD, OD, FAAO
Associate Dean of Science for Optometry
TBA
Assistant Dean, Special Projects
H. Hahn, BA
Executive Assistant to the Dean

INDEPENDENT STUDIES PROGRAM
R.H. Holmes, BA, MA, PhD
Academic Board Chair
G.A. Griffin, BA, MA, PhD
Academic Director

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Dean of Graduate Studies
J.D. Aplevich, BE, PhD, PEng
Associate Dean, Graduate Studies
D.L. Judge
Associate Registrar, Graduate Studies
R.E. Garner
Graduate Awards Co-ordinator

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Office of Research
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TBA
Associate Director, Technology Transfer and Licensing
TBA
Associate Director, Research Grants
P. O'Neill, BA, MA
Manager, International Programs
B.C. Scott, BMath, MASc, CGA
Associate Director, Contract Research
TBA
Software Co-ordinator
S.E. Sykes, BA, MASc, PhD
Associate Director, Office of Human Research and Animal Care
E. Davison, BSc, PhD, PEng
NRC Industrial Technology Advisor
TBA
Administrative Assistant

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Development and Alumni Affairs
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Executive Director
Information and Public Affairs
M. Van Nierop, BA
Director

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E.M. Barnes
Associate University Secretary
R.J. Bullen, BMath
Associate University Secretary

D.P. Scheifele
Associate University Secretary

T.L. Canning
Assistant University Secretary

Internal Audit
J.E. Buschert, BA, CMA
Director

Safety Office
K.A. Stewert, BA, CRSP
Safety Director

Security
A.L. MacKenzie, BA
Director

Co-ordinator, Ethical Behaviour and Human Rights
M.M. Erickson, BA

ASSOCIATE PROVOST, ACADEMIC AFFAIRS
TBA

Audio-Visual Centre
TBA
Director

Co-operative Education and Career Services
B.A. Lumsden, BA
Director
TBA
Program Administrator, Applied Health Sciences
K.B. Kenning, BA
Program Administrator, Arts
TBA
Program Administrator, Mathematics, Accounting
TBA
Program Administrator, Environmental Studies
TBA
Program Administrator, Science
D.N. Thomas, BSc, MBA
Systems Administrator
J.F. Westlake, BASc, MSc, PhD, PEng
Program Administrator, Engineering

Library
M.C. Shepherd, BEd, MA (LS)
University Librarian
TBA
Associate Librarian, Information
TBA
Associate Librarian, Collections
TBA
Associate Librarian, Systems
L. Beattie, BA, MA, PhD
Co-ordinator, Library Resources Management
S. Bellingham, BA, MLS
Head, Special Collections Department

University Offices

M. Stanley, BA
Library Development Officer

Office of the Registrar
TBA
Registrar
TBA
Associate Registrar, Records
K.A. Lavigne, BA
Associate Registrar, Admissions and Student Awards
TBA
Director of Secondary School Liaison
P.F. Burroughs, BA, MSc
Assistant Registrar, Arts, Environmental Studies, Independent Studies
G.L. Buckley
Assistant Registrar, Applied Health Sciences, Engineering
J. Awbury, BSc
Assistant Registrar, Mathematics, Science
B.K. LeDrew, BMath
Assistant Registrar, Scheduling
J.H. Wade
Assistant Registrar, Student Awards
D.L. Kaste, BA, MA
Administrative Director, Distance and Continuing Education

Teaching Resources and Continuing Education
G.A. Griffin, BA, MA, PhD
Director
T. Carey, BA, MMath, PhD
Associate Director, Learning Technologies
J.H. Willment, BA, MA
Advisor on Teaching and Learning
V.R. Keller, BA, BEd
Administrative Assistant

ASSOCIATE PROVOST, FINANCE
TBA

Office of Budgets
J.M. Manson, BA, CA
Director

Financial Services
TBA
Director
W.R. Gadsby, BA, CMA
Manager, Accounts Receivable and Credit

Food Services
M.E. Murdoch, BComm
Director

Housing and Residences Operations
TBA
Warden of Residences and Director of Housing
University Offices

Telephone Services
TBA
Manager

University Club
S.M.A. McGraw
Manager

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TBA

Bookings
D.K. Schell
Co-ordinator

Bookstore
TBA
Director, Text and Trade
M. Yan
Director, Retail and Licensing

Central Stores and Mail Services
TBA
Director

Graphic Services
L.C. Norton
Director

Human Resources
C. Scott, BA
Director

Plant Operations
D.E. Huber, BBA, CMA
Director of Business Services
D.J. Churchill, BSc, PEng
Director of Technical Services
TBA
Director of Custodial and Grounds Services

Purchasing
TBA
Director

UW Computer Store
TBA
Director

Waste Management Co-ordinator
P.L. Cook

ASSOCIATE PROVOST FOR STUDENT AFFAIRS
TBA

Athletics
J. McCrae, BA, MSc
Director
### Honorary Members of the University

<table>
<thead>
<tr>
<th>Name</th>
<th>Date Conferred</th>
<th>Degree(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Paul Meincke, BSc, PEng</td>
<td>May 1985</td>
<td></td>
</tr>
<tr>
<td>William G. Scott, BA, MA</td>
<td>May 1986</td>
<td></td>
</tr>
<tr>
<td>C. Fred MacRae, BA, MA, PhD</td>
<td>May 1988</td>
<td></td>
</tr>
<tr>
<td>Carl A.W. Totzke, BA</td>
<td>May 1990</td>
<td></td>
</tr>
<tr>
<td>D. Pat Robertson, BComm</td>
<td>October 1991</td>
<td></td>
</tr>
<tr>
<td>J. Page R. Wadsworth, LLB</td>
<td>October 1991</td>
<td></td>
</tr>
<tr>
<td>Wallace A. McLaughlin, BSc, MSc, PhD, PEng</td>
<td>October 1992</td>
<td></td>
</tr>
<tr>
<td>Norman J. Ashton, BSc, MS</td>
<td>October 1993</td>
<td></td>
</tr>
<tr>
<td>J.W. (Jack) Brown, BA</td>
<td>October 1994</td>
<td></td>
</tr>
<tr>
<td>Wallace A. Delahey, BA (Hons. PHRE)</td>
<td>October 1994</td>
<td></td>
</tr>
<tr>
<td>C.F. Arthur Beaumont, BA, MS</td>
<td>May 1995</td>
<td></td>
</tr>
</tbody>
</table>

### Distinguished Professors Emeriti

<table>
<thead>
<tr>
<th>Name</th>
<th>Date Granted</th>
<th>Department</th>
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<tbody>
<tr>
<td>H.B. Noel Hynes, BSc, PhD, DSc, ARCS, FRSC</td>
<td>October 1992</td>
<td>Biology</td>
</tr>
<tr>
<td>William T. Tutte, BA, MA, PhD, DMath, FRSC, FRSC</td>
<td>June 1985</td>
<td>Combinatorics and Optimization</td>
</tr>
<tr>
<td>William B. Pearson, DFC, MA, DSc, FRSC, FCIC</td>
<td>February 1986</td>
<td>Chemistry, Physics</td>
</tr>
<tr>
<td>Edward J. Fisher, BA, MA, DSc, FAAO Optometry</td>
<td>June 1986</td>
<td>Optometry</td>
</tr>
<tr>
<td>W.A.E. (Pete) McBryde, MA, PhD, FCIC Chemistry</td>
<td>July 1986</td>
<td>Chemistry</td>
</tr>
<tr>
<td>Jerzy T. Pindera, MSc, PhD, DSc, PEng, FCSME, FSEM Civil Engineering</td>
<td>April 1987</td>
<td>Civil Engineering</td>
</tr>
<tr>
<td>J. William Dyck, AB, MA, PhD Germanic and Slavic</td>
<td>January 1988</td>
<td>Germanic and Slavic</td>
</tr>
<tr>
<td>Francis W. Karasek, BS, PhD, FCIC Chemistry</td>
<td>August 1988</td>
<td>Chemistry</td>
</tr>
<tr>
<td>Harold J. Faitiding, BA, BSc, MA, PhD, FRSC Sociology</td>
<td>February 1989</td>
<td>Sociology</td>
</tr>
<tr>
<td>William M. Lyle, OD, MS, PhD, FAAO Optometry</td>
<td>October 1989</td>
<td>Optometry</td>
</tr>
<tr>
<td>Park M. Reilly, BASc, DIC, PhD, FCIC, PEng Chemical Engineering</td>
<td>October 1989</td>
<td>Chemical Engineering</td>
</tr>
<tr>
<td>Alfred Rudin, BSc, PhD, PEng Chemistry</td>
<td>February 1991</td>
<td>Chemistry</td>
</tr>
<tr>
<td>Vidyadhar P. Godambe, MSc, PhD Statistics and Actuarial Science</td>
<td>July 1991</td>
<td>Statistics and Actuarial Science</td>
</tr>
<tr>
<td>Leonard O. Gerlak, BA, MA, FCIP Urban and Regional Planning</td>
<td>October 1991</td>
<td>Urban and Regional Planning</td>
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<tr>
<td>Donald S. Scott, BSc, MSc, PhD, PEng Chemical Engineering</td>
<td>February 1992</td>
<td>Chemical Engineering</td>
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<tr>
<td>Shao-Fu Wang, DSc Physics</td>
<td>February 1992</td>
<td>Physics</td>
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<tr>
<td>Hirenagur K. Kesavan, BSc, BE, MS, PhD, PEng Systems Design Engineering</td>
<td>April 1992</td>
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<tr>
<td>Niels C. Lind, MSc, PhD, PEng, FRSC, FCAE Civil Engineering</td>
<td>April 1992</td>
<td></td>
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<tr>
<td>Ronald A. Aziz, BA, MA, PhD Physics</td>
<td>February 1993</td>
<td></td>
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<td>Ralph R. Krueger, BA, MA, PhD Geography</td>
<td>February 1993</td>
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<td>Nancy-Lou Patterson, BA, DLitt Fine Arts</td>
<td>February 1993</td>
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<td>W. Keith Thomas, MA, PhD English</td>
<td>February 1993</td>
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<tr>
<td>János D. Aczé, BA, MA, PhD, Habil DSc, FRSC Pure Mathematics</td>
<td>October 1993</td>
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<tr>
<td>William F. Forbes, BSc, PhD, DSc, DIC, ARCS Gerontology</td>
<td>October 1993</td>
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<tr>
<td>Peter H.J. Nash, AA, BA, CE, MA, MOP, MPA, PhD Geography</td>
<td>October 1993</td>
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<tr>
<td>Douglas P. Crowne, BA, EdM, PhD Psychology</td>
<td>February 1994</td>
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<tr>
<td>Walter R. Martin, BA, MA, DLitt et Phil English</td>
<td>February 1994</td>
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<tr>
<td>John A. Schey, Dipl Ing, CSc, Dr. Ing. h.c., Dr. Ing. h.c., FASM, FSME, PEng Mechanical Engineering</td>
<td>February 1994</td>
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<tr>
<td>Lawrence A. Cummings, AD, AM, PhD Architecture</td>
<td>September 1994</td>
<td></td>
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<tr>
<td>Robert N. Farvolden, BSc, MSc, PhD Earth Sciences</td>
<td>October 1994</td>
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<tr>
<td>Terence H. Qualter, BA, PhD Political Science</td>
<td>October 1994</td>
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<tr>
<td>Erwin B. Dumbroff, BSc, MForestry, PhD Biology</td>
<td>February 1995</td>
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<tr>
<td>W. Bryce Kendrick, BSc, PhD, DSc, FRSC Biology</td>
<td>February 1995</td>
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<tr>
<td>Melvin J. Lerner, BA, MA, PhD Psychology</td>
<td>February 1995</td>
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<tr>
<td>Warren U. Ober, BA, PhD English</td>
<td>February 1995</td>
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<tr>
<td>David. A. Winter, BSc, MSc, PhD, PEng Kinesiology</td>
<td>February 1995</td>
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<tr>
<td>Edmund Heier, BA, MA, PhD Germanic and Slavic Languages and Literatures</td>
<td>April 1995</td>
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<tr>
<td>Bernard Suits, BA, MA, PhD Philosophy</td>
<td>April 1995</td>
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<tr>
<td>T. Viswanatha, MSc, PhD Chemistry</td>
<td>October 1995</td>
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