1995-96
UNDERGRADUATE
CALENDAR

UNIVERSITY OF WATERLOO
University of Waterloo

Undergraduate Calendar 1995-96
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 and the hours/type of instruction may vary somewhat from that listed. Furthermore, circumstances may warrant changes to the term(s) when courses are made available. To be assured of complete information for registration, students must also consult the detailed Course Offerings List published separately for each academic term, and any other information distributed by their Faculty/Department, before arranging their programs of study.

Information on tuition and other fees applies, except as may otherwise be indicated, to the 1995-1996 fiscal year of the University which commences May 1, 1995. Information relating to academic course and program regulations is that for the Fall/Winter/Spring academic cycle which commences in September 1995. 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 1995 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 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 without prior notice.

Students with Disabilities

The University has developed a number of services to assist students with disabilities. More information is on page 1:16 of this Calendar.

Inquiries

Inquiries and formal applications for admission should be directed to:

The Registrar
University of Waterloo
Waterloo, Ontario, Canada N2L 3G1
Telephone (519) 888-4567, ext. 5378
Fax (519) 746-2882

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 Church Colleges:

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

Renison College
Westmount Road North
Waterloo, Ontario N2L 3G4
(519) 884-4400

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

Page Numbering System

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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.
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<td>Health Studies</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.
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.
## Programs Available

<table>
<thead>
<tr>
<th>Programs Available</th>
<th>Honours Comp</th>
<th>Honours Regular</th>
<th>General Regular</th>
<th>Option</th>
<th>Professional</th>
<th>Program Information</th>
<th>Course Descriptions</th>
<th>Depth of Information</th>
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<td>Speech Communication</td>
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<td>Systems Design Engineering</td>
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<tr>
<td>Women’s Studies</td>
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<td>15:19 :154</td>
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</tr>
</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.
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 1:8.

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 – 1995**

<table>
<thead>
<tr>
<th>Event</th>
<th>Date</th>
<th>Day</th>
</tr>
</thead>
<tbody>
<tr>
<td>Arts Full-Time Application Deadline – On Campus – Spring Admission</td>
<td>March 1</td>
<td>Wednesday</td>
</tr>
<tr>
<td>Meeting – Senate Executive Committee</td>
<td>March 6</td>
<td>Monday</td>
</tr>
<tr>
<td>Preregistration Begins – Undergraduate Programs – Fall Term</td>
<td>March 6</td>
<td>Monday</td>
</tr>
<tr>
<td>Preregistration Ends – Undergraduate Programs – Fall Term</td>
<td>March 10</td>
<td>Friday</td>
</tr>
<tr>
<td>Campus Day</td>
<td>March 14</td>
<td>Tuesday</td>
</tr>
<tr>
<td>Meeting – University Senate, 7:30 p.m.</td>
<td>March 20</td>
<td>Monday</td>
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<tr>
<td>Meeting – Board of Governors Executive Committee</td>
<td>March 21</td>
<td>Tuesday</td>
</tr>
<tr>
<td>Last Day to File &quot;Intent to Graduate&quot; – Spring Convocation</td>
<td>March 31</td>
<td>Friday</td>
</tr>
<tr>
<td>Arts Part-Time Application Deadline – On Campus – Spring Admission</td>
<td>March 31</td>
<td>Friday</td>
</tr>
<tr>
<td>Last Day for Arts Students to Preregister – Spring Term</td>
<td>March 31</td>
<td>Friday</td>
</tr>
<tr>
<td>Lectures End – Engineering and Mathematics – Winter Term</td>
<td>March 31</td>
<td>Friday</td>
</tr>
<tr>
<td>Lectures End – Other Faculties – Winter Term</td>
<td>April 3</td>
<td>Monday</td>
</tr>
<tr>
<td>Meeting – Senate Executive Committee</td>
<td>April 3</td>
<td>Monday</td>
</tr>
<tr>
<td>Meeting – Board of Governors, 3:30 p.m.</td>
<td>April 4</td>
<td>Tuesday</td>
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<tr>
<td>English Language Proficiency Examination, PAC</td>
<td>April 5</td>
<td>Wednesday</td>
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<tr>
<td>Examinations Begin – Winter Term</td>
<td>April 6</td>
<td>Thursday</td>
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<tr>
<td>Good Friday – University Holiday*</td>
<td>April 14</td>
<td>Friday</td>
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<tr>
<td>Meeting – University Senate, 7:30 p.m.</td>
<td>April 17</td>
<td>Monday</td>
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<tr>
<td>Course Drop/Withdrawal Deadline – Distance Education – Winter Term</td>
<td>April 19</td>
<td>Wednesday</td>
</tr>
<tr>
<td>Examinations End – Winter Term</td>
<td>April 21</td>
<td>Friday</td>
</tr>
<tr>
<td>Final Examination Results Due – Winter Term</td>
<td>April 28</td>
<td>Friday</td>
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<tr>
<td>Winter Work Term Ends – Co-operative Programs</td>
<td>April 28</td>
<td>Friday</td>
</tr>
<tr>
<td>Registration Begins – Undergraduate Programs – Spring Term</td>
<td>May 1</td>
<td>Monday</td>
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<tr>
<td>Lectures Begin – Spring Term</td>
<td>May 1</td>
<td>Monday</td>
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<tr>
<td>Spring Work Term Begins – Co-operative Programs</td>
<td>May 1</td>
<td>Monday</td>
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<tr>
<td>Meeting – Senate Executive Committee</td>
<td>May 1</td>
<td>Monday</td>
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<tr>
<td>Registration – Graduate Studies – Spring Term</td>
<td>May 1</td>
<td>Monday</td>
</tr>
<tr>
<td>Registration Ends – Undergraduate Programs – Spring Term</td>
<td>May 3</td>
<td>Wednesday</td>
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<tr>
<td>Start of Late Fees – Spring Term – See Chapter 3 for Details</td>
<td>May 4</td>
<td>Thursday</td>
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<tr>
<td>Examinations – Distance Education – Winter Term</td>
<td>May 6</td>
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<tr>
<td>Meeting – University Senate, 7:30 p.m.</td>
<td>May 15</td>
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<tr>
<td>Deadline to Drop or Withdraw from On-Campus Courses with 100% Tuition Refund</td>
<td>May 19</td>
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<td>Victoria Day – University Holiday*</td>
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<td>End of Course Change Period – Spring Term – See Individual Faculty Chapters</td>
<td>May 23</td>
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<td>Spring Convocation (Applied Health Sciences, Environmental Studies, Independent Studies) – 2:00 p.m.</td>
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<td>Spring Convocation (Arts) – 2:00 p.m.</td>
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<td>Spring Convocation (Science) – 2:00 p.m.</td>
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<td>Spring Convocation (Mathematics – 10:00 a.m.; Engineering – 2:00 p.m.)</td>
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<td>Arts Application Deadline – Summer Session</td>
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<td>Application and Course Change Deadlines for New Students –</td>
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<td>Distance Education – Fall Term</td>
<td>June 1</td>
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<td>Final Examination Results Due – Distance Education – Winter Term</td>
<td>June 1</td>
<td>Thursday</td>
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<tr>
<td>Meeting – Senate Executive Committee</td>
<td>June 5</td>
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<tr>
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<td>June 6</td>
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<td>Preregistration Begins – Co-operative Programs – Winter Term</td>
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<td>Preregistration Ends – Co-operative Programs – Winter Term</td>
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<td>Arts Full-Time Application Deadline – On Campus – Fall Admission</td>
<td>June 30</td>
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<tr>
<td>Application and Course Change Deadlines for Returning Students –</td>
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<td>Distance Education – Fall Term</td>
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*Some University Departments may be open for limited service on these days.*
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<tr>
<th>Event</th>
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<td>Canada Day – University Holiday*</td>
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<td>Registration – Summer Session</td>
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<tr>
<td>Lectures Begin – Undergraduate Program – Summer Session</td>
<td>July 4</td>
<td>Tuesday</td>
</tr>
<tr>
<td>Start of Late Fees – Summer Session – See Chapter 3 for Details</td>
<td>July 5</td>
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<td>Lectures End – Spring Term</td>
<td>July 26</td>
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<tr>
<td>Course Drop/Withdrawal Deadline – Distance Education – Spring Term</td>
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<td>Examinations Begin – Spring Term</td>
<td>July 31</td>
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<tr>
<td>Arts Part-Time Application Deadline – On Campus – Fall Admission</td>
<td>August 1</td>
<td>Tuesday</td>
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<tr>
<td>Last Day for Arts Students to Preregister – Fall Term</td>
<td>August 1</td>
<td>Tuesday</td>
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<tr>
<td>Civic Holiday – University Holiday*</td>
<td>August 7</td>
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<td>August 11</td>
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<td>Examinations – Distance Education – Spring Term</td>
<td>August 12</td>
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<td>Examinations – Fall Term</td>
<td>August 12</td>
<td>Saturday</td>
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<tr>
<td>Final Examination Results Due – Spring and Summer</td>
<td>August 18</td>
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<td>Spring Work Term Ends – Co-operative Programs</td>
<td>August 25</td>
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<tr>
<td>Fall Work Term Begins – Co-operative Programs</td>
<td>August 28</td>
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<td>Labour Day – University Holiday*</td>
<td>September 4</td>
<td>Monday</td>
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<tr>
<td>Registration Begins – Undergraduate Programs – Fall Term</td>
<td>September 5</td>
<td>Tuesday</td>
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<tr>
<td>Meeting – Senate Executive Committee</td>
<td>September 5</td>
<td>Tuesday</td>
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<tr>
<td>Registration – Graduate Studies – Fall Term</td>
<td>September 5</td>
<td>Tuesday</td>
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<tr>
<td>English Language Proficiency Examination, PAC</td>
<td>September 6</td>
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<td>Final Examination Results Due – Distance Education – Spring Term</td>
<td>September 7</td>
<td>Thursday</td>
</tr>
<tr>
<td>Registration Ends – Undergraduate Programs – Fall Term</td>
<td>September 8</td>
<td>Friday</td>
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<tr>
<td>Lectures Begin – Fall Term</td>
<td>September 11</td>
<td>Monday</td>
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<tr>
<td>Start of Late Fees – Fall Term – See Chapter 3 for Details</td>
<td>September 11</td>
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<tr>
<td>Application and Course Change Deadlines for New Students – Distance Education – Winter Term</td>
<td>September 11</td>
<td>Monday</td>
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<tr>
<td>Meeting – University Senate, 7:30 p.m.</td>
<td>September 18</td>
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<tr>
<td>Meeting – Board of Governors Executive Committee</td>
<td>September 19</td>
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<tr>
<td>Deadline to Drop or Withdraw from On-Campus Courses with 100% Tuition Refund</td>
<td>September 29</td>
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<tr>
<td>End of Course Change Period – Fall Term – See Individual Faculty Chapters</td>
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<td>Meeting – Senate Executive Committee</td>
<td>October 2</td>
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<tr>
<td>Meeting – Board of Governors, 3:30 p.m.</td>
<td>October 3</td>
<td>Tuesday</td>
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<tr>
<td>Application and Course Change Deadlines for Returning Students – Distance Education – Winter Term</td>
<td>October 6</td>
<td>Friday</td>
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<tr>
<td>Thanksgiving Day – University Holiday*</td>
<td>October 9</td>
<td>Monday</td>
</tr>
<tr>
<td>Meeting – University Senate, 7:30 p.m.</td>
<td>October 16</td>
<td>Monday</td>
</tr>
<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 21</td>
<td>Saturday</td>
</tr>
<tr>
<td>Deadline to Drop or Withdraw from On-Campus Courses with 50% Tuition Refund</td>
<td>October 30</td>
<td>Monday</td>
</tr>
<tr>
<td>Arts Full-Time Application Deadline – On Campus – Winter Admission</td>
<td>November 1</td>
<td>Wednesday</td>
</tr>
<tr>
<td>Preregistration Begins – Co-operative Programs – Spring Term</td>
<td>November 1</td>
<td>Wednesday</td>
</tr>
<tr>
<td>Preregistration Ends – Co-operative Programs – Spring Term</td>
<td>November 3</td>
<td>Friday</td>
</tr>
<tr>
<td>Meeting – Senate Executive Committee</td>
<td>November 6</td>
<td>Monday</td>
</tr>
<tr>
<td>Meeting – University Senate, 7:30 p.m.</td>
<td>November 20</td>
<td>Monday</td>
</tr>
<tr>
<td>Arts Part-Time Application Deadline – On Campus – Winter Admission</td>
<td>December 1</td>
<td>Friday</td>
</tr>
<tr>
<td>Last Day for Arts Students to Preregister – On Campus – Winter Term</td>
<td>December 1</td>
<td>Friday</td>
</tr>
<tr>
<td>Meeting – Senate Executive Committee</td>
<td>December 4</td>
<td>Monday</td>
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<td>Lectures End – Fall Term</td>
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<td>English Language Proficiency Examination, PAC</td>
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* Some University Departments may be open for limited service on these days.
### 1995 Continued

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<td>Examinations Begin - Fall Term</td>
<td>December 8</td>
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<tr>
<td>Meeting - University Senate, 7:30 p.m.</td>
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<td>Examinations End - Fall Term</td>
<td>December 21</td>
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<tr>
<td>Fall Work Term Ends - Co-operative Programs**</td>
<td>December 22</td>
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<td>Christmas Holidays*</td>
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<td></td>
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### 1996

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<td>Winter Work Term Begins - Co-operative Programs</td>
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<tr>
<td>Registration - Graduate Studies - Winter Term</td>
<td>January 2</td>
<td>Tuesday</td>
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<tr>
<td>Meeting - Senate Executive Committee</td>
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<tr>
<td>Course Drop/Withdrawal Deadline - Distance Education - Fall Term</td>
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<td>Tuesday</td>
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<td>Final Examination Results Due - Fall Term</td>
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<td>Lectures Begin - Winter Term</td>
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<td>Examinations - Distance Education - Fall Term</td>
<td>January 20</td>
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<tr>
<td>Application and Course Change Deadlines for New Students -</td>
<td>January 22</td>
<td>Monday</td>
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<tr>
<td>Distance Education - Spring Term</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 - Board of Governors Executive Committee</td>
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<td>End of Course Change Period - Winter Term - See Individual Faculty Chapters</td>
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<td>Meeting - Senate Executive Committee</td>
<td>February 5</td>
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<tr>
<td>Meeting - Board of Governors, 3:30 p.m.</td>
<td>February 6</td>
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<tr>
<td>Final Examination Results Due - Distance Education - Fall Term</td>
<td>February 8</td>
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<tr>
<td>Application and Course Change Deadlines for Returning Students -</td>
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<td>Distance Education - Spring Term</td>
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<tr>
<td>Meeting - University Senate, 7:30 p.m.</td>
<td>February 19</td>
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<tr>
<td>Winter Study Period† - Engineering and Mathematics§</td>
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<tr>
<td>Winter Study Period† - Other Faculties</td>
<td>February 19-23</td>
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<td>Deadline to Drop or Withdraw from On-Campus Courses with 50% Tuition Refund</td>
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<td>Meeting - Senate Executive Committee</td>
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<td>Preregistration Begins - Undergraduate Programs - Fall Term</td>
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<tr>
<td>Last Day to File “Intent to Graduate” - Spring Convocation</td>
<td>April 1</td>
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<tr>
<td>Arts Part-Time Application Deadline - On Campus - Spring Admission</td>
<td>April 1</td>
<td>Monday</td>
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<tr>
<td>Last Day for Arts Students to Preregister - Spring Term</td>
<td>April 1</td>
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<tr>
<td>Meeting - Senate Executive Committee</td>
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<td>Meeting - Board of Governors, 3:30 p.m.</td>
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<tr>
<td>English Language Proficiency Examination, PAC</td>
<td>April 3</td>
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</tbody>
</table>

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

** Some employers may extend the Fall Work Term to December 29.

† 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.
1996 Continued

<table>
<thead>
<tr>
<th>Event / Deadline</th>
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<tr>
<td>Good Friday – University Holiday*</td>
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<td>Examinations Begin – Winter Term</td>
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<td>Monday</td>
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<td>Meeting – University Senate, 7:30 p.m.</td>
<td>April 15</td>
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<tr>
<td>Course Drop/Withdrawal Deadline – Distance Education – Winter Term</td>
<td>April 17</td>
<td>Wednesday</td>
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<tr>
<td>Examinations End – Winter Term</td>
<td>April 20</td>
<td>Saturday</td>
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<tr>
<td>Final Examination Results Due – Winter Term</td>
<td>April 26</td>
<td>Friday</td>
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<tr>
<td>Winter Work Term Ends – Co-operative Programs</td>
<td>April 26</td>
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<tr>
<td>Spring Work Term Begins – Co-operative Programs</td>
<td>April 29</td>
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<tr>
<td>Registration Begins – Undergraduate Programs – Spring Term</td>
<td>May 1</td>
<td>Wednesday</td>
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<tr>
<td>Lectures Begin – Spring Term</td>
<td>May 1</td>
<td>Wednesday</td>
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<tr>
<td>Registration – Graduate Studies – Spring Term</td>
<td>May 1</td>
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<tr>
<td>Registration Ends – Undergraduate Programs – Spring Term</td>
<td>May 3</td>
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<td>Examinations – Distance Education – Winter Term</td>
<td>May 4</td>
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<td>Meeting – Senate Executive Committee</td>
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<tr>
<td>Start of Late Fees – Spring Term – See Chapter 3 for Details</td>
<td>May 6</td>
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<tr>
<td>Victoria Day – University Holiday*</td>
<td>May 20</td>
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<td>Meeting – University Senate, 7:30 p.m.</td>
<td>May 21</td>
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<td>Meeting – Board of Governors Executive Committee</td>
<td>May 21</td>
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<td>Deadline to Drop or Withdraw from On-Campus Courses</td>
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<td>with 100% Tuition Refund</td>
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<tr>
<td>End of Course Change Period – Spring Term – See Individual Faculty Chapters</td>
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<tr>
<td>Spring Convocation (Applied Health Sciences, Environmental Studies, Independent Studies) – 2:00 p.m.</td>
<td>May 22</td>
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<tr>
<td>Spring Convocation (Arts) – 2:00 p.m.</td>
<td>May 23</td>
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<tr>
<td>Spring Convocation (Science) – 2:00 p.m.</td>
<td>May 24</td>
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<td>Spring Convocation (Mathematics – 10:00 a.m.; Engineering – 2:00 p.m.)</td>
<td>May 25</td>
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<td>Final Examination Results Due – Distance Education – Winter Term</td>
<td>May 30</td>
<td>Thursday</td>
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<td>Arts Application Deadline – Summer Session</td>
<td>June 3</td>
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<td>Meeting – Senate Executive Committee</td>
<td>June 3</td>
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<td>June 4</td>
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<td>Preregistration Begins – Co-operative Programs – Winter Term</td>
<td>June 5</td>
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<td>Preregistration Ends – Co-operative Programs – Winter Term</td>
<td>June 7</td>
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<td>Canada Day – University Holiday*</td>
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<td>Arts Full-Time Application Deadline – On Campus – Fall Admission</td>
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<td>Registration – Summer Session</td>
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<td>Lectures Begin – Undergraduate Program – Summer Session</td>
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<td>Start of Late Fees – Summer Session – See Chapter 3 for Details</td>
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<td>Course Drop/Withdrawal Deadline – Distance Education – Spring Term</td>
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<td>July 31</td>
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<td>Arts Part-Time Application Deadline – On Campus – Fall Admission</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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<td>August 9</td>
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<td>Final Examination Results Due – Spring and Summer</td>
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<td>Spring Work Term Ends – Co-operative Programs</td>
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* Some University Departments may be open for limited service on these days.
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</table>
Ontario highways to Kitchener-Waterloo

Roads to University of 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

Classes at the University of Waterloo commenced in July, 1957, with the introduction of the Co-operative Engineering Program. In March, 1959, a Private Bill was approved by the Legislative Assembly of the Province of Ontario incorporating the University of Waterloo as a degree-granting institution offering courses at both the undergraduate and the graduate level. The University is co-educational and non-denominational. Programs are offered in Applied Health Sciences, Arts, Engineering, Environmental Studies, Independent Studies, Mathematics, and Science. The University is a member of the Association of Universities and Colleges of Canada and the Association of Commonwealth Universities.

The Campus
The University is situated on a beautiful 900 acre (365 hectare) campus in the northwest section of the City of Waterloo. Waterloo and its twin city Kitchener are located in mid-watertown Ontario and have a combined population of approximately 240,000.

Since the opening of its first permanent structure on campus in 1958, the University has experienced continuous development of its campus environment. The now more than 40 buildings on campus provide excellent facilities to support the University's teaching and research programs. These include extensive library and computing facilities and a variety of student accommodation in University and Church College residences. In addition, the campus provides accommodation for a broad range of student social, cultural, recreational and athletic programs and activities.

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

University Arms and Motto
The Arms and Motto for the University of Waterloo, as first adopted in October 1961, and as officially granted in August 1987, by the Lord Lyon King of Arms, are described as follows:

Or, on a chevron Sable between three lions rampant Gules a Chevronel Argent. Above the Shield is placed an Helm suitable to an Incorporation (VIDELICET: - a Salade Proper lined Gules) with a Mantling Sable doubled Or, and on a Wreath of the Liveries is set for Crest between two maple branches in saltire a trillium displayed and leaved all Proper, and in an Escrol over the same this Motto "CONCORDIA CUM VERITATE" - in Harmony with Truth.

The University Mace
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 church-related colleges federated and affiliated with the University. 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 suspended 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.

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) — yellow
- 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)
- Doctor of Optometry (OU) — black silk hood in the American style, seafoam green border and gold lining

2. For the Master's degree, hoods are black silk in the Oxford Master shape, lined with the appropriate degree colour and turned over ¼", trimmed with two rows of white soutache braid (except where noted), ⅛" from the coloured edge.

- Master of Accounting (MAcc) — lining and narrow border in green with gold soutache braid trim
- Master of Applied Environmental Studies (MAES) — orange (Environmental Studies — Local Economic Development)
- Master of Applied Science (MASc) — scarlet (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 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 ¼" 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 as far 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 church-related 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 church colleges as of November 1, 1994 was as follows:

| Faculty of Applied Health Sciences | 1177 | 239 |
| Faculty of Arts | 4245 | 4609 |
| Faculty of Engineering | 3303 | 243 |
| Faculty of Environmental Studies | 1401 | 426 |
| Independent Studies Program | 26 | 8 |
| Faculty of Mathematics | 2916 | 383 |
| Faculty of Science | 2408 | 1174 |
| Total Undergraduate Enrolment | 15476 | 7082 |
| Graduate Student Enrolment (all faculties) | 1690 | 405 |

THE CHURCH 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 1,000 full- and part-time students, a men's and women's residence accommodating 250 students, and a faculty and staff of over 50 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. Renison also offers two Certificate programs: one in General Social Work and the other focusing on Child Abuse issues.

The College offers courses in Social Work, Psychology, Sociology and Interdisciplinary Social Science for its Social Development Studies program. This multi-disciplinary Major is designed for students interested in such helping professions as social work, teaching, theology 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.

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

Renison residences accommodate 75 men and 97 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.

The University of Waterloo
Academic Organization

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. The residence accommodates 113 students in a congenial atmosphere which emphasizes interpersonal relationships and community responsibility. College-sponsored extra-curricular programs in music, sports and the chapel are designed to complement the academic lives of students. The chapel program is central to the religious life of the College. Students from all backgrounds and world-views are welcome, subject to their willingness to abide by the College's values. An Associate Student program allows University of Waterloo students to engage in the life of the Grebel community while living outside the residence. Application forms for both the residence and associate programs are available from the College.

Conrad Grebel College offers courses in Interdisciplinary Arts, History, Philosophy, Religious Studies, Sociology, Peace and Conflict Studies and Music. The Peace and Conflict Studies and Music programs are administered by the College. All courses and programs are fully integrated into the University curriculum and are available to all students of the University. Students register for Conrad Grebel College courses through the University of Waterloo or through Renison or St. Jerome's Colleges.

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 – see Chapter 15 for details. 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 students who have achieved some competence in French an opportunity to further develop their skills. This program is offered in co-operation with the French Department.

Resident life in the College provides a valuable contribution to a student's university experience. Through a program of athletics, community dinners, and interest groups, students are able to involve themselves with various projects and issues related to the University, the church, personal life and society. Residents and Associates of St. Paul's participate in a vital and enriching community.
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 (MPPhil)
- 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 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 Chapter 5.

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" page 2:3). 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) 888-4002
  Fax: (519) 746-6393
  Email: contexco@core1.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://uwinfo.uwaterloo.ca
- 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 may 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, published annually, 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 calendar from the Distance Education Office to acquaint themselves with the offerings, the methods of operation and fees. For application deadlines see page 2:10 of this Calendar.

General 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 courses offered on and off campus, except that a refundable deposit is required on the audio tapes used for lectures and on other special materials that may be required.

Complete details about UW's distance education courses and application forms are provided in the Distance Education Calendar. Copies may be obtained from:

Distance and Continuing Education Office
University of Waterloo
Waterloo, Ontario N2L 3G1
(519) 888-4050
Fax: (519) 746-6373
Email: 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 courses 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.

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.

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 applicant 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.

Continuing Professional Education in Planning and Kinesiology
During the year, various courses and workshops are conducted for professionals working in the fields of Urban Planning and Kinesiology. For details on the current year's offerings, call 888-4002.

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 Professionals 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 may be obtained from the organization listed or from the Distance and Continuing Education Office.

Non-Credit Courses

Topics as diverse as "Total Quality Management", "Writing Popular Novels", and "Directions in Personal and Office Computing" are offered through UW's Continuing Education program. Other business courses, professional, personal and skills development courses are also available.

Courses are offered in the Fall and Winter terms and generally meet one evening a week for three to eight weeks.

Organizations with special needs are encouraged to contact Continuing Education to discuss customizing courses for in-house training.

For information on our extensive continuing education offerings call: (519) 888-4002.

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.

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<th>Assigned</th>
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<tr>
<td>Letter</td>
<td>Weighting</td>
<td>Percentage</td>
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<td>Grades</td>
<td>Factors*</td>
<td>Grades*</td>
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<td>A+</td>
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<td>A</td>
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<td>A-</td>
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<td>80-84</td>
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<td>B-</td>
<td>72</td>
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<tr>
<td>C+</td>
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<td>67-69</td>
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<td>C-</td>
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<td>D+</td>
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<td>F-</td>
<td>32</td>
<td>0-34</td>
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</tbody>
</table>

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

Non-Graded Standings

AEG Aegrotat, credit granted due to illness  
AUD Audit only, no credit granted  
CR Credit granted  
DNW Did not write examination, no credit granted  
INC Incomplete course work, no credit granted  
IP Course in progress, no grade assigned at this time
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 this system the credit weights for passed courses are total number of course credits required for the degree. in a term system.

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 required to sit for, examinations, tests or lectures. The last five teaching days of the lecture schedule in any term shall be required to sit for, final examinations during the regular term, 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.

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 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 Church 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 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 (Campus Centre, 150C, 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.

* The full text of Policy 71 is available electronically on UWinfo. Copies can also be obtained from the Ombudsperson (Campus Centre) and the University Secretariat (Needles Hall).

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 (Campus Centre 150C, 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.

Ethical Behaviour (Policy #33)

Sexual harassment, discrimination and abuse of supervisory authority are explicitly cited in Policy 33 as being antithetical to the nurturing environment UW strives to provide. Any student who believes that principles expressed in the Policy 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 in Needles Hall (room 3060, ext. 2749). The Ombudsperson (Campus Centre) and the Sexual Harassment Counsellor (Counselling Services, Needles Hall, room 2080, ext. 2814) are also available to advise students.

* The full text of Policies 70, 71 and 33 is available electronically on UWinfo. Copies can also be obtained from the Ombudsperson (Campus Centre) and the University Secretariat (Needles Hall).

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:

a) 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.

b) With the exception of examination answer papers, the University receives a non-exclusive royalty-free licence to:

i) circulate the work as part of the University Library collection;
ii) make copies or representations of the work for academic purposes within the University;
iii) make copies of a thesis deposited in the University Library at the request of other universities or bona fide individuals or institutions;
iv) microfilm the work and submit the microfilm to the National Library of Canada;
v) 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:
   a) Students may be participating in software development as part of a process of research and development 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.
   b) 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.
   c) 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.

* In Canada, there are no formalities required to copyright original work. The author is the immediate owner of the copyright in the original work, except in certain cases where he or she is under an employment contract.

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**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.

**Policy 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 be reviewed by the Co-ordinator of the Office of Human Research (OHR) for ethical acceptability, legal liability and medical advisability. Advisory to the Co-ordinator is the Committee on Research Involving Human Participants. The review process ensures that the research conforms to the requirements outlined in the OHR Guidelines for Research with Human Participants (Guidelines), and that the safety rights and welfare of the participants are adequately protected. The Guidelines provide information to University of Waterloo researchers about ethical issues and procedures which should be of concern to them when planning research with human participants (for example, confidentiality, risks and benefits, free and informed consent, etc.).

A definition of human research, as well as complete details about the application and review procedures are presented in the Guidelines. Copies of this document and application information are available through the OHR. In addition, the Co-ordinator is available to provide advice and can be reached at ext. 6005 (Needles Hall, Room 3015).

**University Services**

The University provides a number of services designed to enhance and enrich student campus life. These are described briefly in the following pages. 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 Cooperative 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 Board is composed of the principal officers including the President, Vice-President Operations and Finance, the Vice-President University Affairs, and all Senior Officers. The Board controls day-to-day administration, and recommends policy to the Students' Council.

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

The Vice-President Operations and Finance works with the General Manager to oversee and formulate the Federation Budget, the Federation's business, and other ancillary services such as the Toronto Bus Service, the Landlord and Tenant Information Office and the Federation Safety Van. This Vice-President also oversees the Office of Internal Affairs and is responsible for the co-ordination of all Federation social events.

The Vice-President University Affairs is directly responsible to Council, to make sure members are informed of all matters pertinent to Federation policy. This position is also responsible for the supervision of the Speaker and Secretary of Council as well as the Office of Student Issues. The VPUSA is the external liaison with the provincial government through the Ontario Undergraduate Student Alliance.

The Office of Academic Affairs' responsibilities include encouraging the evaluation, maintenance and development of academic programs and standards at the University of Waterloo. It focuses on developing cohesive student representation in the academic sector of the University and in the relevant levels of government.

The Office of Internal Liaison's responsibilities include encouraging greater input and communication between the Federation and Clubs, Faculty Student Societies, Residence Councils, and Federation Clubs of the University of Waterloo.

The Office of Student Issues' responsibilities include addressing important issues outside of the academic curriculum with the purpose of educating the university community. The office educates and makes all people at the University aware of gender issues and concerns; 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; and enriches the learning environment through extra-curricular programs and the provision of alternative learning situations.

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 into the Office. All letters and interviews are treated confidentially.

Other Federation Services include the GRAPHIX Factory - a Word Processing, Resume and Graphics Service, the Music Source, Campus Shop, Post Office, Used Books Store, 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, Campus Centre or telephone 868-4042.

Campus Centre
The Campus Centre offers a place for the University community to meet, relax and take advantage of the many facilities in the building. Open around the clock every day of the year, the Campus Centre offers non-stop music, craft fairs, occasional exhibits, magazines, games, pinball and arcades. More information is available from the Turnkey on duty in the Great Hall of the Campus Centre.

The Student Newspaper (Imprint)
Imprint is the newspaper of, by, and for the students 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 without share capital, and is both student-owned and student-operated. Located in the Campus Centre, Room 140, 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
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 31 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, Red North entrance of 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 distinctive crestede 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 and the new UW Kids corner. We carry a large selection of greeting cards, calendars and magazines. 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. 3996
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 1239. 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 Career Services section of Chapter 5, page 5:9.

Health Services and the Safety Office
Health and Safety Building
Health Services and the Safety Office include the Medical Clinic centrally located across from the Campus 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 888-4088. Physicians’ fees at Health Services, as well as laboratory work, x-rays, and most referrals are paid by the Ontario Health Coverage (OHIP) or other provincial health plans. 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.

Discrimination, Harassment, 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 conducive to this environment and will not be tolerated. The Co-ordinator for Ethical Behaviour and Human Rights is available as a resource to all members of the University community in matters pertaining to ethical and human rights issues. The Co-ordinator is located in the Math and Computer Building, Room 4048, ext. 3765. For situations involving sexual harassment, a Sexual Harassment Counsellor, available through Counselling Services, can provide students with information and confidential advice.

Alternative personnel include: Counselling Services, Health Services, the Safety Office, the Ombudsperson, and the Co-ordinator for Persons with Disabilities.

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 changes and withdrawals 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 9:00 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 Maraden Co-operative Day Nursery and the Kiemmer Farmhouse Co-operative Nursery.

The Maraden 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. Sixteen 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 with the co-operative assistance of parents. 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 Nursery School programs to children ages 2-1/2 to 5 years of age. Children may attend either morning or afternoon sessions. The Centre is operated by the Psychology Department as a research facility for students and faculty in the department. Fees vary according to the number of days a child is in attendance (2, 3, 4 or 5 half days are offered). Teachers all hold degrees plus ECE certification. Note: This is not a day care facility and does not meet the needs of families requiring daily child care. Children attend 2-1/2 hours per session. 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 new location of 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.

Wednesdays and Fridays at Waterloo consist of a Welcome Presentation which introduces visitors to our facilities and programs and provides information on the physical layout of the campus, residence options and social and athletic opportunities. After the Welcome Presentation, students are encouraged to visit one or more of the faculty areas and participate in activities such as: consulting with academic advisors, taking a student-guided campus tour or a University residence tour and visiting our student service facilities.

Please telephone or fax for details on how to arrange a visit. Phone (519) 888-4567, ext. 3614 or Fax (519) 746-8088.

Office of Research
The Office of Research is responsible for providing the overall administration for research including, but not limited to: acting as a centre of communications between granting agencies and faculty; assisting faculty to obtain grants and negotiating contracts for undertaking research; ensuring that University policies and agency/sponsor requirements are met; and providing financial administration, monitoring and reporting to researchers, University administration and external sponsors.

The Office is also responsible for assisting with the development and administration of: international programs, including exchange agreements; research centres; institutes and groups; and technology transfer including commercialization of University research through licensing and spin-off companies.

1. Research Grants: The Research Grants Section develops and disseminates information on sources of research funding and other support; makes personal contacts with such sources to seek to open up opportunities for University researchers by maintaining active liaison between faculty and appropriate personnel in government, industry and other sectors of society; aids faculty in the preparation of research proposals; and maintains records and administers all proposals, applications, and University grant programs. A resource centre containing information on available grants, application forms and procedures is maintained in Room 3015, Needles Hall.

2. Contract Research: The Contracts Section of the Office of Research provides assistance to researchers and to industry, governments 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.

3. Technology Transfer and Licensing Office: The Technology Transfer and Licensing Office (TTLO) has been established to facilitate the identification of commercially significant research-based technologies. The Office also assists the University research community in technology-transfer and commercialization of research spin-off technologies, including assistance in patenting, licensing, and the sale and protection of technologies on behalf of the researcher and the University. In addition, co-ordination of software licensing activities is also accommodated in the TTLO.

4. International Programs Office: The International Programs Office provides assistance, liaison and administration for the growing number of international projects in co-operation with the Canadian International Development Agency (CIDA), the International Development Research Centre (IDRC), the World Bank, and other agencies. In addition, the Office is responsible for the establishment and monitoring of international exchange programs involving undergraduate and graduate students and faculty. An International Exchange Committee, chaired by the Dean of Research, oversees the 40 University exchange agreements currently in place.

5. Office of Human Research and Animal Care: The Manager, Human Research and Animal Care reviews all research - invasive and non-invasive - conducted by faculty, students and staff which involves humans as sources of data. The ethics review process ensures the projects comply with the Office of Human Research Guidelines and are ethically, medically and legally acceptable. The Office is also responsible for approving and making arrangements for studies which require...
the participation of elementary and secondary school students and/or teachers. (For more information see Research with Human Participants, page 1:11). The Manager provides ongoing monitoring of human research projects and advises the Dean of Research and the Committee on Research Involving Human Subjects on issues and procedures related to research with humans.

The Manager, in consultation with the Committee on Animal Care, reviews University research and teaching activities involving animals according to the requirements of The Animals for Research Act and the Canadian Council on Animal Care. The Manager monitors these projects and the animal facilities on-campus and advises the Dean of Research and the Committee on issues and procedures relating to the care of research animals.

6. **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.

7. **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, Notre Dame, 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. Also available is the Waterloo Co-op Residence, owned and operated by students and situated just off campus. 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

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

- Housing Office
  - Village I

**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 Centre 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.
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 2089, 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 tutor-markers, lab instructors, or those in similar teaching roles.

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

Planner-in-Residence
This program was developed 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 been Ray Spaxman of British Columbia (1990) and John Sweeney of Ontario (1991). In the Fall term (1992) J. Gardner Church was the Pragma Planner-in-Residence and during the Winter term (1993) Henry E. Stewart was in the School as the Alumni Planner-in-Residence. J. Gardner Church (Deputy Minister on leave from the Ontario Provincial Government) held, for the second time, the position of Planner-in-Residence for the Fall term (1993).
Students enjoying their first snowfall on campus.
Admissions
General Information
General Admission Requirements

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, 1995.

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.

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 Honours Arts Regular Programs 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.

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 communications 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): 200

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 these 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 Ontario Secondary Schools
See the 1995-96 Admission Requirements for Year One Programs on pages 2:5-2:9 for general admission requirements and specific program requirements and recommendations.

Equivalent Certificates
All applicants are required to hold the specific subject requirements indicated on pages 2:5-2:9 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.

Applicants from Other Canadian Provinces
Alberta Grade 12
British Columbia Grade 12
Manitoba Grade 12
New Brunswick Grade 12
Newfoundland Year 1 Memorial University. Outstanding Grade 12 graduates are also considered.
Northwest Territories Grade 12
Nova Scotia Grade 12
Prince Edward Island Grade 12
Quebec First Year CEGEP program or equivalent
Saskatchewan Grade 12
Yukon Territory Grade 12

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 Baccalaureate
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.

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 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.

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

Transfer credit will depend upon the program applied to, the relevancy of the previous program studied and approval from the appropriate department that such courses are to be credited to the student's program.

As the specific transfer credit policies vary with each Faculty, students are advised to refer to the Faculty sections in this Calendar for detailed regulations.

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 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.

Each application will be considered on its merits by the Admissions Committee of the desired Faculty.

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 form 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

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 60% 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 provided 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 60% 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 1995-96

<table>
<thead>
<tr>
<th>Faculty/Program</th>
<th>Requirements</th>
<th>Recommendations</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Applicants should read the instructions accompanying the application form carefully, select the correct code and indicate their preference for a Co-op program, if applicable.</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>
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<tr>
<td>Honours Co-op Health Studies</td>
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<tr>
<td>Honours Regular Health Studies</td>
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<tr>
<td>Honours Co-op Kinesiology</td>
<td>Six Ontario Academic Courses</td>
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<td>Applicants planning to enter the Joint Honours program in Health Studies/Kinesiology must fulfill the Kinesiology admission requirements. Applicants are encouraged to complete a 'Personal Information Form'.</td>
</tr>
<tr>
<td>Honours Regular Kinesiology</td>
<td>Including: Calculus, Chemistry, one of Biology or Physics</td>
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<tr>
<td>Honours Co-op Recreation and Leisure Studies</td>
<td>Six Ontario Academic Courses.</td>
<td>Applicants are encouraged to include OAC English and one OAC Mathematics in their program.</td>
<td>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 a 'Personal Information Form'.</td>
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<tr>
<td>Honours Regular Recreation and Leisure Studies</td>
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<tr>
<td>Faculty/Program</td>
<td>Requirements</td>
<td>Recommendations</td>
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<tr>
<td><strong>Arts</strong></td>
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<td>When the admissions committee considers an application individually, it focuses on the overall average, the average in arts-related subjects, particularly OAC English, and information provided on the Arts 'Admission Information Form'.</td>
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<tr>
<td>(All programs)</td>
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<tr>
<td><strong>Honours Arts</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 Economics, Psychology and Geography.</td>
<td>Entry to Honours, and major programs, including departmental Co-op, occurs following Year One and is based on academic performance in Year One.</td>
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<tr>
<td>(Regular)</td>
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<tr>
<td><strong>Renison - Social Development Studies</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>
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<tr>
<td>(Regular)</td>
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<tr>
<td><strong>Honours Accountancy Studies</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 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 'Admission Information Form'.</td>
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<td>(Co-op)</td>
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<tr>
<td><strong>Honours Applied Studies</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 Applied Studies, may be considered for the Honours Arts Regular program.</td>
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<tr>
<td>(Co-op)</td>
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<tr>
<td><strong>Engineering</strong></td>
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<tr>
<td>Chemical</td>
<td>Six Ontario Academic Courses including:</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 'Personal Information Form' sent to them with the acknowledgement of their application. The 'Personal Information Form' 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 Personal Information Form. This form is sent to all applicants when receipt of the application is acknowledged.</td>
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<td>Civil</td>
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<td>Computer</td>
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<td>Electrical</td>
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<td>Environmental (Chemical)</td>
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<tr>
<td>Environmental (Civil)</td>
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<td>Geological</td>
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<td>Mechanical</td>
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<tr>
<td>Systems Design</td>
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</table>
### Environmental Studies

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<tr>
<th>Faculty/Program</th>
<th>Requirements</th>
<th>Recommendations</th>
<th>Comments</th>
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<tbody>
<tr>
<td>Architecture (pre-professional program)</td>
<td>Six Ontario Academic Courses including: English or Français, Physics, Calculus, Algebra and Geometry.</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 'Personal 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>
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</tr>
<tr>
<td>Independent Studies</td>
<td>Six Ontario Academic Courses including English. An interview is normally required (see &quot;Comments&quot;).</td>
<td>It is recommended that applicants include OAC Finite Mathematics in their program.</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 Ontario Academic Courses. Admission is based on the results of the interview, letters of reference, a 'Personal Information Form', and secondary school achievement. Admission to Co-op Urban and Regional Planning occurs in Year Two.</td>
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</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.
### Mathematics

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<tr>
<th>Faculty/Program</th>
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<th>Recommendations</th>
<th>Comments</th>
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<tr>
<td>Honours Co-op Computer Science Mathematics Accounting Options</td>
<td>Six Ontario Academic Courses including: Algebra and Geometry Calculus English with a minimum grade of 60% in each of the required courses.</td>
<td>All applicants are expected to complete and submit the Mathematics 'Personal 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 strongly recommended that applicants take at least one Computer Science course at some point in their secondary school studies. Although Finite Mathematics is not a specific requirement, and lack of it will not adversely affect consideration for admission, it is strongly recommended that applicants include this course in their selection. It is recommended that applicants, who are considering a Mathematics and Accounting program, should include OAC Accounting. Those presenting OAC Accounting will be excused from taking the introductory Accounting course in Year One. A consequence of planning course selection to incorporate the above advice may be that applicants exceed the minimum number of courses required for admission.</td>
<td>The Admissions Committee also considers other evidence, as presented on the 'Personal Information Form', such as performance in the Descartes Mathematics Contest, teachers' recommendations, the number and variety of OAC credits and involvement in extracurricular activities. Applicants not offered admission to the program of their choice are considered for all other Mathematics programs. The Faculty administers an English as a Second Language Program for students with exceptional Mathematics skills who do not meet normal English admissions requirements. Those interested in the Co-op Mathematics Teaching Option should apply to Honours Co-op Mathematics or Honours Co-op Computer Science in Year One. Admission occurs in Year Two on the basis of two interviews and satisfactory academic and work-term performance.</td>
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</tbody>
</table>

### Science

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<tr>
<th>Faculty/Program</th>
<th>Requirements</th>
<th>Recommendations</th>
<th>Comments</th>
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<tbody>
<tr>
<td>Honours Regular Science</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 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.</td>
<td>Those not admitted to the program of their choice, are automatically considered for other programs in Science for which they qualify.</td>
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<tr>
<td>Honours Co-op Environmental Science</td>
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<tr>
<td>Honours Regular Environmental Science</td>
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<tr>
<td>Honours Regular Science and Business</td>
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</table>
### Admissions
Specific Admission Requirements and Recommendations

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<th>Faculty/Program</th>
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<th>Recommendations</th>
<th>Comments</th>
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<tbody>
<tr>
<td>Honours Co-op Biology</td>
<td>Six Ontario Academic Courses including: Chemistry one additional Science credit from Biology or 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>
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<tr>
<td>Honours Regular Biology</td>
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<tr>
<td>Honours Co-op Biochemistry</td>
<td>Six Ontario Academic Courses including: Chemistry Physics two Mathematics credits, one of which must be Calculus, and the second from Algebra and Geometry or Finite Mathematics.</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>
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<tr>
<td>Honours Regular Biochemistry</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 Physics Algebra and Geometry Calculus</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>
</tr>
<tr>
<td>Honours Regular Chemistry</td>
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<tr>
<td>Honours Co-op Applied Physics</td>
<td>Six Ontario Academic Courses including: Physics one additional Science credit from Biology or Chemistry 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 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>
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<tr>
<td>Honours Regular Physics</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

1. 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):

   a) 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.

   b) All other applicants must complete OUAC Form 105. These forms may be obtained from the Registrar’s Office.

   c) 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.

2. a) 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.

   b) 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.

3. 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 1995</td>
<td>March 1, 1995</td>
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<tr>
<td>July 1995</td>
<td>June 1, 1995</td>
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<tr>
<td>September 1995</td>
<td>May 1, 1995</td>
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<tr>
<td>January 1996</td>
<td>November 1, 1995</td>
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</tbody>
</table>

   Architecture and Urban and Regional Planning require that applications must be dated as received at the OUAC no later than March 15. Supporting documents for Architecture and Urban and Regional Planning must be received at the University no later than April 1.

   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.

   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               Students previously registered at UW
   Fall Term  
   June 1, 1995                                        June 30, 1995
   Winter Term                                           Winter Term
   September 11, 1995                                   October 6, 1995
   Spring Term                                           Spring Term
   January 22, 1996                                     February 16, 1996

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 15, 1995 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 15, 1995 are required to confirm acceptance by June 29, 1995.

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.
Registration and Fees

Following admission, students will be required to preregister for courses and then make final arrangement for registration. See Chapter 3 for an explanation of these procedures.
Explaining transportation routes to a new student.
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 Registrars 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:
   a) Co-operative Programs
      During the preceding on-campus term.
   b) 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 receipted 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.

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.

ASSESSMENT
Fees are assessed as follows: (Foreign Students - see Note 5 on page 3:6).

1. Co-operative Programs:
   All Terms
   a) 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.
   b) 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:
   a) All Terms
      i) 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.
      ii) 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.
   b) 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
   a) By Mail
      The University encourages students to register by mail. Detailed instructions outlining the payment procedure will be included with the Fee Statement.
b) **In Person**

   For students who cannot register by mail, a registration period is held on campus at the beginning of each term. See pages 8 to 11 for dates.

3. **General Information**

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

   b) 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.

   c) 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 60 days processing time). OSAP funds not received by the start of term cannot be used as a means to register.**

   d) 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 1995</td>
<td>May 1, 1995</td>
</tr>
<tr>
<td>September 1995</td>
<td>September 5, 1995</td>
</tr>
<tr>
<td>January 1996</td>
<td>January 2, 1996</td>
</tr>
<tr>
<td>May 1996</td>
<td>May 1, 1996</td>
</tr>
</tbody>
</table>

   e) 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.

   f) **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.

   g) 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.

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

   i) 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.

   j) 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>
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<tbody>
<tr>
<td>May 1995</td>
<td>June 30, 1995</td>
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<td>September 1995</td>
<td>October 31, 1995</td>
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<tr>
<td>May 1996</td>
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</table>

   **WITHDRAWALS**

   (Individual Faculty sections should be consulted for academic penalties for late withdrawal.) See Academic Calendar (pages 9 to 12) 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.
   3. Part-time students will be charged $10.
   4. Students withdrawing during weeks four to seven of a term (second week of Summer Session) will receive a refund of 50% (tuition only).
   5. 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.

Fees and Registration
Preregistration, Registration, Fees

DROP/ADDS
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 a 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). There is no refund of incidental fees when dropping to part-time.

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.
## SCHEDULE OF FEES

**1995 PRELIMINARY Schedule of Fees – Undergraduate Programs – Tuition and Incidentals for All Years**

- **Canadian Citizens and Permanent Residents**

These fees have not been approved by the Board of Governors. They are based on information available in January 1995. 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 page 3:6 for fee information.

### Faculty

<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 Incidentals Fees**</th>
<th>Total Fees per Term**</th>
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<td>- Half Course (0.5 credits)</td>
<td>276.00</td>
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<td>- Full Course (1.0 credits)</td>
<td>552.00</td>
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<td><strong>Unit Course Fee (Note 4)</strong></td>
<td>276.00</td>
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</table>

*The total fee for the Professionally Accredited Stream (PAS) of this program includes the required Internship Fee of $247.00 per term.

† Includes $14.00 work report marking fee (see Note 3).

** The Student Services Fee is estimated (see Note 17).
FEES FOR FOREIGN STUDENTS WITH STUDENT AUTHORIZATIONS (see also Note 5)
These fees have not been approved by the Board of Governors. They are based on information available in January 1995. 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.
   - Architecture $ 6.00
   - Arts $ 7.00
   - Engineering $14.00
   - Environmental Studies $ 5.00
   - Independent Studies $ –
   - Mathematics $ 7.50
   - Optometry $ 9.00
   - Science $ 9.00

Voluntary Student Contribution (see Note 15)
   - Accounting $75.00
   - Engineering $75.00
   - Science $50.00
   - Math $31.42

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 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)
   - One person $196.41
   - Two persons $392.82
   - Three persons (or more) $621.72

INCIDENTAL FEES

1. The following incidental fees are compulsory:

   Student Services Fee (see Note 17)
   - Full-time $40.73
   - Part-time $12.22

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

   Federation of Students (see Note 8) $23.50

   Interuniversity Athletics $33.50

   Health Insurance (see Note 6)
   - Regular $35.05
   - Co-op $65.70

   Federation Hall (see Note 7) $ 7.50

   Student Co-ordinated Plan (see Note 16) $25.00

   Imprint – including GST (see Note 13) $ 4.10

   Student Society (see Note 9) $ 3.00

   Applied Health Sciences

Term

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.
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. 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 his/her official duties as a diplomatic or consular officer or representative or official property accredited to 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 $46.91 for a Regular student per term and $87.96 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.

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 pages 9 to 12 of this 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 pages 9 to 12 of this Calendar.

Note 11 - Sanford 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 involved as indicated on pages 9 to 12 of this 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 pages 9 to 12 of this 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 pages 9 to 12 of this 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 involved as indicated on pages 9 to 12 of this Calendar.

Note 15 - Voluntary Student Contribution (Accounting, 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 other 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 pages 9 to 12 of this 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. The 1995/96 fees shown are those estimated when the Student Services Fee was approved in 1994. The final 1995/96 fees are expected to be approved by the Board of Governors by May 1995.

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 $20.00
- Replacement of lost or stolen student 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, 1996.

* 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, 1996.)
Awards and Financial Aid

Muriel Shepherd, retired staff member, presents the Muriel Shepherd Scholarship to Karen Kerk, Honours Co-op Applied Studies student, Faculty of Arts.
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.

Regulations Governing University of Waterloo Undergraduate Awards

1. Unless otherwise stated in the terms of reference of the awards, eligibility for entrance and upper year awards is normally restricted to students who register for a full course load (minimum five half-credits per term).

2. Awards with a monetary value are normally paid during terms when the recipient is registered as a full-time student.

3. The first charge against any award payment will be for tuition and fees.

4. Awards valued at more than one-term tuition will normally be paid in two term instalments.

5. A student may not hold more than one major University of Waterloo award in one academic year. (A major award may be defined as having a value equal to one-term full-time tuition at the University of Waterloo.)

Awards marked with an asterisk (*) are considered major University of Waterloo awards and may preclude an individual from receiving another University of Waterloo award.

6. If a student withdraws or otherwise fails to complete the term(s) covered by an award, the award will be pro-rated.

7. If no qualified applicant is found for a particular award in any year, the University reserves the right to withhold the award.

8. Awards based on donations from outside sources cannot be guaranteed by the University and can be forwarded only after the funds have been received from the donor.

9. The value of awards financed by endowed funds may vary each year dependent upon investment interest rates.

10. Deadline dates: where the advertised deadline date falls on a Saturday or Sunday the deadline date is the preceding Friday.

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

The University administers a substantial number of entrance awards to entering students. With the exception of special awards for students from Waterloo County secondary schools, 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 Ontario Secondary Schools. 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 fulltime 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.

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 three 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. Continuance in Years Two and Three may be in the form of a fellowship and 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 First Year 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 Mina 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 first year 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 Fellowships
One award, with a total possible value of $5,000 is provided annually to a Year One applicant to an Accounting program in the Faculty of Arts. One thousand dollars is allocated in first and second year and $1,500 is allocated in third and fourth year, if the student maintains a B+ average in accounting-related subjects. Applicants must complete the Faculty of Arts Admission Information Form. Selection of the fellow is based on academic merit and extracurricular activities.

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.
Awards and Financial Aid
University of Waterloo Entrance Awards

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 $1,600 to $2,600; (3) one or two awards valued at $3,200 for Year One and renewable for Years Two, Three and Four each having a total value of $5,400. 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 Personal 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.

Association of Professional Engineers Entrance Award
The Association of Professional Engineers of the Province of Ontario 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.

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.

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

Planning
Awards are offered on the basis of comments made on the Personal 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 University Student Awards Office.

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.

*Bill Harvie Scholarship/Fellowship
This award, valued at $4,500 over three 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. Continuance in Years Two and Three will be in the form of a fellowship and will be dependent on the student maintaining a B+ overall average.

*Friar Luca Pacioli Fellowships
One award, with a total possible value of $5,000 is provided annually to a Year One applicant to an Accounting program in the Faculty of Mathematics. One thousand dollars is allocated in first and second year and $1,500 is allocated in third and fourth year, if the student maintains a B+ average in accounting-related subjects. Applicants must complete the Personal Information Form. Selection of the fellow is based on academic merit and extra-curricular activities.

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
Scholarships valued at $1,500 may be available in Year One and renewable in Year Two providing an overall average of 80% is maintained.

Biochemistry Scholarships
Scholarships valued at $1,500 may be available in Year One and an additional $1,000 available in Year Two providing an overall average of 83% or better is maintained.

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, 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, 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.

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 $1,000 in Year One and renewable for Years Two, Three and Four for a possible total of $4,000 may be offered. A yearly average of 84% is required for renewal of entrance scholarships.

Earth Sciences Scholarships
Scholarships may be offered in varying amounts for Year One only.

Honours Science, Honours Science and Business, Honours Environmental Science Scholarships
Several scholarships valued at $1,000-$1,500 for Year One and renewable in Year Two may be offered. An overall average of 80% is required for renewal.
*Kay & Harry McLeod Chemistry Entrance Scholarship
One scholarship valued at $1,200 may be offered for Year One in conjunction with the Chemistry Entrance Scholarships. It is renewable for $1,000 annually in subsequent years. A year average of at least 84% is required for renewal.

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.

*Physics Scholarships
Scholarships are available in varying amounts up to $3,000 in Year One and a possibility of an additional $1,600 in Years Two, Three and Four for a total value of $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

Canada Scholarships
The federal government's Canada Scholarships Program presents over 2,500 scholarships annually to students entering undergraduate studies in selected Science, Engineering and Mathematics programs. The scholarship can be worth up to $10,000 received in installments of $2,500 annually over four years. Furthermore, outstanding Canada Scholars in their third and fourth years of study in certain disciplines may also be recommended by their faculty to receive an additional award sponsored by the corporate sector. For more information, contact the Student Awards Office or The Canada Scholarships Program, Awards Division, A.U.C.C., 350 Albert Street, Suite 600, Ottawa, Ontario K1R 1B1, Tel.: (613) 563-1236.

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, extra-curricular 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 $2,500 and are renewable for up to three years. Successful candidates registering at the University of Waterloo will also receive a University of Waterloo - Canadian Merit Scholarship equivalent to the value of tuition and incidental fees and renewable for up to three years.

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, LLD, a distinguished friend of the University and business and community leader in Kitchener-Waterloo for several decades.

Ford S. Kumpf Scholarships
Through a bequest of the late Ford S. Kumpf of Waterloo, a number of 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.

*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
The Kaiulani Carw Award is awarded annually to a senior. This $500 scholarship was established by friends, relatives and associates in recognition of superior academic achievement in the previous year. Applications should be submitted by January 10th each year.

Gladys and Norman Rafter Memorial Scholarships
A number of entrance scholarships are awarded to the top eligible students graduating 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 should be submitted by January 10th each year.

Andrea Fraser Memorial Scholarship
This $400 scholarship was established by classmates, relatives and friends in memory of Andrea Louise Fraser, BSc. The award is presented to a third- or fourth-year Kinesiology student who holds a minimum B average, shows a special interest in rehabilitation and is widely involved in class and athletic endeavours. Applications must be submitted to the Student Awards Office by October 15th.

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 in the Student Awards Office and must be submitted during the 38th 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 third-year Regular Program, with a deadline of March 15 each year.

Warren Laverty Memorial Award
A $500 award has been established in memory of Warren Laverty, 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 31 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
These scholarships, valued at $600, are awarded annually to the student with the highest overall cumulative academic average at the completion of Year Two in each of Honours Dance, Honours Health Studies, Honours Kinesiology and Honours Recreation and Leisure Studies. Students with an overall average of 80% or better will be considered.
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 Co-op 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 September 30th.

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 24 each year.

Sunnyside Home Award for Therapeutic Recreation
One award valued at $50 is offered 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 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 Year Three or Year Four 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 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. The award is made to an outstanding graduating student who has displayed achievement in Accounting. No application necessary.

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 28 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. A limited number of 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 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 the next 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 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.

Andrew James Dugan Memorial Award
This award, established in the memory of Andrew James Dugan, is awarded to a student enrolled in 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.

*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 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 $600 has been established by Alcan and many friends of Mr. Gobeil at the University of Waterloo, where Mr. Gobeil was a founding member of the University's Accounting Advisory Council. The scholarship is awarded annually, based on academic excellence, to a student on completion of Year Two in Honours Accountancy Studies who intends to pursue a career in either internal or external auditing. The emphasis on internal or external auditing was based on Mr. Gobeil's considerable interest and service to both the Institute of Internal Auditors and to the Chartered Accounting profession in Canada.

*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.

Awards and Financial Aid
University of Waterloo Upper-Year Awards

*Management Accounting Student of Merit Award
The Management Accounting Student of Merit Plaque and Award valued at $500 is offered by the Society of Management Accountants of Ontario each year. The award is given to an Accountancy Studies student who has an outstanding performance in ACC 381, 382 and 680. The winner is selected by the Management Accountancy Studies area.

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 fulltime Fine Arts major on the basis of performance in first-year courses and presentation of a portfolio.

J.C. McKegney Memorial Award
Two awards are presented annually to upper-year students in the Faculty of Arts who have shown outstanding academic performance and/or extra-curricular interests in the Hispanic Area: one in Peninsular Spanish Studies and one in Spanish American Studies. Applications should be submitted no later than February.

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. 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 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' recommendation, 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 valued 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. Walters Award
One or more awards, based on academic excellence, are made each year to outstanding students in the Honours Psychology Program.

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 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 department 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 commitment 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 4A term in either the Faculty of Engineering or a Co-operative Mathematics Program. Selection of the recipient will be based on academic achievement, active participation/leadership in extra-curricular 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.

Association of Professional Engineers Gold Medal for Academic Achievement Award
The Association of Professional Engineers of the Province of Ontario 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.

*Association of Professional Engineers Undergraduate Scholarship
The Association of Professional Engineers of the Province of Ontario offers eight annual scholarships of $600 each to students in each of the second, third, and fourth years in an accredited Engineering program who have the highest average in the examinations for that year. It is intended that 50% of the scholarships be presented to women.

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.

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 before October 14th each year.

Canadian Posture and Seating Centre Scholarship
Two scholarships valued at approximately $2,500 have been established to recognize and encourage student interest in 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 before 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.

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

Morgan Champness Memorial Award
Two awards of $100 each are given to fourth-year Mechanical Engineering students who demonstrate outstanding leadership in extra-curricular 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 extra-curricular 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 Delcan 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 extra-curricular 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 extra-curricular activities and athletics and have evidence of leadership qualities. Applications should be submitted during the 3B term.

Ellis-Don Construction Limited Scholarship
One award of $1,500 is awarded annually to an outstanding undergraduate student entering third year in Civil Engineering. The award will be based on academic performance and work-term performance evaluations.

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 $1000, 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 jointly by the Academic Faculty and the Department of Co-operative Education and Career Services.

*Sfluor Daniel Canada Inc. Scholarship
Two scholarships valued at $2,000 each are presented to 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 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 necessary.

Microsoft Technical Scholarship
Two awards valued at $5,000 each are awarded to full-time, undergraduate second- or third-year students in Computer Science, Computer or Electrical Engineering, Applied Math or Physics. The awards are based on interest in the software/PC industry, written and technical quality of the application and a minimum overall B average. Special applications are available from the Student Awards Office or the Computer Science Department and must be submitted by December 1 for Co-op and Regular students registered in the Fall term and by January 21 for Co-op students registered in the Winter term.

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.)

Ontario Construction Education and Research Foundation (O.C.E.R.F) Award
An annual award of $500 is available to a third- or fourth-year Civil Engineering student who has demonstrated, through study and/or practice, a commitment to a career in construction and who has attained an above-average academic standing. Applications are available from the Department of Civil Engineering, and are to be submitted by October 31 each year directly to the Department.

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. The decision will be made during the Winter term each year.

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.

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 $800 per term and provide an opportunity for undergraduates to participate in original Engineering research. These 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

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 $2200. The award is presented to an Architecture student who submits the best energy-related design.

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.

Job 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 $2200. 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 are 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.

Kaderalli 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 $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 $500 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 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.

Smaie 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 256, 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

J. 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.

*Aandersen Consulting Scholarship
One award valued at $1,000 is given to a student entering 4A term in either the Faculty of Engineering or a Co-operative Mathematics Program. Selection of the recipient will be based on academic achievement, active participation/leadership in extra-curricular 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.

Alley Bailin Memorial Award in Actuarial Science
This award, in memory of the late Alley 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.

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 the approximate value of $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.

*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 3B 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.
Awards and Financial Aid
University of Waterloo Upper-Year Awards

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).

*Scot Kelsey Fervreau Memorial Award*
A $500 award has been established in memory of Scott Kelsey Fervreau, 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, extra-curricular 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 extra-curricular 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.

Microsoft Technical Scholarship
Two awards valued at $5,000 each are awarded to full-time, undergraduate second- or third-year students in Computer Science, Computer or Electrical Engineering, Applied Math or Physics. The awards are based on interest in the software/PC industry, written and technical quality of the application and a minimum overall B average. Special applications are available from the Student Awards Office or the Computer Science Department and must be submitted by December 1 for Co-op and Regular students registered in the Fall term and by January 21 for Co-op students registered in the Winter term.

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.)

Pure Math Book Prize
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-Botzang Scholarship
The Rees-Botzang 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
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.
Awards and Financial Aid
University of Waterloo Upper-Year Awards

*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 necessary.

*Stem Cohen Accountancy Studies Scholarship
Established by Stem Cohen, Chartered Accountants, in recognition of their 36th 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 awarded 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 2B 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 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. These 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 Optometry 499A, 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 ranking first and second in general proficiency.

Allergan Prize – For Excellence in Anatomy of the Eye and Visual System
A cash award of $500 plus a plaque is presented to a student beginning second year 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.

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 for 25 years at the School of Optometry from 1967 to 1992. The prize is presented to the student with the highest standing in Optometry 348A/B for general clinical proficiency.

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 Pathology.

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 applying and who are spending their Summer in research support in Physiological Optics.
Barnes-Hind Student Recognition Award
This award for $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.

Bausch and Lomb Outstanding Achievement Awards
Total value of these awards is $1,000. These awards 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.

Bausch and Lomb Soflens O.D. 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.

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.

Bemell 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 supplies and equipment provided by the Bemell 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.

Awards and Financial Aid
University of Waterloo Upper-Year Awards

1. Three General Proficiency Prizes (value $250 each) awarded to the student in the School of Optometry standing highest in General Proficiency in each of the first, second and third years.
2. Three General Proficiency Prizes (value $200 each) awarded to the student in the School of Optometry standing second highest in General Proficiency in each of the first, second and third years.
3. Two awards to final-year students for academic excellence or proficiency in specified subjects.
4. In addition to the above, prizes are awarded for highest academic standing in certain second-, third- and fourth-year subjects as funds allow.

Note
All of the above prizes are made available through contributions of the following Canadian Suppliers and Laboratories:
- Canadian Optical Supply Co., 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 study.

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 Pediatric Optometry.

CIBA Vision Care 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, the gift of the Cole family and donated in honour of their father A.W. Cole, is awarded to the final-year Optometry student ranked highest in Clinical 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 256 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 extra-curricular 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 extra-curricular 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 two students admitted to the first professional year of the School of Optometry. They 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 Elsdon 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 annually this award of equipment to a final-year Optometry student with excellent academic standing in the areas of Geometrical or Optometrical Optics.

William Feinbloom 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.

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.

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.

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. The award, which is not based on academic criteria, will be given to a final-year Optometry student who actively encourages fellow students to participate in athletic and social affairs.

Helen Sawyer Hogg Scholarship in Astronomy
A scholarship of $500 is presented annually in honour of Dr. Michael Gutwein. The award, which is not based on academic criteria, will be given to a final-year Optometry student who actively encourages fellow students to participate in athletic and social affairs.

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.
Don E. Irish 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 Chemistry course and laboratory. The award 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 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 standing. 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 LaCourciere Award for General Proficiency
The Sudbury Association of Optometrists presents an award of $250 annually to the top final-year student of the School of Optometry who was a resident of District #3 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.

Awards and Financial Aid
University of Waterloo Upper-Year Awards

Douglas T. MacPherson Scholarship
AOCO Limited/Limitée presents annually the Douglas T. MacPherson Scholarship to a Canadian student admitted to the first professional year of the School of Optometry. This $1,000 award is made on the basis of academic achievement.

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 is normally 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.

Microsoft Technical Scholarship
Two awards valued at $5,000 each are awarded to full-time, undergraduate second- or third-year students in Computer Science, Computer or Electrical Engineering, Applied Math or Physics. The awards are based on interest in the software/PC industry, written and technical quality of the application and a minimum overall B average. Special applications are available from the Student Awards Office or the Computer Science Department and must be submitted by December 1 for Co-op and Regular students registered in the Fall term and by January 21 for Co-op students registered in the Winter term.

Jerome T. Miller Memorial Prize
A $600 scholarship is normally awarded annually to a student in third year of a program which combines studies in Chemistry and Physics.

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 co-op 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. Janis Newell (UW Class of 1982) to honour her father on his retirement from optometric practice after 43 years. The prize is awarded to a fourth-year 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. The decision will be made during the Winter term each year.

Optometric Services 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, who has demonstrated leadership with excellent academic standing, in the areas of professionalism and communication skills.

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.

Safilo Research Scholarship
The Safilo 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 to each of 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 Wade Mesher
Nancy O. Bray Mary R. Mitchell
J.L. Daniel E.J. (Ted) Mulrooney
Nicola Duthie John A. Reeves
Anne Fiedtkou Randall E. Soley
Roman Guzowsky Robert G. Sommerville
David Lamb Michael Souliere
B.H. Luneberg Steve Llewellyn

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 applied and been accepted to spend a Summer in Optometrical Research support.

**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 from Sunsoft Contact Lenses, 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 of the Alumni Association in memory of the late Dean J.C. Thompson 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 annually by the Wesley-Jessen Contact Lens Company to the student completing the third-year professional program in Optometry who attains the highest mark in OPTOM 347 and demonstrates clinical proficiency.

**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.

**UNIVERSITY-WIDE**

**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.

**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 mid-January.

**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 extra-curricular 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 forfeit.

**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 extra-curricular activities. A bursary application plus a résumé and letters of reference should be directed to Neil Widmeyer, Faculty of Applied Health Sciences. Special application is required.

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 to Neil Widmeyer, Faculty of Applied Health Sciences. January 9.

Students to undertake graduate studies. These awards are plus a resume and letters of reference should be directed to Neil Widmeyer, Faculty of Applied Health Sciences. Special application is required.

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.

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 extra-curricular 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
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. The 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
Dean 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.

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.

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.

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.

Sci-Lab Materials Testing Inc. Award
One award of $200 to a second-, third- or fourth-year Chemical Engineering student.

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.
Awards and Financial Aid
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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.

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.

Institute for Polymer Research Award
Three awards of $100 each to second-, third- or fourth-year Chemical Engineering or Applied Chemistry students.

Metall Mining Corporation Work-Term Report Award
Three awards of $100 each to second-, third- or fourth-year Science 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

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 ARTS BURSARIES
Certified Management Accountant Bursary
The Society of Management Accountants of Ontario, Grand River Chapter, has established a $300 bursary for students who attended high school in the counties of Perth, Waterloo or Wellington. The bursary is awarded to a full-time student registered in first year of Arts or Mathematics/Chartered Accountancy Studies or Management Accountancy Studies.
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 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 each in the amount of $500, 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 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.

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. 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.

INDEPENDENT STUDIES BURSARY

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 MATHEMATICS BURSARIES

3M Canada Inc. Bursaries
Four bursaries valued at $500 are awarded as follows: one to an Engineering student and the remaining three to students in either Business, Science or Computer Science-related fields.

Certified Management Accountant Bursary
The Grand River Chapter of the Society of Management Accountants of Ontario has established a bursary fund for full-time students registered in Mathematics/Business Administration, Mathematics/Chartered Accountancy or Mathematics/Management Accountancy. Special bursary application required.

Emco Limited Bursaries

Alan W. Shattuck Memorial Bursaries
Three bursaries of $500 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.

A.C. Nielsen Company of Canada Ltd. Bursary
A.C. Nielsen Company of Canada Ltd. has made available two bursaries each in the amount of $500, 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.
A.F. (Tony) Pickard Memorial Award
One award valued at $150 has been established in memo-
ry of A.F. (Tony) Pickard, former Research Co-ordinator,
Applied Analysis and Computer Science, at the University
of Waterloo. Undergraduates enrolled in the Faculty of
Mathematics who have an active interest in Computer
Science and show academic promise combined with
financial need may apply for this award.

Pink Tie Bursary
A bursary fund has been established by the Math Society
for undergraduate Mathematics students. Special consid-
eration is given to Mathematics students who have been
involved in extra-curricular activities. A minimum overall
average of 60% is required, as well as a demonstrated
need.

FACULTY OF SCIENCE BURSARIES
3M Canada Inc. Bursaries
Four bursaries valued at $500 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.

Biology Club Bursary
This $200 bursary, donated by the Biology Undergraduate
Society, is available to any undergraduate student
registered in the Biology Department.

UNIVERSITY-WIDE BURSARIES
Jerzy W. Anders Memorial Award
A $300 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 difficul-
ties or family obligations and are experiencing financial
hardship upon re-entering the academic world. Mature stu-
dents experiencing financial difficulties should write to the
Assistant Registrar, Student Awards detailing their circum-
cstances.

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 bonafide
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 special
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
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 estab-
lished 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 appli-
cation 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 the 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 $500 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 Pipeline 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%.

Hildegarde Marsden Bursary Fund
A bursary fund has been established in memory of Hildegarde 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. An application form must be submitted to the Student Awards Office by January 31st.

Awards and Financial Aid
Bursaries

Mature Student Bursary Fund
Undergraduate, part-time students, studying on campus and encountering financial difficulties should arrange to speak with the Assistant Registrar, Student Awards regarding assistance from this source. Students must complete a special bursary application.

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 1956 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 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.

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 Detweiler Student Loan Fund
This loan fund was established by Mr. J.R. Detweiler in memory of his mother, Adelaide Detweiler.

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 loan 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.
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.

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. Appointment with the Student Awards Officer is necessary.

University of Waterloo Alumni Student Assistance Plan
This loan fund has been established 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 the Student Awards Officer regarding assistance from this source.

University of Waterloo Loan Fund
Loans up to $300 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.

Women’s Auxiliary to the Optometrical Association of Ontario 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.
Government Assistance Programs

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 six plans:

1. 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.

2. The Ontario Student Loans Plan provides interest-free loan assistance to both full- and part-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.

3. The Child-Care Bursary is 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.

4. The Bursary For Students With Disabilities is available to students who have applied for and qualified for OSAP funding and who will incur disability-related educational expenses. Applications are available in the Disabled Student Services Office.

5. 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.

6. 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 have a low family income. Students receiving Ontario Special Bursary are not eligible to receive OSAP for the same study period.

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

Co-op students gain valuable work experience.
Co-operative Education and Career Services

Director
B. A. Lumsden, BA (Western)

Program Administrators
W.B. Fuller, BA (Western Ontario)
K.B. Kenning, BA (Wilfrid Laurier)
R.A. Klawitter, BA (Western Ontario), CIM
R.A. Pullin, BSA (Toronto)
J.F. Westlake, BASc, MASC, PhD (Waterloo), PEng

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R.A. Pullin, BSA (Toronto)
J.F. Westlake, BASc, MASC, PhD (Waterloo), PEng

Systems Administrator
D.N. Thomas, BSc (Guelph), MBA (McMaster)

Co-ordinators, Co-operative Education
H.S. Barr, BMath (Waterloo)
D.J. Beaufre, 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, BDS, MA (Waterloo)
C.J. Engle, BSc (Toronto), BED (Western)
D.B. Everest, BA (McMaster), MA (Waterloo)
M.E. Flett, BE (Technical University of Nova Scotia)
R.A. Grant, BSc (Queen’s), PEng
M.E. Grosch, BA (Western)
J.C. Henshaw, BASc (Toronto), PEng
J.W. Hollard, BASc (Toronto), MBA (Western), PEng
C.E. Jenkins, BA (Western)
S.J. Kimberley, BA (Toronto), CA
J. Martin, BA (Windsor), CHRP
R. Mateyk, BASc (Toronto), PEng
P.J. Mazzei, BSc, MSc (Queen’s), PEng
W.D. Moore, BA (McGill)
G.C. Murphy, PEng
R. Parker, BSc (Montreal), MBA (Toronto)
L.I. Pineaud, BSc, MSc (Queen’s)
A.M. Prins, BA (McMaster), MA (Waterloo)
D.E. Rittenhouse, BASc (Waterloo), MEng (Carleton), PEng
R.H. Roach, BSc (Waterloo)
C.D.J. Ross, BA, MA (Wilfrid Laurier)
F.M. Fuszer, 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, BRE (Emmanuel)
J. L. Metz
B.A. Robertson, BA (Toronto)

The Co-operative Education unit of the Department is responsible for the work-term aspect of all Co-operative programs. The staff includes professional personnel who have extensive business and industrial experience.

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 on pages 53 and 54. 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.
## Work/Study Sequence

**Note:** The letters A and B denote academic terms.

### Program (By Faculty)

<table>
<thead>
<tr>
<th>Applied Health Sciences</th>
<th>1A</th>
<th>1B</th>
<th>2A</th>
<th>2B</th>
<th>3A</th>
<th>3B</th>
<th>4A</th>
<th>4B</th>
</tr>
</thead>
<tbody>
<tr>
<td>Health Studies, Kinesiology, Recreation and Leisure Studies</td>
<td>1A</td>
<td>1B</td>
<td>2A</td>
<td>2B</td>
<td>3A</td>
<td>3B</td>
<td>4A</td>
<td>4B</td>
</tr>
</tbody>
</table>

**Arts**
- **Applied Studies with Honours in: Anthropology, Classical Studies, Drama, Economics, English, Fine Arts, French, German, History, Latin, Medieval Studies, Music, Philosophy, Political Science, Psychology, Religious Studies, Russian, Slavic Studies, Social Development Studies, Sociology, Spanish. The Arts Administration, International Trade, Management Studies and Personnel Studies Specializations are available with any of these Honours majors.**

- **Applied Studies with Honours in: Anthropology, Classical Studies, Drama, Economics, English, Fine Arts, French, German, History, Latin, Medieval Studies, Music, Philosophy, Political Science, Psychology, Religious Studies, Russian, Slavic Studies, Social Development Studies, Sociology, Spanish. The Arts Administration, International Trade, Management Studies and Personnel Studies Specializations are available with any of these Honours majors.**

<table>
<thead>
<tr>
<th>1A</th>
<th>1B</th>
<th>2A</th>
<th>2B</th>
<th>3A</th>
<th>3B</th>
<th>4A</th>
<th>4B</th>
</tr>
</thead>
<tbody>
<tr>
<td>Accountancy Studies</td>
<td>1A</td>
<td>1B</td>
<td>2A</td>
<td>2B</td>
<td>3A</td>
<td>3B</td>
<td>4A</td>
</tr>
</tbody>
</table>

**Engineering**
- Chemical, Civil, Computer, Electrical, Environmental (Chemical and Civil Branches), Geomatics, Mechanical, Systems Design
- **Chemical, Civil, Computer, Electrical, Environmental (Chemical and Civil Branches), Geomatics, Mechanical, Systems Design**

<table>
<thead>
<tr>
<th>1A</th>
<th>1B</th>
<th>2A</th>
<th>2B</th>
<th>3A</th>
<th>3B</th>
<th>4A</th>
<th>4B</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chemical, Civil, Computer, Electrical, Environmental (Chemical and Civil Branches), Geomatics, Mechanical, Systems Design</td>
<td>1A</td>
<td>1B</td>
<td>2A</td>
<td>2B</td>
<td>3A</td>
<td>3B</td>
<td>4A</td>
</tr>
<tr>
<td>Environmental Studies</td>
<td>1A</td>
<td>1B</td>
<td>2A</td>
<td>2B</td>
<td>3A</td>
<td>3B</td>
<td>4A</td>
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</tbody>
</table>

**Environmental Studies**
- Architecture
- **Architecture**

<table>
<thead>
<tr>
<th>1A</th>
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<th>2B</th>
<th>3A</th>
<th>3B</th>
<th>4A</th>
<th>4B</th>
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</thead>
<tbody>
<tr>
<td>Architecture</td>
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<td>2A</td>
<td>2B</td>
<td>3A</td>
<td>3B</td>
<td>4A</td>
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</tbody>
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**Environmental Studies**
- **Architecture**

<table>
<thead>
<tr>
<th>1A</th>
<th>1B</th>
<th>2A</th>
<th>2B</th>
<th>3A</th>
<th>3B</th>
<th>4A</th>
<th>4B</th>
</tr>
</thead>
<tbody>
<tr>
<td>Architecture</td>
<td>1A</td>
<td>1B</td>
<td>2A</td>
<td>2B</td>
<td>3A</td>
<td>3B</td>
<td>4A</td>
</tr>
</tbody>
</table>

* 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 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.

**Stream 8 only**
**Stream 4 only**
**Point of admission to specialization**
**Point of selection of Chartered Accountancy or Management Accountancy Studies**
**Indicates anticipated continuation into the Master of Accounting (MAcc) portion of the five-year integrated program.**

Students admitted to Applied Studies Regular will not have a Co-op work term following 1B.

(continued on next page)
Co-operative Education and Career Services
Work/Study Sequence

Work/Study Sequence (continued)

Note:
- The letters A and B denote academic terms
- * denotes work term

Program (By Faculty)

<table>
<thead>
<tr>
<th>Mathematics</th>
<th>Steam 8</th>
<th>Stream 4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stream 8</td>
<td>1A 1B 2A 2B 3A 3B 4A 4B</td>
<td>1A 2A 3A 3B 4A 4B</td>
</tr>
<tr>
<td>Stream 4</td>
<td>1A 1B 2A 2B 3A 3B 4A 4B</td>
<td>1A 2A 3A 3B 4A 4B</td>
</tr>
</tbody>
</table>

| Accountancy | Charter Accountancy |
| Management Accountancy |
| Math Teaching Option |
| Three-Year General Stream 4 |
| Stream 8 |

| Science |
| Biology, Biochemistry, Chemistry |
| Biology, Biochemistry Stream 4 |
| Chemistry Stream 4 |
| Earth Sciences, Environmental Chemistry (Stream 8 only) |
| Environmental science - Programs 1 and 2 (Stream 8 only) |
| Physics Stream 8 |
| Stream 4 |
| Psychology Regular off term |
| Science Teaching Option |
| Science and Business Regular 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.

** Stream 8 only
†† Stream 4 only
(*) Optional work term
§ Specialization work term
△ Point of admission to specialization
▲ Point of selection of Chartered Accountancy or Management Accountancy Studies
■ Indicates anticipated continuation into the Master of Accounting (MAcc) portion of the five-year integrated program.
✓ 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.
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.

CAFCE Accreditation

The University of Waterloo is a member of the Canadian Association for Cooperative 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
1. each work situation is developed and/or approved by the co-operative educational institution as a suitable learning situation;
2. the co-operative student is engaged in productive work rather than merely observing;
3. the co-operative student receives remuneration for the work performed;
4. the co-operative student’s progress on the job is monitored by the co-operative educational institution;
5. the co-operative student’s performance on the job is supervised and evaluated by the student’s co-operative employer;
6. 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 2 1/2 weeks, to interview applicants. At the end of the period the rank-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 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.

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.
Co-operative Education and Career Services

Work Terms

Quantities

Work Terms

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 term/months equal to, or greater than, half the number of academic term/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 — refusal to honour previous agreement." 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".

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 sign off a job prior to an offer.

- 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.

Standings and Appeals
Applicable to information on pages 5:5 and 5:6. 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 page 5:6 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.

T.F Corcoran (President)
Confederation Life Group of Companies

D.B. Beldam (Vice-President)
Clarke, Henning & Beldam Ltd.

J.W. Shaddick (Secretary)
London Life Insurance Co

R. Francis (Membership Chair)
Deloitte & Touche

J.A. Howard (Assistant Membership Chair)
Ontario Hospital Association

J.M. Schneider Inc.

J. Bailey

Ontario Hospital Association

J. Bishop

Environment Protection Labs

R. Clark

Novacor Chemicals Ltd.

F. Clegg

Microsoft Canada Inc.

D.R. Cox

Northern Telecom Limited

S.P. Crawford

The Co-operators Group Limited

S.B. Fisher

KPMG

J. Gartner

Gartner Lee Limited

A. Hanson

International Institute of Sustainable Development

K.R. Jennings

Cyanamid Canada

R. LaFleur

Health & Welfare Canada

F.N. MacLachlan

3M Canada
Students 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 Advisors
M. Bryan, BA (Waterloo)
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, resume 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 resume 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

Part-time, Summer Jobs (NH 1115, ext 4047): advertised throughout the year, in the Career Resource Centre.
Graduating Students (NH 1115, 888-4047): 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 (NH 1115, 888-4047): 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.
Organizations Employing Co-operative Students

The following is a list of employers who participated in Waterloo's Co-operative programs in 1994. The list does not acknowledge the individual departments within some of the participating organizations.

A & A Group of Companies
A & L Computer Software Ltd.
A & W Restaurants
A – D Structural Engineering Ltd.
Aastra Aerospace Inc.
Aball Software Inc.
ABC Data and Telecom Ltd.
ABC Plastic Moulding
Abell Computers Ltd.
Abererki Computer Assoc.
Abex Friction Production
Abilize Price Inc.
ABL Canada Ltd.
Able One Computers Inc.
Abso Engineering Systems
Urs. Abraham & Saunders
Acadia University
Accelerated Data
Access Capital Corp.
Accident Injury Management Clinic.
Acomo Canadian Co. Ltd.
ACIS
ACKWA
Acer Consultants Ltd.
ACLO Compounds Inc.
Acorn Packaging Inc.
Acros International Ltd.
ACSE Inc.
Actel Resources Inc.
Action Student Window Cleaners
Activation Laboratories
Acmedica Canada Inc.
Shary Adams Architect
Adams Brands
Adamson Assoc.
Adaptive Networks Ltd.
Adcom Electronics
Addiction Research Foundation
The Adelaide Club
ADGA Ltd.
ADM Agri Industries
ADP
ADS Associés Ltd.
ADT Co-Operation Centre
Advanced Monobloc
Adventure Village
Advanced Scientific Computing Ltd.
Advanced Technological Services Inc.
Aeometric Corp.
Aegean Architects (Hong Kong) Ltd.
Aepos Technologies Corp.
Aerotec Engineering Services
Aetna Canada
AFLAC Insurance Co.
Agence Buff (France)
AGF Management Ltd.
Agora Telecom
AGRA Earth & Environmental Engineering
Ainey & Assoc.
Ainsworth Technologies
Airbus of American Corp.
Aisso Systems Inc.
Akie Melotak & Frimot
Alacrity Inc.
Leo Alarie & Sons Ltd.
Albany International Canada
Alberta Ballet
Alberta Energy Co. Ltd.
Alberta Theatre Projects
Alberto Culvar
Alcan International Ltd.
Alcatel Canada Inc.
Alexander Consulting Group
Algoquin Industries International Inc.
Algoquin Space Campus
AlgoTRICS Inc.
Agra Plastics Inc.
Atlas Research Inc.
All Services Accredited Professionals Inc.
Howard A. Allan
Allied Biopharmaceuticals
Allen & Allen
Allen & Sherriff
Allen Personnel Services
Allen-Bradley Canada Ltd.
Allendale
Alied Signal Aerospace Canada
Allis Mineral Systems
Allstate Insurance Co. of Canada
Alphair Ventilation Systems
Altera Systems Corp.
Alternative Primary School
Altius Design Group
Alydar Software Corp.
Amcan Castings Ltd.
Amdahl Ltd.
American Express Canada Inc.
American President Line
American Sensors
American Standard
American Security Services Inc.
AMT Partners Inc.
AMP of Canada Ltd.
Amphol Rex Canada Corp.
AMS Management Systems Canada
Analyticals International Group
Anas Smith & Griffin Chartered
Accountants
Anchor Shoring Ltd.
Ancient Forest Exploration & Research
Anderon Human Resources
Andersen Consulting
Arthur Andersen & Co.
Anderson Water Systems Ltd.
Andreshak Design Group Inc.
Andyne Computing Ltd.
Angela's Craft Centre Ltd.
Angkor Construction
Angus Software International Ltd.
Angus Employment Ltd.
Anior Consulting
Annau Associates
Antares Alliance Group
Artect Equipment Corp.
Apley Opttronics Inc.
Apex Reformation Inc.
Apogee Research
Apotex Inc.
Apple Canada Inc.
Applegrove Community Centre
Appledore Heights Secondary School
Applied AI Systems Inc.
Applied Industrial Flow Systems Ltd.
Apriel Inc.
Ken Apri Associates
Aquator Engineering Ltd.
Aquanux Coatings Inc.
Aquartech Water Management Services
Inc.
Arbor International
Arc Aviation Research Corp.
Archibald, Gray & McKay Ltd.
Archives of Ontario
Argor Corp.
Ariandise Productions
Anet Nemantics Inc.
Arkon Technologies Inc.
Armstrong Shwowskyy Kluyman
Armitage
Architecture
Anisorcraft Corp.
Aixov Electronics Inc.
Artech Digital Entertainments
Artek Contracting Ltd.
Arthur District High School
Arthur Mieghen School
Arts Coatings Ltd.
Arts Club Theatre
Arts Marketing Services Inc.
Asarco Explorations Co.
ASC Ltd.
Ascent Ltd.
Asena Brown Bovier Inc.
Aseco Integrated Systems Ltd.
ASG Inc.
Ashwarren Engineering Services
ASL Distribution
Asian Technologies Ltd. (Japan)
Aspen Technology Inc.
Aspentech Asia Ltd. (Hong Kong)
Associated Engineering
Associated Tube Industries Ltd.
ASW Systems Inc.
AT-8 F
A1 & I Shanghai
Athabasca University
Ati Technologies Inc.
Atkinson Tremblay & Assoc. Inc.
Atlantic Italian Bakery
Atlantic Aerospace
Atlantic Scientific Systems Group Ltd.
Atlas Rock Co. Ltd
Atlas Speciality Steels
Atlas Supply Co. of Canada Ltd.
Atman Computer Systems
Atomic Energy Control Board
Atomic Energy of Canada Ltd.
Attachmate
Atina Engineering Hydraulics Ltd.
AIS Helis
Audio Sonic
Aufl Foods Ltd.
Aurora Instruments Ltd.
Ausable – Bayfield
Austin Park
Austin Rehabilitation
Australian Mutual Provident Society
Australian Paper
Auto-Bake Industries Ltd.
Auto-Tron Technology Ltd.
Autodesk Inc.
Automation Engineering Associates Ltd.
Automation Specialties
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<tr>
<th>Organization Name</th>
<th>Industry/Field</th>
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<td>Bethany Long Term Centre</td>
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<td>Bick's Pickles</td>
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<td>Bio-Mega Inc</td>
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<td>Black &amp; Moffatt Architects Inc.</td>
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<td>BML Leasing Ltd.</td>
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<td>BNR Europe Ltd.</td>
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<td>Boreal Property &amp; Casualty</td>
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<td>Boy Group</td>
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<td>Canada Life Assurance Co.</td>
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<td>Canadian Construction Assoc.</td>
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<td>Canadian Consulate General (Japan)</td>
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<td>Canadian Corporate News</td>
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<td>Canadian Deaf, Blind &amp; Rubella Assoc.</td>
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<td>Canadian Depository for Securities Ltd.</td>
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<td>Canadian Hearing Society</td>
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<td>Canadian Industrial Conveyors Inc.</td>
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<td>Canadian Instrumentation and Research Ltd.</td>
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Co-operative Education and Career Services
Organizations Employing Co-operative Students

Coda Community Opportunities
Development Assoc.
Cognitive Systems Inc.
Cognos Inc.
Cold Springs Farm Ltd.
Cole Sherman & Assoc. Ltd.
Colgate Palmolive Canada Inc.
College of Family Physicians of Canada
College of Nurses of Ontario
College Pro Painters
College St. Physiotherapy Centre
Collegewood College Institute
Collins Barrow-Mueller Noiseux
Colonial Cookies
Colour Tech Finishears Inc.
Columbia Centre for Integrated Health Services
Columbia Sports Medicine Centre
Com Dev. Ltd.
Combeick Computer Design Inc.
Comcare
Concor Waste Systems Ltd.
Conradale Technologies Inc.
Comoino Ltd.
Commcorp Financial Services Inc.
Comminso's Food Terminal
Communications Technology Group
Communications Engineering Services Ltd.
Communications Security Establishment
Community Information Centre of Metro Toronto
Community Life Care Inc.
Community Rehabilitation Services
Comnetix Computer Systems Inc.
Complete Business Solutions Inc.
Computech Computer Systems Corp.
Compu-Quote Inc.
Compsense
Computer Action Inc.
Computer Assembly Systems Inc.
Computer Master
Computer Methods International Corp.
Computer Shield Group Ltd.
Computerized Portfolio Management Services Inc.
Computing Devices Canada
Computing Dynamics
Computerware Corp.
Comtest Instruments Ltd.
Con Cast Pipe
Concord Drafting Ltd.
Concord Elevator Inc.
The Conenara Group
Conestoga Bible Camp
Conestoga Sailing School
Conestoga-Rovers & Assoc.
Conex Freight Forwarding
Conklin Shows
Connaught Laboratories Inc.
Connect Tech Inc.
Connelly, Koshy, & Frouin Chartered Accountants
Consolidated Canadian Contractors Inc.
Contractors Gas Co. Ltd.
Contact Human Resources Group
Contact Personnel Group
Continental Insurance Management
Contour Management
Contrad Technology (Canada) Inc.
Convectair - NMT Inc.
Cook Millwriting Inc.
Cookson Walker
Cooper Industries
Cooper Molyneux & Markuz
Coopers & Lybrand
Copywell Corp.
Core Literacy
Corel Corp.
Coretek Inc.
Cormack Animal Clinic
Corman Technologies Inc.
Corwall Warehousing Ltd.
Corwall's Energy Efficiency Team
Corporate Communications Inc.
Corporate Consultants
Corporate Foods Ltd.
Corrigan Manufacturing
Corrosion Intervention
Cosburn Patterson Wardman Ltd.
Cosyn Technology
Cott Beverages
The Cottage Rental Magazine
Coullier Electronics of Canada Ltd.
Council of Ontario Construction Associations
County of Grey
County of Hastings
County of Huron
County of Lambton
County of Peterborough
County of Renfrew
County of Simcoe
Courtece Steel Ltd.
Courtland Video & Variety
Covertech Fabricating Inc.
Cox & Mellit Co.
Coyote Software Corp.
CPRI
CR Assoc.
Crane Canada Inc.
John Crane Canada Ltd.
Crawford & Co.
Crawford Smith & Swallow
Creative Personnel Inc.
Credit Valley Hospital
Crestwood Valley Day Camp
Crockford & Duffy Barriers & Solicitors
Cron Geophysics & Exploration Ltd.
Crosskey Systems Corp.
Crown Cork & Seal Canada Inc.
Crown Pioneer
Crown Life Insurance Co.
Crowntek Business Centre
Crystal Services
CSA Research Ltd.
CSC Inc.
CTA Systemsresource Corp.
CTMG Canadian Technology Marketing Group
Cumis Life Insurance Co.
G.G. Cunningham & Associates
Custom Cheques of Canada
Custom Pharmaceuticals Ltd.
Custom Plastics International
Cutler-Hammer Eaton Yale Ltd.
Cyamand Canada Inc.
Cybersystems inc.
Cyberworld Inc.
The Cyclepath
Cygnus Computer Assoc. Ltd.
Cytron Industries
Cypress Semiconductor
D & E Artelco Co. Ltd.
D.P. IV Hire Inc.
D’Angela Sorrenti Collins Barrow
D-Link Canada Inc.
DAC Easy Canada Ltd.
DACO Laboratories Ltd.
Dacon Corp. Ltd.
Daedalian Systems Group
Dawood Engineering Co.
Daily Transportation
Dako Services Inc.
Dalsa Inc.
Dalton Chemical Laboratories Inc.
Dames and Moore Canada Ltd.
Danik Industries Ltd.
Danny Grossman Dance Co.
Danec Systems
Darren Marinfeld Carr & Co. CA
Data Business Forms
Data Perceptions
Datamek Technologies
Davenport Medical Clinic
John G. Davies Architect Inc.
Davis & Henderson Interchange
Dawn Wan & Co.
Dawson Gray
DBA Engineering Ltd.
DBM Systems Inc.
DDM Plastics
De Blais & Assoc.
De Gaspe Publishing Inc.
De Havilland
Deacon Barclays De Zoete Wedd Ltd.
Definitive Systems Consultants Inc.
Del Wilber & Assoc.
Delta Corp.
Delhi Industries Inc.
Delight Food Industries Inc.
Dell Computer Corp.
Delotte & Touche
Deloro Stellite
Delphax Systems
Delina (Canada) Corp.
Delta Centre for Learning Technologies
Frank Dempsey & Sons
Dennis Morris High School
Dentofacial Software Inc.
Depco International Inc.
Descartes Systems Group Inc.
Design Vision
Desview Concepts Ltd.
Deutsch Bank Canada
Devon Institute of Technology
New Engineering & Development Ltd.
Dextran Products
DI/OCS Assoc. Inc.
Dickenson Mines Ltd.
Diemaster
Dietrich Office Equipment
Digital Equipment of Canada Ltd.
Digital Processing Systems Inc.
Digital Security Controls Ltd.
Digitcm Canada Inc.
Dimension Laboratories
Dinamation International Corp.
Dipex Technologies Inc.
Discount Car & Truck Rentals Ltd.
Discreet Logic Inc.
The Disney Store (Canada) Ltd.
District Municipality of Muskoka
District of Lunenberg
Ditek International
Diversco Scuba Inc.
Diversey Inc.
Diverscare Corp.
Dixon Gordon & Co.
DMO Industries
DMR Group Inc.
DMS Market Services
Doane Raymond Pannell
Dolakco
Dogbite
Dolce International (Ont.) Inc.
Dolphin Developments
Dolphins Cruise Lines
Dominion Colour Corp.
Dominion Controls Co.
Dominion of Canada General Insurance Co.
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Dowell Construction Co.
Donwell Institute
Doon Heritage Crossroads
Domtec Industries
Doug Delight
Down Canada
Down Jones/Telerec
Downtown Orillia Management Board
Down Aerospace
Down Sicotab
Doyle Prior Personnel Ltd.
Dr. Norman Bethune Collegiate Institute
Drake International
Drew Chemical Co. Ltd.
Drew Heleman-Coburn Chartered Accountants
Duffern Assoc. for Community Living
Duffern Construction Co.
Duhaime Agribusiness Consulting
Dunbarton High School
Dunlip Personnel of London
Dunlop Farrow Inc.
Al Dunn Heating
Dund Spinco Inc.
Dura Building Systems
Duracell Inc.
Durham Board of Education
Durham College of Applied Arts & Technology
Duward Jones Barkwell & Co.
Gerald Duthie & Co.
DY-4 Systems Inc.
Dylex Ltd
Dynacare Laboratories
Dynamic & Proto Circuits
Dynamic Fund Management
Dynamico Canada Corp.
Dynapro Systems Inc.
Dynake Automation Systems Inc.
Eagle Electronics Devices Ltd.
Eagle Precision Technologies
East Hill Esso
East York Board of Education
Easter Seal Society
Eastern Overhead Doors Ltd.
Eastwood Collegiate Institute
Eaton Corp.
Eaton Yale Ltd.
Eaton's
EBM Industries Inc.
Evans Rent-a-Car
ECF Group Ltd.
Eco-Logic Ltd.
Ecological Services for Planning Ltd.
Economic Developers Council of Ontario
Economic Research Assc. Ltd.
Economical Mutual Insurance Co.
Ecotec Planners & Advisors
ECS Canada
ECS Construction
EDA Instruments Inc.
E.B. Eddy Forest Products Ltd.
J. Edgar & Assoc.
Edge
Edgecomb Group Inc.
Edmonds Environmental Services
Edmonton Fringe Theatre Event
Edmund Caglia & Co.
Edmund Shoe Goods
EDS of Canada Ltd.
Education Relations Commission
EFD Computer Solutions
Effem Foods Ltd.
Eggert Tax Services
Ehren Engineering
Electrohome Ltd.
Elf Autochem
Elili Eco Logic
El Lilly Canada Inc.
Craig E. Elliott Architect
Elliott & Page Ltd.
Elmriest Resort
Elmira Foundry Inc.
Elmwood Centre for Environmental Excellence
Ecobay Bailey Inc.
Emberson
Emerson Electric Canada Inc.
John Emery Gentechnical Engineering Ltd.
Enshat Engineering
Empire Buildings Inc.
Empire Life Insurance Co.
Empix Imaging Inc.
EM Powering Technologies Inc.
Energy Pathways Inc.
Environmcal Engineering Ltd.
Engel Canada Inc.
Engines Systems Ltd.
Engineering Interface Ltd.
England Naylor Engineering Ltd.
Englehart & District Hospital
John English MP Campaign
English in the Working Environment
Enhanced Design
Ensys Technologies
Enterprise Planning Systems Inc.
Enterprise Solutions Ltd.
Envirocure
Environ Corp.
Environmental Permit Co.
EPAC
EPG Construction
EPS Software Consultants Ltd.
Epicon Industries Inc.
Equis Inc.
Equitable Life Insurance Co. of Canada
Ergolab Canada Inc.
Ericson Communications Inc.
Ernst District High School
Ernst & Young
The ESAB Group Canada Inc.
ESAC (Electrical Systems Advanced Control)
Exeland Environmental Technologies
ESRI Canada Ltd.
Essex Region Conservation Authority
Esso Canada
Esso Research Ltd.
ETAC Sales Ltd.
Etarco
Ethiopian Airlines Co.
Etobicoke Board of Education
Etobicoke Collegiate Institute
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Evans Martin CA
Everest & Jennings Canada Ltd.
Everest Management Network Inc.
Evergreen Forestry Services
Evergreen Foundation
Everyware Development Corp.
Exemplar Systems Corp.
Exocom Group of Companies
Expertexf Systems Inc.
Export Development Corp.
Ezer & Assoc. Inc.
F. & P. Manufacturing Inc.
Fabricated Steel Products
Fagge
FAG Bearings Ltd.
Falconbridge Ltd.
Family Service Association
Fantasia & Co. Chartered Accountants
Farm Bay
Farm Business Consultants
Fasco Motors Ltd.
Fast Data Computer Systems Ltd
Fastec Technologies Inc.
Faulkner Dressarts Ltd.
Fawett Tractor Supply
Farsource
FBI Distillery Co. Ltd
FDI - Brown Inc.
FIS/Canada Computer Solutions Inc.
Freeman T. Freshock
Federal Industries
Federal University of Technology, Nigeria
Walter Foye Partnership
Ferguson Simek Clark Engineers & Architects
Fennar Paving Ltd.
Fiberglas
Fillet of Sole Restaurant
Financial Models Co.
Finch-West Treatment & Rehabilitation Centre
Finders Research Corp.
Finkenstein Bossin
Firestone Textiles
First Brands (Canada) Corp.
First Marathon Securities Ltd.
First Professional Management Inc.
First Wave Technology Inc.
Fischer & Porter (Canada) Ltd.
Frederick Fisher Architect
J.C. Fisher Assoc. Ltd.
Fisher Gauge Ltd.
Fisher Left & Assoc.
Fitzhenry & Whiteside
J & D Flanagan Sales & Distribution Ltd.
Fleetwood Metal Industries
Fleming Systems
Fisco International Corp. (Philippines)
FLS Research Inc.
Focus Automation Systems
Focus Technologies
FOHA Corp.
Foley Broderick
Footprint Software Inc.
Ford Electronics Manufacturing Corp.
Ford Motor Co. of Canada Ltd.
Formglas Interiors Inc.
Forming Technologies Inc.
Fort Hays State University
Foster Wheeler Ltd.
Foundation for Educational Exchange
Boxet Canada & the USA
Frames Plus Inc.
W.A. Frank CA
Frank Oke Secondary School
Co-operative Education and Career Services
Organizations Employing Co-operative Students

Gettysburg College Computing Services
Geosoft
Giffels Assoc. Ltd.
Gilbey Canada Inc.
Georgia Institute of Technology
General Electric Canada Inc.
Gencorp. Automotive
Gates Canada Inc.
Gastops Ltd.
Gallium Software Inc.
Gakushukan Ltd. Language School
Georgia Pacific Corp.
The Future Shop
Gainbery Computer Product Inc.
Geranium Homes
Geovision Systems Inc.
Georgetown District High School
General Utilities
Geon Co. (Ohio)
Gannex
Gencorp Automotive
General Accident Indemnity Co.
General Chemical Canada Ltd.
General Electric Canada Inc.
General Motors of Canada Ltd.
General Security (HK) Ltd. (Hong Kong)
The Gateway Group
Galleria Furniture Ltd.
Ganex Ltd.
Gates Canada Inc.
The Gateway Group
Gauviller & Co. CA
GB Arquitectos (Portugal)
G. B. Forsyth Inc.
Gates Canada Inc.
The Games Exchange
Gananoque Steel Forging Inc.
Garrison Canadian
Garbutt Pam
Garland Commercial Rangees Ltd.
Gastops Ltd.
Gates Canada Inc.
The Gateway Group
Gauviller & Co. CA
GB Arquitectos (Portugal)
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Garrison Canadian
Garbutt Pam
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Gastops Ltd.
Gates Canada Inc.
Co-operative Education and Career Services
Organizations Employing Co-operative Students

Heritage Halton Hills
H.B. Block
H.M.T. Sales Tax Consultant
H.T.S. Engineering Ltd.
Habash & Lam Architects
Habitat for Humanity Canada
M. Hagohm Holdings Ltd.
Haley Griffen Corp.
Halton-Norfolk Information Centre
Haliburton Kawaartha & Pine Ridge District Health Council
Halifax Insurance Co.
Halifax Climate Control Canada Inc.
Halifax Associates Ltd.
Halton Board of Education
Halton District Health Council
Hamilton Board of Education
Hamilton Executive Consultants
Hamilton Harbour Commissioners
Hamilton Philharmonic Orchestra
Hamilton Psychiatric Hospital
Hamilton Region Conservation Authority
Hamilton Wentworth Regional Police
Hamilton Wentworth Star
Hamilton Wentworth Work Injuries Rehabilitation Clinic
Hammond Manufacturing Co. Ltd.
Hanover & District Hospital
Harbourfront Centre
Harcourt Brace Canada
Hardy Holzman Pfeiffer Associates
Harlequin Enterprises Ltd.
Harris & Partners
Harris Computer Systems
Harris Media Systems Ltd.
John J. Hartness Architect
Donald Hart & Assoc.
G. Hart & Sons Well Drilling Ltd.
Hatch Assoc.
Hay Management Consultants
Hayes Dana Inc.
Hayes Microcomputer Products Inc.
Hayes Smith & Assoc. Inc.
Hayward, Fretz, Power & Assoc.
Hayward Gordon Ltd.
Hazarra Corp. (Japan)
Health Recovery Clinic
Health Temp Personnel Placement Agency
Healthcare Benefit Trust
Healthcor Inc.
Healthware Technologies Inc.
Heart and Stroke Foundation of Ontario
Heart Health
Heathrow Airport Ltd.
David Heenbrock
Heidt Products Ltd.
Victor J. Heinrichs Architect
H. J. Heinz Co. of Canada
Hematite Manufacturing
Hemlo Gold Mines Inc.
Henderson General Hospital
Hendrickson Canada Ltd.
Henchel Canada Ltd.
Henry of Pelham Vineyards
Hercules Canada Ltd.
Heritage Green Nursing Home
Heritage Halton Hills
Heron Cable Industries Ltd.
Heuer Ltd.
The Hermann Group Ltd.
Hertz Canada
Hewitt Assoc.
Hewlett-Packard (Canada) Ltd.
Hillco Systems
Hidden Valley Resort
High Make Electronic Ltd.
High Point Canada
Highland Road Medical Centre
Hillborn Ellis Grant & Co.
Pam Hill Assoc.
C.M. Hincks Treatment Centre
Hiram Walker & Sons Ltd.
Hobb, Bakker, Bergen
Hockey Valley Resort
Hoffman Laroche
Walter Hofman GmbH (Germany)
Hogg Fuel & Supply
Hogg Shan & Scheuck
Hoblerbank Consulting Ltd.
Holland Equipment Ltd.
John Hollifield Architect
Holland Hitch of Canada Ltd.
Hokopane Canada Inc.
The Holstein Assoc. of Canada
Holt Renfrew Ltd.
Holy Cross C. H. S.
Home Oil Co. Ltd.
Homefit Exercise Equipment
Homer Watson House & Gallery
Homewood Health Centre Inc.
Honda of Canada Inc.
Honeynell Ltd.
Hong Kong Electric Co. Ltd.
Hong Kong Stock Exchange Ltd.
Horizon Executive Search
Home & Co.
Horseshoe Valley Resort
Horton CBI Ltd.
Hospital for Sick Children
The Hospital Medical Records Institute
Hospitality Group of Canada Ltd.
Hospitals of Ontario Pension Plan
Hostess Frito-Lay
Household Financial Corp. Ltd.
C. D. Howe Central Ltd.
Howden Fan Co.
Howe Sound Pulp & Paper
Hsin Chong Real Estate Management Co. Ltd.
(Hong Kong)
HTM Global Corp.
Hub Engineering & Development Co. Inc.
Hudson Bay Mining & Smelting Co. Ltd.
Hudson's Bay Co.
Hugh MacMillan Rehabilitation Centre
Hughes Litz Optical Technologies Ltd.
Hughes Rapp Collins
Husl Canada Inc.
Humbold Norfok Information Centre
Hybrid Turkeys Inc.
Hyde Houghton
Hydro Mississauga
Hydromantis Inc.
Hygenius Inc.
Hymarc Ltd.
Hyprotech Ltd.
Hyundai (Korea)
Hyundae Auto Canada Ltd.
Hyundai Stone Development Co. Ltd.
(Korea)
IBI Group
IBM Canada Ltd.
ICI Controls
ICI Forest Products
ICI Superior Explosives
ICM Krebsorge Canada Ltd.
ICS Consultants
Iedewild Manor
IE Engineering
IECL
Iko Industries Ltd.
Image Impression Inc.
Image Integration Inc.
Image Systems Solutions Inc.
Imaging Research Inc.
Imaps Inc.
Imara Research Corp.
Imasco Ltd.
Imax Corp.
InMadd Broadcast Services
Imapq Office Technologies
Imperial College of Canada
Imperial Flavours
Imperial Life Assurance Co.
Imperial Oil Ltd.
Imperial Tobacco Ltd.
Impulse Computer Corp.
In-House Solutions Inc.
Ina Bearings Co. Ltd.
Inago
Incapac Pacific Ltd., Hong Kong
Inco Ltd.
Incom Ltd.
Indalex
Independent Order of Foresters
Indus Systems
Industrial Research & Development Institute
Info 2000 Inc.
Info-Electronics Systems Inc.
Info Design Corp.
Informatics Search Group
Infrastructures for Information Inc.
Ingersoll-Rand Canada Inc.
Inglis Ltd.
Ingraham Micro Inc.
InM-International Neural Machines Inc.
Innotech Multimedia Corp.
Innovative Computer Training Inc.
Innovative Steam Technologies
Innoware Technology Inc.
Insight Business Consultants
Insight Logistics Ltd.
Insignia House
Instantel
Institen Corp.
Institut National D'Optique
Institute for Space and Terrestrial Science
Institute of Spiritual Studies
Insurance Bureau of Canada
Insurance Systems
Intech Resource Group Inc.
Integra Capital
Integra Foundation
Integra Personnel Inc.
Integrated Systems Engineering
Intelscan Technologies Inc.
Intellware Development Inc.
Interna Information Technologies
Interactive Image Technologies Inc.
Interfacing Technologies Corp.
Intergen Biomanufacturing Corp.
Intergraph Canada Ltd.
Interlogic Systems Inc.
International Career Specialists Inc.
International Investment Properties
International Telefilm
Interplan Architecture & Planning
Interprovincial Pipe Line Inc.
Intersolv Canada Inc.
Intranet Developments Corp.
Inverpower Controls
Investment Challenge Inc.
Investment Planning Counsel of Canada
Investors' Bank & Trust Co.
Investors' Group Financial Services Inc.
Investors' Bank & Trust Co.
Investors' Group Financial Services Inc.
Investors' Bank & Trust Co.
Investors' Group Financial Services Inc.
Investors' Group Financial Services Inc.
Investors' Group Financial Services Inc.
Investors' Group Financial Services Inc.
Intracan Developments Corp.
IT Net
ITN Ltd.
ITT A-C Pumps Canada
ITT Automotive
ITT Commercial Finance
ITW Plastiglids
ITX Technologies Inc.
J & J Contracting Ltd.
J & J Display Sales
J.B. Control
Jacob Hespeler Secondary School
Jacques Whittord Ltd.
Jade Simulations
Jagger Hims Ltd. Consulting Engineers
The James Hawker Group Inc.
Jamestown Controls
Janka Systems Inc.
Michael Janzti Research Assoc.
Japan Adventures in Teaching Nova Group Inc.
Jascula, Terman & Assoc.
J M Consulting
JBA Software (Canada) Ltd.
JDS Filet Inc.
Jet-Tech
Jet-Form Corp.
JLL Broadcast Group
JMF Engineering Inc.
JM Consulting
Jockey Confecciones, Venezuela
John Deere Ltd.
John Fraser Secondary School
John's Garden Centre
Johnston & Mathiessen Ltd.
Johnson Controls Ltd.
Phillip Johnson Architects (USA)
R.W. Johnson Pharmaceutical Research Institute
David Johnston Architects Inc.
Richard Jones Planning Consultants
Jorden & Cook Architects
Jostens Canada Ltd.
Journey's End Corp.
JSO Consulting
JTD Engineering
JTS Computer Systems Ltd.
Juch-Tech Inc.
Paul Jurecka Architect
K.T.M. Locks
K Mart Canada Ltd.
Kadlac Products Inc.
Kalman Technologies Inc.
Kambria Controls Ltd.
Karp Namataniak Yamamoto Architects Inc.
Kasian Kennedy Architects
The Karolinska Institute (Sweden)
Kasten Chase Applied Research
KCM Management Consultants Ltd.
Keatsway Public School
Keeler's Society
Kellogg Canada Inc.
Kelly Temporary Services
Kemp Elliot & Blair CA
Kemptville College of Agriculture
Kenhar Products Inc.
Kentner Kelly & Wilson
Kerr Vayne Systems Ltd.
Kerr Wood Leidhal Associates Ltd.
Kerry Ingredients
Kershaw Traver Gillespie
Kettle Creek Conservation Authority
Keytech Water Management
KG Packaging
Khafa Engineering Consultants
Kharasanee & Phipps
Kids Creek Mines
The Kidspace Foundation of Canada
Peter Kiewit Sons Co. Ltd.
Kimberly-Clark Canada Inc.
Kim Mills Dunlop
Kindersmilak international
Kindred Industries
Kinetics Technology Inc.
King Waij Repair Auto Service (Hong Kong)
King-Dufferin Treatment & Rehabilitation Centre
Kingston Area Economic Development Commission
Kingston Regional Cancer Centre
Kingwood Life Sciences Ltd.
Kirk's Copes
Kirin Brewery Co. Ltd. (Tokyo)
Kitchener Cateners
Kitchener Transit
Kitchener-Waterloo Collegiate Institute
Kitchener-Waterloo English School
Kitchener-Waterloo Gymnastics Club
Kilkimoot Board of Education
Kitimat Systems Inc.
Kl. Group Inc.
Klintents Inc.
Klockner Packaging Machinery
Klonidike National Historic Sites
KMK Consultants Ltd.
L. George Knelider Architect
K. C. Knox Distributors Inc.
Knoo & Assoc.
Knox Insurance Brokers Ltd.
Kolmar of Canada Ltd.
Kolvoox Communications Inc.
Komex International
Kostuch Engineering
KPMG Peat Marwick Thorne
Kraft General Foods Canada
Kresin Engineering & Planning Ltd.
Kruger Manufacturing Ltd.
KTS Kanata Teleconferencing Systems Ltd.
Kub Coatings
Kubota Corp. (Japan)
Kathleen Kurth Architect
Kuwakura Payam McKenna Blumberg
Stanley Kwan & Co. Chartered
Legislators' Bank of Canada
L.H. Consultants Inc.
L.N.S. Systems
L'Arche Daybreak
L'Essor Elementary School
La Garderie des Luftins
Labeck Brewing Co. Ltd.
Laborie Medical Technologies Corp.
Lambton County Board of Education
Lambton District Health Council
Lambton Health Unit
Lamiko Tool & Mould Inc.
Lancaster Financial
Land Between the Lakes, TVA (Kentucky)
Lannick Group
Larcan Communications Equipment Inc.
Laurentian University
Laurier Life
Laval University
Lawrence Computers Inc.
Lawrence Curfew Physiotherapy
Lawson Research Institute
Le Chateau Anne Trading Co. (Hong Kong)
Leach, Bradbury CA
Lea Seating Canada Ltd.
Learnex Ltd.
Ledco Ltd.
The Learning Centre
The Learning Edge
Brian Lee, Architect
Leeds-Grenville County Board of Education
Legacy Storage Systems Inc.
Lohman & Assoc.
Lettinh Technology Inc.
Lemex & Assoc. Ltd.
Co-operative Education and Career Services
Organizations Employing Co-operative Students

Miramichi Pulp & Paper Inc.
Microtech Inc.
MIS Consultants
Missabey School
Mississauga Private School
Mister Leonard Inc.
Mitchell District High School
Mitchell Golf Club
Mitel Corp.
Mitsubishi Electric Corp. (Japan)
Mitsubishi Kazai Corp. (Japan)
Mitsubishi Research Institute (Japan)
Mizgala & Cis. CA
MJP Communications
MJR & Assoc.
Mobil Oil Canada Ltd.
Mobile Computing Corp.
Modern Ornamental Iron Works Ltd.
Modlar Vision Systems Inc. MVS
Mohawk College of Applied Arts & Technology
Moir and Associates Ltd.
Moir Management Systems Inc.
Mold Masters Ltd.
Molly Maid Canada Inc.
Molson's Breweries Of Canada Ltd.
Monenco Agre Inc.
Monosanto Inc.
Monteith Zelinka Ltd.
Montgomery Siirim Architects
Montgomery Thomason & Assoc.
Montreal Trust Co.
Moore Business Forms
Moripan Stanley Canada Ltd.
Morphometrix
G. F. Morison Consulting Inc.
Morrison Lamoth
Morrice Kern Systems Inc.
Morton International Ltd.
Mosaic Inc.
Moscow Power Engineering Institute
Motor Speciality Mfrs.
Motorola Canada Ltd.
Motorola Semiconductors (Hong Kong) Ltd.
Mount Saint Vincent University
Mount Sinai Hospital
Mountview Hospital
Mountainview Optical
MPT Teltech Ltd.
MTC Animal Health
MTC-MultiMark Inc.
MTD Products Ltd.
Mu Sigma Engineering Consultants Ltd.
Mullen Fluid Power Ltd.
Multilife Care Systems Inc.
Multimatic Manufacturing
Multiple Sclerosis Society
Multiservices
Muma Manufacturing Inc.
Municipality of Langley, B.C.
Municipality of Metropolitan Toronto
Dr. Munro Chiropractic Clinic
Murray & Murray Assoc.
Murray Canada Inc.
Muse Research Inc.
Muskoka Board of Education
Muskoka Festival
Musselin's
The Mutual Group
MVS Restorations
Myrus Design Inc.
Mytec Technologies Inc.
M3I Systems Inc.
Nabisco Brands Ltd.
Nacan Products Ltd.
Naedebeach & Redelev (Germany)
Nalco Canada Inc.
Nambikwai Foundation (India)
Namosy Inc.
Nanometrics Inc.
Narco Scientific Ltd.
National Ballet of Canada
National Capital Commission
National Executive
National Gallery of Canada
National Grocers Co. Ltd.
National Research Council
National Silicates Ltd.
National Steel Forge Co. Ltd.
National Trust
National-Standard Co. of Canada
Nationalview Public School
National Resource Management Institute (Sweden)
Naval Engineering Test Establishment
Navicon Inc.
Navistar International Corp. Canada
Navtech Systems Support
NBS Southern Inc.
NCR Canada Ltd.
Nee-giner Inc.
Neilson Cadbury
Nels Consulting
Nelson Canada
Neptec Design Group Ltd.
Nestlel Thomson Inc.
Nestle Canada Inc.
Netron Inc.
Network Design & Analysis Corp.
Network Xcellence
New Automation Inc.
New York Life Insurance Co.
New York Medical College
Newbridge Communication Network Corp.
Newchift International Inc.
Newcount Financial
Newfoundland Processing Ltd.
Newman Sversky & Co.
Newmatic Tooling & Machine
Newport Canada
Nexgen Software Inc.
Nextech
Niagara Christian College
Niagara Falls Chiropractic Clinic
Niagara Region Development Corp.
Niagara Regional Police Service
Nicolacci Bros. Inc.
Nicolucci International
Niemeg Schmidt Inc.
Nicoleti Canada Inc.
Nordal International Inc.
Norton Controls Ltd.
Northern Electric Canada Inc.
North American Life Assurance Co
North American Trust
North Bondary School
North Leeds Secondary School
North York Board of Education
North York General Hospital
North York Police
Northwestern Ontario Regional Cancer Centre
Northern Digital Inc.
Northern Lights School of Dance
Northern Ontario Teleconference Network Inc.
Northern Reflections
Northern Telecom Ltd.
Northern Telecom Texas
Northern Telephone Ltd.
Northstar Financial Services LLC
Northwest Territories Power Corp.
Northwood Pulp & Timber Ltd.
Norval Outdoor School
Notable
Nova Scotia Teachers' College
Novocor Chemicals Ltd.
Novasoft Information Technology
Novell Canada Ltd.
Novopharm Ltd.
NTN Bearing Corp. of Canada Ltd.
Nu-Pharm Inc.
Numelux Ltd.
Nyman Brothers Ltd.
O.I. Personnel Services Ltd.
O'Connor Assoc.
Oakville Chamber of Commerce
Oasis Technology Ltd.
Object Technology Int'l. Inc.
Objectarts Inc.
Objecttime Ltd.
Obvious Systems Inc.
Occupational Health Clinic for Ontario Workers
Odyssey Theatre
OISE
OJI Paper Co. Ltd. (Japan)
Okanagan University College
Oleson Woodland Architects
Olympia & York Developments Ltd.
OMMRI
Omphalos Recovery Systems Inc.
Ormon Dualtech
On-Site
ON/Q Corp.
Ontario Agriculture Museum
Ontario Blue Cross
Ontario Cancer Foundation
Ontario Cancer Institute
Ontario Clean Water Agency
Ontario College Application Service
Ontario Development Corp.
Ontario College of Art
Ontario Development Corp.
Ontario Drive & Gear Ltd.
Ontario Environment Network
Ontario Forest Research Institute
Ontario Gymnastic Federation
Ontario Healthcare Assoc. Inc.
Ontario Hydro
Ontario Information & Privacy Commissioner
Ontario Library and Information Commission
Ontario Laser and Lightwave Research Centre
Ontario Ministry of Agriculture & Food
Ontario Ministry of Citizenship
Ontario Ministry of Community & Social Services
Ontario Ministry of Health and Long Term Care
Ontario Ministry of Health Care
Ontario Ministry of Health Services
Ontario Ministry of Health & Long Term Care
Ontario Ministry of Indian and Northern Affairs
Ontario Ministry of Social Housing
Ontario Municipal Affairs
Ontario Municipal Board of Health
Ontario Municipal Board Secretariat
Ontario Municipal Board of Education
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<td>Owens Coming</td>
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<td>Pan Abrasives Inc.</td>
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<td>Paradigm Electronics Inc.</td>
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<td>Ontario Ministry of Consumer &amp; Commercial Relations</td>
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<td>Ontario Ministry of Correctional Services</td>
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<td>Ontario Ministry of Culture, Tourism &amp; Recreation</td>
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<td>Ontario Ministry of Northern Development &amp; Mines</td>
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<td>Ontario Teachers' Pension Plan Board</td>
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<td>Ontario Women's Directorate</td>
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<td>Onset Corp.</td>
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<td>Opera Actor</td>
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<td>Opera Lyra Ottawa</td>
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<td>Optikon Corp.</td>
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<td>Oracle Corp. Canada Inc.</td>
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<td>Orchid Automation Group Inc.</td>
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<td>Orakelain &amp; Partners</td>
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<td>Original Confection Ltd.</td>
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<td>Oshawa General Hospital</td>
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<td>Ostec Communications Inc.</td>
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<td>Ontario's Canada Relay Walk Foundation</td>
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<td>Ottawa Fibre Industries Ltd.</td>
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<td>Owens Coming</td>
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<td>Page &amp; Steele</td>
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<td>Page Systems</td>
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<td>Parker Consultants</td>
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<td>Parker Hannifin (Canada) Inc.</td>
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University of Manitoba
University of Notre Dame
University of Ottawa
University of Paderborn (Germany)
University of Toronto
University of Victoria
University of Waterloo
University of Western Ontario
The Upjohn Company of Canada
Upper Canada College
Urban Development Institute
Urbanysystems Ltd.
Valiant Printing Ltd.
Van Lane Communications
Vancouver Symphony Orchestra
Vanderpol’s Egg Ltd.
Variety Village
Varley Marketing
Vas-Cath Inc.
Velico Co Canada Inc.
Vent Stamping Corp.
C.A. Ventin Architect Ltd.
Ventra Group Inc.
Versus Technologies Inc.
Vista Rail Canada Inc.
Vickery & Vickery Chartered Accountants
Victoria Hospital Corp.
Victoria Westmount Medical
Victrust Order of Nurses
Viewlogic
Village of Drayton
Vincento Reggimenti (Italy)
VisionVision Corp.
Virtual Prototypes Inc.
Visa Seminar International Group
Visible Decisions Inc.
Visible Genetics Eye Research Institute of Canada
Visio Softare (USA)
Viskase Canada Inc.
Vital Signs
VMI Communication & Learning
Vodden Bender & Seebach Chartered
Accountants
Volkswagen Canada
Von Gerkan Marg & Partner (Germany)
Vytabase Inc.
W.E.T. Automotive & Electronic Systems
W.M.K.Y. Ltd.
Wainbee Ltd.
Wainman & Kydd
Walbar Canada Inc.
Walker Exhausts
Walker Industries
Walters Consulting Corp.
Ward Consulting Group
Wardrop Engineering Inc.
Wanner-Lambert Canada Inc.
Warren Blithic Ltd.
Washington Mills Electrominerals
Wastewater Technology Centre
Watcom International Corp.
Waterloo Board of Education
Waterloo Furniture Components Ltd.
Waterloo Maple Software
Waterloo North Hydro
Waterloo Region Family & Children’s Services
Waterloo Region Roman Catholic Separate School Board
Watkins
Clifford M. Watson & Assoc. Ltd.
Peter Watson Investments Ltd.
Watson & Henning Chartered Accountants
Watts Industries (Canada) Inc.
WCB Credit Union
Wearcheck Canada Inc.
Weather Research House
Wed Tech Inc.
Weed Man
Woodkoppen Consulting GMBH (Germany)
Gren Wels, Architect & Assoc.
Welch & Co.
Weldco Beales Ltd.
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Welding Institute of Canada
Weldwood of Canada Ltd.
Wellesley Hospital
Wellington County Separate School Board
Wellington Insurance Co.
Wellington Partners International Inc.
Richard Wengle Architect Inc.
B. James Wensley Architect Ltd.
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West Park Hospital
West Parry Sound Board of Education
West-End Physiotherapy Clinic
Westbury Canadian Life Insurance Co.
Western Combine Corp.
Western Foundry Co. Ltd.
Western Gas Marketing Ltd.
Western Ventilation
Westlighthouse Canada Inc.
Westmount Ponds Environmental Centre
Westmount Quilt & Country Club
Weston Bakeries Ltd.
Weston Larkin
WGA - Wong Gregerson Architects Inc.
Wheelabrator Corp. of Canada Ltd.
White Bay-Central Development Assoc.
White Integrated Technologies Inc.
White Rose Craft & Nursery Sales Ltd.
Whitney & Assoc.
Widescore Group Inc.
Wider Enterprises Ltd.
Wixlox Bodies
Wilderness Tours
Willard Laurie University
R. J. Wilkie
Wilkinson & Co.
Bruce Willis Chartered Accountants
Wilmot Centre Missionary Church
Wilson Technologies Inc.
Winsor Minerals
Windiss Hammer Partnership
Wing Construction
Wing Lung Bank Ltd. (Hong Kong)
Wingham & District Assoc. for Community
Living
Winnipeg Auto Auction
Winpak Ltd.
Wimsome Construction Co.
WinSystems
Wintek Engineering Services
Withey Addison Chartered Accountants
W K Information Systems Ltd.
The Wollongong Group Canada
Wong Tung & Partners Ltd. (Hong Kong)
W.O.C. Wood Co. Ltd.
Woodbridge Foam Corp.
Woodside National Historical Park
Woodstock General Hospital
Woolco
Work That Body Fitness Programs Inc.
Workable Centres Inc.
Workers’ Compensation Board
Workers’ Compensation Board of B.C.
World Access Canada Inc.
World Bank
World Exchanges Inc. China Teaching Program
Worldlink Telecommunications Ltd.
Wrighley Canada Inc.
Wui Fat Trading Co. (Hong Kong)
The Wyatt Co.
Wynn’s Precision Canada Ltd.
Xbase Technologies Corp.
Xerox Canada Inc.
Xiris Inc.
Xield Management Group Inc.
YM-YWCA London
YMCA Burlington
YMCA Cagawakita
YMCA Midland
YMCA Mississauga
YMCA of Greater Toronto
YMCA Sudbury
YMCA-YWCA of/d/Ottawa-Carleton
M.S. Yolles & Partners Ltd.
York Board of Education
York Central Hospital
York County Physiotherapy & Sports Injury Clinic
York Region Board of Education
York Region Separate School Board
York South Association for Community Living
York University
Yorklea Children’s Centre
Cecilia Young CA
K.K. Young & Co. (Hong Kong)
Young Adult Program
Young People’s Theatre
Young & Wright Architects
Young & Young Trading Co. Ltd.
Your Expression
Youth Coalition Work
Youth Challenge International
YWCA Cambridge
YWCA Head Office
YWCA Kitchener
YWCA Women’s Place
Zarcap inc.
Zehrs Markets
Zeidler Roberts Partnership
Zeneca Bio Products
Zenon Environmental Systems Inc.
Zeuthen Technologic GmbH (Germany)
Zepf Technology Inc.
Zimmack Inc.
Zippy Print
Zurich Canada
1st Group Inc.
3M Canada Inc.
The 500 Personnel Services Inc.
7-Eleven Stores
800 Superphone 519 Inc.
9 to 5 Personnel Services Inc.
912850 Ontario Ltd.
The University Library

The Dana Porter Library.
# The University Library

**University Librarian**  
M.C. Shepherd, BEd (Saskatchewan), MA (LS) (Denver)

**Co-ordinator, Library Administrative Services**  
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)

**Business Administrator**  
J. Jorgensen, BA (Toronto)

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## Collections Division

**Associate Librarian, Collections and Head, Cataloguing Department pro tem.**  
C.D. Emery, BA (Durham), MPhil (Cranfield), ALA

**Head, Materials Acquisition Department**  
B. Bruder, BA (Waterloo Lutheran)

**Cataloguers (Materials Acquisition Department)**  
J. Kuhn, BA, MA (Creighton), MLS (Western Ontario)

**Co-ordinator, Collections Management**  
S. MacKinnon, BA (Mount Allison), Bl S (McGill)

**Co-ordinator, User Services**  
S. Routliffe, BA (Carleton), MLS (Western Ontario)

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## Information Division

**Associate Librarian, Information**  
B. MacNeil, BSc (Laurentian), MLS (McGill)

**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)

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## Systems

**Associate Librarian, Systems**  
M. Ridley, BA (Guelph), MA (New Brunswick), MLS (Toronto)

**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 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 those 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 a Reserve Reading Room, the Doris Lewis Rare Book Room, the microform collection, and eight typing cubicles. 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 is located on the third floor. Government publications and Interlibrary Loan are 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 700 library users.

The Dana Porter Library houses collections to support programs in the social sciences and humanities. The collection numbers over 2,166,000 items including books, pamphlets, theses, microforms, documents, reports and other material. The Library subscribes to over 6,000 serials and over 49 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 800 readers.

The Davis Centre Library houses collections to support programs in engineering, mathematics and science. The collection numbers over 486,000 items including books, microforms, government publications, technical reports and maps. The Library subscribes to over 4,800 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 132,500 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 catalogued 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.

An electronic reference service (ASK) is available to any member of the university community with access to an electronic mail system. 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.

The Library provides a Machine Assisted Reference Service (WATMARS) which is a quick and efficient method of searching databases by computer. The charge for this service depends on the database being searched, the amount of time required to conduct the search and the number of references obtained.

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 Libraries (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.
Computing Services on Campus

Student computing is an integral part of the Waterloo experience.
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 and Research
L. L. Haworth, BA (Rollins), MA, PhD (Illinois)
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 computer account for word processing and other applications such as spreadsheets and graphics. There is a charge for this account. There is no charge for accounts that are provided as part of an academic course. The cost of printing draft quality documents is included with any account. Documents requiring high quality may be printed 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 1080, PAS 1084, PAS 1087 and HH 236. Printer facilities are located in HH 236 and PAS 1099.

ENGINEERING COMPUTING DEPARTMENT
Associate Dean for Computing
W.J. Wilson, BE, MSc (Saskatchewan), PhD (Cambridge)

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.
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 Hons (Otago, New Zealand), MA, PhD (McMaster)
Information and Services Technology Manager
M. Dumancic, BMath, MA (Waterloo)
Instructional Network Manager
M. Ruehlicke
Digital Image Systems Manager
J. Piwowar, BES, MA (Waterloo)
Modelling and Design Systems Manager
P. Ochotta, BFA (Alberta), BArch (Waterloo)
Instruction and 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), PEng
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 services 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.
The Faculty of Science has a broad range of computing facilities available to undergraduates. Courses are taught using four WATSTAR networks, one in each of the four Departments, and a Novell network in the School of Optometry. These networks are used by students in many courses. The networks typically have eight to 32 IBM-PC microcomputers linked to a central “file server” unit. 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 a laser printer, a plotter and a film recorder for high quality output. 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.

An experimental laboratory of ten X-Windows workstations is also to be 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
P.H. Dirksen, BSc, MA (Waterloo)

Associate Directors
J.P. Sprung, BASc (Toronto), MA (Waterloo)
- 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, from Kitchener/Waterloo area via local telephone calls, 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, programming languages, and DOS, MacOS, and UNIX computing systems.

Consulting Offices (MC-1050, BMH-2326, PAS-1077, E2-2349A, ES2-190A, ESC-254B): to help you resolve difficulties encountered in the process of using a computer. The MC location is the DCS “Customer Support Centre” and also contains computing-system reference documentation and access to file servers containing DOS and MacOS software that you can copy for use on your own computer.

For information on any of above, please contact one of the Consulting Office locations.

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 houses demonstration units of personal workstations from Apple, IBM, SUN microsystems, and many more, including our own brand of PC-compatible, the Scooter computer. Application software for DOS, MacOS and UNIX computing 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.
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 mandate of the Faculty is to provide a wide range 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 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.

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.

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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. Many of the course offerings are not found elsewhere. 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, 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 Academic Programs section) or a minor (e.g., Chemistry, Biology, Computer Science). Several Option programs (e.g., Ergonomics, Gerontology, Management Studies, 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:
1. Business Option
2. Parks Option
3. Therapeutic Recreation Option

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 13 full-time professors, 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 Chapter 5 of the Calendar for further details concerning the Co-operative program.

Regular System
In Regular programs students attend school during the Fall and Winter terms each year for three or four years.
Admission

The admission categories, requirements and procedures for all programs are outlined in detail in Chapter 2 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.

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
   a) 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.
   b) 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.
   c) 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.
   d) 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) (see page 1:10).

Additional regulations concerning examinations may be found in Chapter 1.
2. Standing
a) The Faculty has endorsed the letter grade system outlined in Chapter 1 of this Calendar.
b) Unless as otherwise indicated under 2F 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).
c) 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.
d) It should be noted that all programs use the term-course system (see page 18 of this calendar for a description of this system). This means that courses with credit weight of .75 offered by other departments will only count as one term course. Similarly, courses with a credit weight of .25 will be considered as one-half of a term course.
e) Students who are readmitted after being required to withdraw may choose to have their average cleared. See page 8:4 regarding transfer credit options.

The following cumulative averages are required to proceed in the programs of the Faculty:

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<thead>
<tr>
<th>Cumulative Averages</th>
<th>Overall</th>
<th>Major</th>
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<tbody>
<tr>
<td>Overall</td>
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<tr>
<td>Field</td>
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<tr>
<td>Kinesiology Honours</td>
<td>63</td>
<td>67</td>
</tr>
<tr>
<td>Health Studies Honours</td>
<td>63</td>
<td>67</td>
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<tr>
<td>Kinesiology General</td>
<td>53</td>
<td>60</td>
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<tr>
<td>Recreation Honours</td>
<td>65</td>
<td>70</td>
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<tr>
<td>Dance Honours</td>
<td>63</td>
<td>67</td>
</tr>
<tr>
<td>Dance General</td>
<td>60</td>
<td>63</td>
</tr>
</tbody>
</table>

f) 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 from 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 agreeable 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 a 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 2 terms in order to be eligible for inclusion on 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
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 first 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 Dean of Undergraduate Studies and 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. The Associate Chair may approve up to five term courses (or equivalent). Requests for approval for additional courses must go to the Applied Health Sciences Undergraduate Studies Committee. 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 concerned.

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 enrols 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 with-
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 FOCUS AREAS TARGETS A NUMBER OF POTENTIAL CAREER FIELDS.

COURSES OFFERED IN 1995-1996 ARE AVAILABLE TO ANY STUDENT 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:
a) For Program A** (14) DANCE 110, 111, 230, 235, 241, 264, 336, 341, 351, 366, 367, 409 or 410, 484, and one DANCE Elective;
b) 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 this program.
* Program A: three years at the University of Waterloo followed by two years at The National Ballet School (NBS). Students must pass the Elementary Caccetti 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 course 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 two components: a Minor in Gerontology 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 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 10 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 404 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 Directed Studies in Special Topics  
- HLTH 420/PLAN 432 Health, Environment and Planning  
- ISS 350D Adult Life Crises and Events  
- 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

**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 5 years.

**Transfer Credits**

A maximum of 2.5 transfer credits (5 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 (3 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 5 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

**Further Information**

For more information about the minor or diploma in Gerontology, please contact:  
Department of Health Studies and Gerontology  
Burt Matthews Hall  
University of Waterloo  
Waterloo, ON N2L 3G1  
(519) 885-1211, ext. 5706
## 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: (a) introduction to health sciences, (b) determinants of disease (epidemiology), (c) environmental health, (d) 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, 317*, 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 226, 258
   - Two of: BIOL 211, 240, 241, 437, 441, 454, 455
   - HLTH 350, 407, 443**

5. **Free electives:**
   - 11 term courses

* KIN 317 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>
<thead>
<tr>
<th>Fall</th>
<th>Winter</th>
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<tbody>
<tr>
<td>HLTH 101</td>
<td>HLTH 102</td>
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<tr>
<td>BIOL 230</td>
<td>BIOL 239</td>
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<td>SOC 101</td>
<td>CHEM 116</td>
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#### Regular Program

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<td>KIN 330</td>
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<td>KIN 317*</td>
<td>Two Electives</td>
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<td>One Elective</td>
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<table>
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<tbody>
<tr>
<td>HLTH 341</td>
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<td>HLTH 349</td>
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<tr>
<td>Three Electives</td>
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<tbody>
<tr>
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<tr>
<td>HLTH 442</td>
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### Co operative Program

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<th>2A (Fall)</th>
<th>2B (Spring)</th>
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<tbody>
<tr>
<td>HLTH 220</td>
<td>HLTH 346</td>
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<tr>
<td>HLTH 245</td>
<td>HLTH 348</td>
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<td>KIN 222</td>
<td>HLTH 349</td>
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<td>KIN 317*</td>
<td>KIN 330</td>
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<tr>
<td>One Elective</td>
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<th>3A (Winter)</th>
<th>3B (Fall)</th>
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<tr>
<td>HLTH 210</td>
<td>HLTH 341</td>
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<tr>
<td>HLTH 340</td>
<td>HLTH 433 or elective</td>
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<tr>
<td>HLTH 344</td>
<td>HLTH 442</td>
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<tr>
<td>CS 316</td>
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<th>4A (Spring)</th>
<th>4B (Winter)</th>
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</thead>
<tbody>
<tr>
<td>HLTH 432 or elective</td>
<td>HLTH 432 or 443</td>
<td></td>
</tr>
<tr>
<td>Four Electives</td>
<td>HLTH 445</td>
<td></td>
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<tr>
<td>Three Electives</td>
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</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.

Health Studies/Kinesiology
Kinesiology/Health Studies
Joint Honours Degree Program
Occasionally there are students within Applied Health Sciences whose interests potentially encompass both the Kinesiology and Health Studies programs. The following Joint Honours program is offered through both the Regular and the Co-operative format of study to accommodate those students and to best prepare them for jobs that require backgrounds in both Kinesiology and Health Studies.

Degree Requirements for Joint Honours include:
1. 42 term courses including:
   Health Studies required courses (ten):
   HLT 101, 102, 245, 341, 348, 349, 432 or 433/443, 442, 445
   Kinesiology required courses (13):
   KIN 102, 103, 200, 222, 250, 255, 300, 317*, 321, 330, 335, 354, 470
   Outside Required (ten):
   BIOL 230, 273, CHEM 116
   CS 102, 316, MATH 107, PHYS 111/111L, 112/112L, PSYCH 101, SOC 101
   Electives (nine):
   a) Kinesiology – four term courses chosen from those electives available in Kinesiology.
   b) Health Studies – three of HLT 210, 340, 344, 436, 443, one of PHIL 226, 258.
   c) Free – one term course chosen from any department within the University.
2. An overall average and major average of 70% is required in the Joint Honours program.
   * KIN 317 laboratory is mandatory.

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, 222, 250, 255, 300, 317, 321, 330, 335, 354, 431 or 433, 470
2. Required courses from other departments:
   BIOL 230, 273, CHEM 116, CS 102*, MATH 107, PHYS 111/111L, 112/112L, PSYCH 101, SOC 101
   *SCI Division
   Course Substitution
   In the case of CHEM 116 and PHYS 103, students may elect to take a full-year course in the appropriate department.
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, 222, 250, 255, 300, 317, 321, 330, 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

<table>
<thead>
<tr>
<th>Year One</th>
<th>(Common to Regular and Co-operative programs)</th>
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</thead>
<tbody>
<tr>
<td>Fall</td>
<td>Winter</td>
</tr>
<tr>
<td>KIN 102</td>
<td>KIN 255</td>
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<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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<tr>
<td>MATH 107</td>
<td>CHEM 116</td>
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</table>
| PHYS 111/111L | PSYCH 101

Students may choose a computer science course in place of an Elective in Year One. CS 102 must be completed by the end of 3A or 3N.

Regular Program

<table>
<thead>
<tr>
<th>Year Two</th>
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<tbody>
<tr>
<td>Fall</td>
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<td>KIN 222</td>
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<td>KIN 317</td>
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<tr>
<td>SOC 101</td>
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<td>One Elective</td>
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Year Three

<table>
<thead>
<tr>
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<th>Winter</th>
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</thead>
<tbody>
<tr>
<td>KIN 335</td>
<td>KIN 330†</td>
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Year Four

<table>
<thead>
<tr>
<th>Fall</th>
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<tbody>
<tr>
<td>KIN 431† or 433†</td>
<td>KIN 470†</td>
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<tr>
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Co-operative Program

<table>
<thead>
<tr>
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<th>2B Spring</th>
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<tbody>
<tr>
<td>KIN 200</td>
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<tr>
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<td>KIN 317</td>
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<td>SOC 101</td>
<td>KIN 354</td>
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3A Winter

<table>
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<th>3B Fall</th>
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<tbody>
<tr>
<td>KIN 250</td>
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</table>

4A Spring

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<th>4B Winter</th>
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<tbody>
<tr>
<td>KIN 431† or 433†</td>
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<tr>
<td>Four Electives</td>
</tr>
</tbody>
</table>

Note
All students in Year One are Honours students.
† for Honours students only

Joint Honours Degree

Joint Honours degrees with Psychology and Economics are available in addition to Health Studies (page 8:10). 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, 222, 250, 255, 300, 317, 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, 367, 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
   PSYCH 261, 307, 357
   SOC 248, 343

* denotes a course in addition to, or substituted for, BSc (Honours Kinesiology) requirements

** Pre-Health-Professions Option programs are also available in the Departments of Biology and Health Studies
Honours Co-op Kinesiology Programs
Ergonomics Option

This limited enrolment Co-op program is intended to help prepare graduates who will contribute to solving workplace problems, particularly in safety ergonomics to reduce the risk of injury and enhance human performance.

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, Kinesiology students will be admitted to the program for the Fall term in Year Two Co-op. First year grades and an interview with the Option Coordinator will be part of the admission consideration.

   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.

4. The cumulative averages required are the same as for Honours Kinesiology.

Program Courses (44)

1. Required Life Sciences (nine):
   KIN 102, 200, 300, 317, 321, 401, 425, BIOL 230, 273

2. Required Behavioural Sciences (eight):
   KIN 103, 250, 255, 348, 354, 356, PSYCH 101, SOC 101

3. Required Physical & Technical Sciences (nine):
   KIN 222, 330, 335, MATH 107, PHYS 111/111L, PHYS 112/112L, CHEM 116, CS 102 (SCI)

4. Required Ergonomics (13):
   KIN 000**, 340, 420, 431*, 432*, 470, 472*, SY DE 142, 442, 543, 548, M SCI 211, 261, HLTH 350

5. Restricted Electives (five):
   Two courses from: KIN 341, 346, 349, 352, 357, 402, 405, 407, 416, 422, 426
   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.
** Non-credit required tutorial each term for work term review, advising and discussion of Ergonomics issues.

Typical Course Sequence

<table>
<thead>
<tr>
<th>1A Fall</th>
<th>2B Winter</th>
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<tbody>
<tr>
<td>KIN 102</td>
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<td>KIN 103</td>
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<td>PHYS 112/112L</td>
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<tr>
<td>PHYS 111/111L</td>
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<th>2A Fall</th>
<th>2B Spring</th>
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<tbody>
<tr>
<td>KIN 200</td>
<td>KIN 300</td>
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<tr>
<td>KIN 222</td>
<td>KIN 321</td>
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<tr>
<td>KIN 317</td>
<td>KIN 354</td>
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<tr>
<td>CS 102 (SCI)</td>
<td>SY DE 142</td>
</tr>
<tr>
<td>M SCI 211</td>
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<table>
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<tbody>
<tr>
<td>KIN 250</td>
<td>KIN 335</td>
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<td>SY DE 442</td>
<td>SY DE 543</td>
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<table>
<thead>
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<th>4A Spring</th>
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</thead>
<tbody>
<tr>
<td>KIN 431</td>
<td>KIN 432 Ergo</td>
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<tr>
<td>KIN 470 Ergo</td>
<td>SY DE 548</td>
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<td>KIN 472 Ergo</td>
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<tr>
<td>M SCI 261</td>
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</tr>
<tr>
<td>KIN 348</td>
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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 learning 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, 300, 317, 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, PHYS 112/112L, 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, 357, GERON 255, SY DE 281 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>
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<tbody>
<tr>
<td>KIN 102</td>
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<tbody>
<tr>
<td>KIN 200</td>
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<td>KIN 356</td>
<td>KIN 330</td>
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<td>KIN 242</td>
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<table>
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<tbody>
<tr>
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<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>
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</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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</tbody>
</table>

Applied Health Sciences
Kinesiology
Recreation and Leisure Studies

* KIN 431, 432, 470, 472 must be on Neurobehavioural Assessment topics approved in advance by the Option Coordinator.

**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):
   a) Required (11):
      REC 100, 205, 209, 210, 220, 230, 250, 270, 371, two 400 level courses.
   b) Recreation Electives (minimum of nine):
      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:
   a) Required (6):
      PSYCH 101
      SOC 101
      Select one course from four of the following seven categories (Restricted Electives):
      i) BUS 121 or ECON 101
      ii) A Fine or Performing Arts or Language course other than English
      iii) GEOG 101 or ENV S 195
      iv) A Science Faculty course
      v) A Health Studies or Kinesiology course
      vi) A Political Science or History or Philosophy course
      vii) An English course
   b) Additional courses to meet minimum requirements of 40 courses overall.

3. Total number of courses to complete degree is 40.

Course Sequence

<table>
<thead>
<tr>
<th>Year One Co-op and Regular</th>
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<tbody>
<tr>
<td>Fall</td>
</tr>
<tr>
<td>REC 100, 210, 230, 250</td>
</tr>
<tr>
<td>SOC 101</td>
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</tbody>
</table>
Regular Program

Year Two
Fall
REC 209, 270
One Recreation Elective
Two Non-Recreation Electives

Winter
REC 205, 220
One or two Recreation Electives
One or two Non-Recreation Electives

Year Three
Fall
Three Recreation Electives
Two Non-Recreation Electives

Winter
REC 371
One or two Recreation Electives
Two or three Non-Recreation Electives

Year Four
Fall
A fourth-year Recreation course
Two Recreation Electives
Two Non-Recreation Electives

Winter
A fourth-year Recreation course
One or two Recreation Electives
Two or three Non-Recreation Electives

Co-operative Program

Year Two
2A (Fall)
REC 270
Two Recreation Electives
Two Non-Recreation Electives

2B (Spring)
REC 209, 220
One Recreation Elective
Two Non-Recreation Electives

Year Three
3A (Winter)
REC 205, 371
One or two Recreation Electives
One or two Non-Recreation Electives

3B (Fall)
Two or three Recreation Electives
Two or three Non-Recreation Electives

Year Four
4A (Spring)
A fourth-year Recreation course
Two Recreation Electives
Two Non-Recreation Electives

4B (Winter)
A fourth-year Recreation course
Two Recreation Electives
Two Non-Recreation Electives

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 Option

Consult the Undergraduate Office for more details.

The Options are currently under review.

Interdisciplinary Programs are also listed in Chapter 15.

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 (11 term courses).
2. All non-department Restricted Electives (PSYCH 101, SOC 101 and three term courses).
3. Joint Honours requirements from the second department.
4. Additional Department of Recreation and Leisure Studies Electives (minimum seven 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.
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 Chapter 2 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.

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)
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 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 (mark of CR) if a minimum grade of C- (50%) 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.

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. With a Major
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
- Greek
- History
- Latin

Four-year General BA programs are also available in the following disciplines:
- Anthropology
- Canadian Studies
- Classical Studies
- Drama
- Economics
- English
- Fine Arts
- French
- Geography
- German
- Greek
- History
- Latin

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 section entitled "Departmental Programs" beginning on page 9:9.

2. Non-Major
Students with interests in a variety of disciplines may choose an individualized program rather than major in a single discipline. Any standard first-year Arts program will satisfy the needs of a student contemplating a General Arts (Non-major) program. A Non-major General Arts program must be arranged through the Arts Faculty Undergraduate Office.

HONOURS PROGRAMS

1. Regular Programs
An Honours Bachelor of Arts (BA) degree is offered by the University in the following disciplines:
- Anthropology
- Classical Studies
- Medieval Studies
- Music

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 section entitled "Departmental Programs" beginning on page 9:9.

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 Chapter 5.) 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 section entitled “Departmental 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 Chapter 15)
Personnel Studies (see Chapter 15)
Environmental Economics (see Economics)

Other Interdisciplinary Programs (see Chapter 15)
Canadian Studies
International Studies
Latin American 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 the French Language
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 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 DEADLINES
(ON-CAMPUS PROGRAMS)

All Arts students must preregister no later than April 1 for
the Spring term, August 1 for the Fall term and December
1 for the Winter term. The Faculty of Arts strongly recom-
mends 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).

SELECTION OF YEAR ONE PROGRAMS

The first year in Arts is usually an exploratory year during
which students take courses in a wide range of subjects
leading to the declaration of a General or Honours pro-
gram 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 interested in 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.

**Teacher Certification in Ontario**

The Ontario Teacher's Certificate may be granted by the Ministry of Education 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). Specific details are available from the Faculties of Education.

**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).

**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.

**Honours Program**

Students in an Honours program must complete 40 to 44 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 (see below) must also be met. Students are asked to refer to "Departmental Programs" for other departmental 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.

**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. This program comprises 1) an English Language Proficiency Examination (ELPE) which all students must write at the beginning of their first year in the Faculty of Arts, and 2) a Writing Clinic where students may receive individual help with their writing problems.

All students whose initial registration in degree 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 requirement by achieving a mark of at least 60% on the English Language Proficiency Examination or by demonstrating this competence in their Writing Clinic assignments.

Students who receive a mark below 60% on the English Language Proficiency Examination should attend the Writing Clinic. Students who do not fulfill the English Language Proficiency requirement by the beginning of their second year must attend the Writing Clinic.

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.

Note
Students who arrange a special sitting of the ELPE outside the scheduled dates will be assessed an administrative charge.

English Language Proficiency Program – Off-Campus Students
When students who are completing all their Arts degree requirements through Distance Education courses or at off-campus centres have finished 15 of their 30 term courses toward the General BA, they will be required to sit the English Language Proficiency Examination during a normally scheduled examination time at a convenient location.

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
- **Group A (ii)**: Arabic, Croatian, Chinese, Dutch, French, German, Greek, 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 subdivided 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 and/or RS 201: New Testament Greek 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 (iii) 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 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 Chapter 1, page 1:8.

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>
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<tr>
<td>B+</td>
<td>78</td>
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<tr>
<td>B</td>
<td>75</td>
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<tr>
<td>B-</td>
<td>72</td>
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<tr>
<td>C+</td>
<td>68</td>
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<tr>
<td>C</td>
<td>65</td>
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<td>C-</td>
<td>62</td>
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<td>D+</td>
<td>58</td>
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<td>55</td>
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<td>D-</td>
<td>52</td>
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<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, which can, in some cases, be an F-.

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 during the two week add period. Failure to satisfy the conditions of Audit will result in the course being dropped from the academic record.

5. There are a number of courses in the Faculty of Arts which are essentially year courses (of two term 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 (withdrawn 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 enrolls 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.

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.
Course Load
Except for students in Joint Honours programs and Honours programs where six term courses per term may be required, the normal full time course load per term is five term courses. Students in programs other than Joint Honours programs and Honours programs as indicated above may take six courses by permission of their Undergraduate Advisor provided that they have an overall average, which includes 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.

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 may pursue degree studies part-time (in most General and Honours programs) by enrolling in one or two regularly scheduled courses meeting in either the day or evening. In addition, courses may be taken in the six week summer program or by distance education. A number of programs are available by distance education (see the University of Waterloo Distance Education Calendar). There is no distinction between part-time and full-time students as to admission requirements, grading practices, or promotion policies.

Standing
1. The minimum criteria for good standing in Year 1 Honours Arts is the completion of four courses at the University of Waterloo with a minimum cumulative overall average of 85%. In programs like Year 1 Applied Studies, Accounting and SDS, good standing will continue to be defined according to the average requirements of the program.

2. To be considered in good standing in a General program, a student must maintain a cumulative overall average of at least 60%, as well as an average of at least 65% in all courses taken in the Major discipline (unless the department specifies a higher average). If a student's overall average falls between 58 and 60%, or the major or non-major average falls below 65% (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.

3. To be considered in good standing in an Honours program, a student must maintain a cumulative overall average of at least 60%, as well as an average of at least 75% in all courses taken in the Honours discipline (unless the department specifies a higher average). A student in a Joint Honours program must maintain a cumulative average of 75% in all courses taken in the two Honours disciplines (unless the departments specify other averages).

   If an Honours degree candidate's major average falls below the prescribed minimum the candidate will be considered for the General degree and the regulations in (1) above will apply. If, subsequently, the student raises the average to the required level, he/she may, through the Department Chair, petition the Examinations and Standings Committee to review her/his case.

4. Even while otherwise in good standing, a student who fails four or more term courses in any academic year (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.

5. A student who has been required to withdraw for academic reasons is eligible to apply for re-admission after an absence of two terms. If such a student is re-admitted, previous course work does not count in the cumulative average; however, all previous course attempts remain recorded on the student's University transcript.

6. Students whose cumulative average(s) has been cleared as in (5) above will be required to complete a minimum of ten additional courses whether or not this will bring the total number of courses in excess of the number required.

7. 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". Students who withdraw to avoid a number of failures will likely be ineligible for re-admission for at least two terms. See page 3:3 for details.

Set A – Basic Statistics Courses

Set B – Advanced Statistics Courses
BIOL 461, PSYCH 202*, 284*, 391, STAT 205*, 304, 321

Set C – Research Methods Courses
ISS 251R, KIN 330, PSCI 315, PSYCH 291, REC 270, 270A*, SOC 281*, 321

*No longer offered

Arts
Examinations and Standings

Basic Statistics Courses

Advanced Statistics Courses
BIOL 461, PSYCH 202*, 284*, 391, STAT 205*, 304, 321

Research Methods Courses
ISS 251R, KIN 330, PSCI 315, PSYCH 291, REC 270, 270A*, SOC 281*, 321

*No longer offered
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 (as soon as possible and at the latest within six months of receipt of the grade or decision) try to work the matter out informally with the instructor, officer or University authority concerned. If the problem cannot be resolved in this way, the student may submit a Request for a Formal Review to the Associate Dean for Undergraduate Affairs of the student's faculty of registration. Students registered through a church college should submit the appeal through the Dean of the College.

Whether or not a student wishes to proceed informally or formally, advice and assistance may be secured either from the office of the Associate Dean for Undergraduate Affairs, Registrar's Office, University Secretariat, and/or the Ombudsperson.

See page 1:10 for more information on the Student Grievance Policy (UW Policy #70).

Petition Procedures
A petition should be used in those instances where a student seeks relief from normal Faculty or University rules and regulations because of special circumstances such as illness or bereavement.

Types of requests include requests to drop or add courses after the deadline; withdraw without academic penalty; take a course at another university; take an additional course above the specified maximum for a program; substitute for a required course; or reconsider an academic decision.

A statement from a physician, counsellor, etc., must accompany all petitions based on health related grounds. Similarly, an employer's statement is required for petitions based on work commitments, etc.

Petition for Exception to Academic Regulations forms are available at departmental undergraduate offices, the Arts Faculty Undergraduate Office and the Registrar's Office.

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 (see page 5:3 for specific sequences of academic and work terms). 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 circum-
the principal programs in the School of Accountancy. In
The Honours Accountancy Studies Regular Program
complete prerequisite courses prior to being admitted.
The Honours Accountancy Studies Coop programs are
Accountancy Studies Coop who are unable to meet the
only available to transfer students or students in Honours
accepted after they have completed one or two years of
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, exclud-
ing 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:
   a) ACC 128 (1.0), 131, 228 (1.0), 231, 371, 372, 382,
      392, 401, 442. Students who have not completed
      an OAC in accounting will be required to success-
      fully complete ACC 101 before taking any further
      accounting courses;
   b) ECON 101, 102 and 201 or 202;
   c) PHIL 215 (or another approved course in profes-
      sional ethics), ACC 143 (or another approved
      problem solving course). ACC 232, ENGL 210 (or
      another approved written communications course);
   d) PSYCH 101, 338;
   e) STAT 211 and 311 (or another approved statistics
      course);
   f) 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;
   g) 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;
   h) either:
      For Honours Chartered Accountancy Studies:
      i) ACC 451, 451, 452, 491
      ii) at least one of ENV S 220, PSCI 231, or
      ECON 331
      For Honours Management Accountancy Studies:
      i) ACC 454, 455, 480, 487, 488
      ii) BUS 352
      iii) M SCI 432
      iv) ENV S 220
      v) PSCI 231
      vi) ECON 301.

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 prin-
cipal requirements for qualification as a CA, as stated by the
ICAO, are passing of or being exempted from the ICAO's
admission examinations, successful completion of the
ICAO's 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 admission examinations 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 Chapter 15 of 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 in Chapter 15, 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 one 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 accounting, auditing and taxation admission examinations and the ICAO 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.

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:
   a) 101, 102, 201, 202, 260, 300, 352, 499A/B;
   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 German
Theatre Arts History
English Political Science
Environment and Psychology
Resource Studies Religious Studies
Fine Arts 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 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 Anthropology. ANTH courses must include:
   a) 101, 102, 201, 202, 260, 300, 352;
   b) one 400-level term course;
   c) 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 second 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. The Applied Studies requirements are listed on pages 9:12 and 9:13.

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 designated 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 seminar (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 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)

Year 3A
ARTS 301
Major Subject and Electives (four or five term courses)

Year 3B
One of SCI 2612, 263, 265, 267 or other approved Science course
Major Subject and Electives (four or five term courses)

Year 4A
Major Subject and Electives (five or six term courses)

Year 4B
Major Subject and Electives (five or six 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.

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 field of specialization and in the Applied Studies courses.
3. Arts Administration, French Teaching, International Trade, Management and Personnel Studies specializations are available for qualified applicants at the beginning of the 2A term. Details in HH 146. See below.
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 the major subject is not allowed except when a course is a specified requirement for both. Double-
Arthur Applied Studies Co-op

6. 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 program, 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 minimum of 42 term courses, of which 14 to 20 are in the Honours major discipline, 8 to 10 are in Applied Studies, and 8 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)
   - PERST 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 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.

Enrolment in the Specialization is limited. Students enter the program in the 2A term through a process of formal application and personal interview.

1. 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.

2. Elective Courses
   - 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 201A 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 254 Interpersonal Relations
   - PSYCH 338 Organizational Psychology
   - 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)
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:

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:
   a) six CDN ST courses: 101 or 102, 201, 202, and three from amongst 301, 302, 311, 313, 365D, ECON 310, ERS 352, SOC 407;
   b) at least two Humanities (ACCC) term courses including at least one term course in French language, or French Canadian Literature, or French Canadian Culture;
   c) at least two Social Science (ACCC) term courses;
   d) at least two Faculty of Environmental Studies (ACCC) term courses;
   e) at least two additional Approved Canadian Content Courses (ACCC).

3. 16 elective courses to be chosen in consultation with advisors.

Note

Students intending to pursue graduate work in social science areas are encouraged to take a course in statistical and/or quantitative methods.
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 two equivalent term courses in Directed Study.

(Senior Honours Thesis) or two equivalent term courses in Directed Study.

Honours Classical Studies
Recommended Program

<table>
<thead>
<tr>
<th>Year One</th>
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</thead>
<tbody>
<tr>
<td>Two of CLAS 100/101/102</td>
<td>CLAS 490A/B</td>
</tr>
<tr>
<td>LAT 100A/B or GRK 100A/B</td>
<td>Directed Study</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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<tbody>
<tr>
<td>CLAS 251/252; 265 or 266</td>
<td>CLAS 490A/B</td>
</tr>
<tr>
<td>One additional CLAS</td>
<td>Directed Study</td>
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<tr>
<td>Two 200-level term courses in LAT/GRK</td>
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<tr>
<td>Four additional term courses</td>
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<tr>
<th>Year Three</th>
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<tbody>
<tr>
<td>One 300-level term course in LAT/GRK</td>
<td>CLAS 490A/B</td>
</tr>
<tr>
<td>Two additional term courses in LAT/GRK</td>
<td>Directed Study</td>
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<tr>
<td>Three CLAS or Directed Study</td>
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<tr>
<td>Four additional term courses</td>
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<tr>
<th>Year Four</th>
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</thead>
<tbody>
<tr>
<td>Two LAT, two GRK</td>
<td>CLAS 490A/B</td>
</tr>
<tr>
<td>CLAS 251/252</td>
<td>Directed Study</td>
</tr>
<tr>
<td>Four additional term courses</td>
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</table>

<table>
<thead>
<tr>
<th>Year One</th>
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</thead>
<tbody>
<tr>
<td>LAT 100A/B or LAT 203/204</td>
<td>CLAS 490A/B</td>
</tr>
<tr>
<td>GRK 100A/B</td>
<td>Directed Study</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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</tr>
</thead>
<tbody>
<tr>
<td>Two LAT, two GRK</td>
<td>CLAS 490A/B</td>
</tr>
<tr>
<td>CLAS 251/252</td>
<td>Directed Study</td>
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<tr>
<td>Four additional term courses</td>
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<table>
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<tr>
<th>Year Three</th>
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<tbody>
<tr>
<td>Four term courses in LAT/GRK, including one 300-level term course in each</td>
<td>CLAS 490A/B</td>
</tr>
<tr>
<td>Two additional CLAS or LAT/GRK, or Directed Study</td>
<td>Directed Study</td>
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<tr>
<td>Four additional term courses</td>
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<table>
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<tr>
<th>Year Four</th>
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</thead>
<tbody>
<tr>
<td>CLAS 490A/B or Directed Study</td>
<td>CLAS 490A/B</td>
</tr>
<tr>
<td>One 400-level term course in LAT/GRK</td>
<td>Directed Study</td>
</tr>
<tr>
<td>One additional term course in CLAS or LAT/GRK</td>
<td></td>
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<tr>
<td>Six additional term courses</td>
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Honours Latin
Recommended Program

<table>
<thead>
<tr>
<th>Year One</th>
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</thead>
<tbody>
<tr>
<td>LAT 100A/B or 203/204</td>
<td>CLAS 490A/B</td>
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<tr>
<td>Eight additional term courses</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Years Two, Three, Four</th>
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</thead>
<tbody>
<tr>
<td>Four term courses in LAT</td>
<td>CLAS 490A/B</td>
</tr>
<tr>
<td>Two term courses in CLAS</td>
<td>Directed Study</td>
</tr>
<tr>
<td>Four additional term courses</td>
<td></td>
</tr>
</tbody>
</table>
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. The Applied Studies requirements are listed on pages 9:12 and 9:13.

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 44 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 or Directed Study (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 Directed Study, or a senior Honours thesis in the other discipline.

Joint Honours Classical Studies  
Recommended Program

<table>
<thead>
<tr>
<th>Year One</th>
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</thead>
<tbody>
<tr>
<td>Two of CLAS 100/101/102</td>
<td>LAT 100A/B or GRK 100A/B</td>
<td>Six additional term courses</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Year Two</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>CLAS 251/252; 265 or 266</td>
<td>Two term courses in LAT/GRK</td>
<td>Seven additional term courses</td>
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</tbody>
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<table>
<thead>
<tr>
<th>Year Three</th>
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</thead>
<tbody>
<tr>
<td>One term course in LAT/GRK</td>
<td>Three CLAS (one may be Directed Study)</td>
<td>Eight additional term courses</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Year Four</th>
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<th></th>
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</thead>
<tbody>
<tr>
<td>CLAS 490A/B or Directed Study</td>
<td>One additional CLAS</td>
<td>Seven additional term courses</td>
</tr>
</tbody>
</table>

Notes For All Honours Classical Studies Programs
1. Students in Classical Studies may take more LAT/GRK 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. Beginning in the second half of third year, students may with the help of the Undergraduate Advisor design proposals for Directed Study. Between two and five term courses in CLAS/LAT/GRK may be taken by Directed Study (between two and three in the case of Joint Honours), of which two would take the place of CLAS 490A/B (Senior Honours Thesis). For further details consult the Department.

3. In CLAS 490A/B a grade of B- or higher must be achieved; in Directed Study an average of B- or higher must be achieved in the equivalent of two 400-level courses.

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:
   a) DRAMA 101A, 101B and 102 must be taken in the first year;
   c) 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:
   a) DRAMA 101A, 101B and 102 must be taken in the first year;
   c) 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 in Drama including:
   a) DRAMA 101A, 101B and 102 must be taken in the first year;
   c) 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 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 overall 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:
   a) six term courses in core Speech (DRAMA 102, 223, 224 required)
   b) 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:
   a) five term courses in core Speech (DRAMA 102, 223, 224 required)
   b) 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, 463, 464; WLU courses CS 308/5Y 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)

Social Sciences Discipline Area: PSCI 101A; PSYCH 253, 254, 334, 335, 338, 394, 440A/B; SOC 216, 233, 234, 237, 243, 245, 246, 265, 310, 415

Note
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 226 Interpreting
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

Arts
Drama and Speech Communication
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:
   a) 101, 102, 201, 202;
   b) 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 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:
   a) 101, 102, 201, 202, 211, 221, 301, 302, 321, 401, 402, 472;
   b) 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. The Applied Studies requirements are listed on pages 9:12 and 9:13.

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:
   a) 101, 102, 201, 202, 211, 221, 301, 302, 321, 401, 402, 472;
   b) 403 or 421;
   c) 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.

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<tbody>
<tr>
<td>1</td>
<td>ECON 101</td>
<td>ECON 102</td>
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<td></td>
<td>Four electives</td>
<td>Four electives</td>
<td>Registration for Honours Applied Economics in February/March</td>
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<tr>
<td>2</td>
<td>Term 2A</td>
<td>First Work Term</td>
<td>Term 2B</td>
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<tr>
<td></td>
<td>ECON 201, 221</td>
<td>ECON 202, 211,</td>
<td>ECON 402</td>
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<td></td>
<td>Four electives</td>
<td>321</td>
<td>Two electives</td>
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<td>3</td>
<td>Second Work Term</td>
<td>Term 3A</td>
<td>Third Work Term</td>
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<td></td>
<td>ECON 301, 302</td>
<td>ECON course at 300-level or above</td>
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<td>Two electives</td>
<td>Two electives</td>
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<tr>
<td>4</td>
<td>Term 3B*</td>
<td>Fourth Work Term</td>
<td>Term 4A</td>
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<td>ECON 401</td>
<td>ECON 402</td>
<td>ECON 403</td>
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<td></td>
<td>ECON 421</td>
<td>Two ECON courses at 300-level or above</td>
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<td>ECON course at 300-level or above</td>
<td>Two electives</td>
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<td>5</td>
<td>Fifth Work Term</td>
<td>Term 4B</td>
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<td>ECON 403</td>
<td>ECON 472</td>
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<td>ECON 403</td>
<td>ECON course at 300-level or above</td>
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<tr>
<td></td>
<td>ECON 472</td>
<td>Two 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 44 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, 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 and Political Economy/Economic History.

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.

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:
a) ECON 101, 102, 201, 202, 211, 221, and 355*;
b) Three credits from ECON 301, 302, 321, 344, 345, 361, 401, 402 and 403;
2. 352W**.

* ECON 344 offered at Wilfrid Laurier University may be taken in place of ECON 355.
** BUS 352W is offered at Wilfrid Laurier University.

ENVIRONMENTAL 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:
   a) ECON 201, 355, 361, 357*, ERS 218 and GEOG 356;
   b) 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 332
      PSCI 435
      SCI 250

2. Economics students may double count no more than two Economics courses towards 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 or (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:
   a) two term courses from 102A, 102B, 103A, 103B, 105A, 105B, 107, 108A-N, 190 (see Note 1);
   b) 200A, 200B (Survey of British Literature – see Notes 2 and 3);
   c) 251A, 251B (Practice and Theory of Criticism – see Note 3);
   e) one term course from 313, 314, 315, 316, 343, 344, 345, 346, 347 (North American Literature);
   f) 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:
   a) two term courses from 102A, 102B, 103A, 103B, 105A, 105B, 107, 108A-N, 190 (see Note 1);
   b) 200A, 200B (Survey of British Literature – see Notes 2 and 3);
   c) 251A, 251B (Practice and Theory of Criticism – see Note 3);
   e) four term courses from 310A, 310B, 310C, 330A, 330B, 350A, 350B, 362, 363, 410A, 410B (British Literature to 1800);
   f) two term courses from 313, 314, 315, 316, 343, 344, 345, 346, 347 (North American Literature);
   g) two term courses from 313, 314, 315, 316, 318, 343, 344, 345, 346, 347 (North American Literature);
   h) four other English major term courses.
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;
2. Literature (seven term courses): 200A/B, 251A/B, three further Literature (one from North American sequences; 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, 406 (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 page 5.3 of this Calendar, 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. The Applied Studies requirements are listed on pages 9.12 and 9.13.

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 44 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%.
2. At least 16 term courses must be in English, including:
   a) two term courses from 102A, 102B, 103A, 103B, 105A, 105B, 107, 100A-N, 190 (see Note 1);
   b) 200A, 200B (Survey of British Literature – see Notes 2 and 3);
c) 251A, 251B (Practice and Theory of Criticism – see Note 3);
d) two term courses from each of:
   iii) 430A, 430B, 451A, 451B, 460A, 460B, 460C (British Literature since 1800);
   iv) 313, 314, 315, 316, 318, 343, 344, 345, 346, 347 (North American Literature);
e) 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 44 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;
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, 309C, 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 (28 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. Five 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.

Arts
English
Fine Arts

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%.

At least 12 term courses must be in Fine Arts. For the different Specializations, the required courses are as follows:

Studio Specialization:
a) FINE 110, 111, 120, 121, 220, 222, 224, 225;
b) four additional Fine Arts courses, two of which must be Art History.

Art History Specialization:
a) FINE 110, 111, 120, 121;
b) two additional Studio courses;
c) six additional Art History courses.

Film Studies Specialization:
a) FINE 110, 111, 250, 251, 270W, 470, 471;
b) at least three term courses from: FINE 350, 351, 352, 353, 360, 361;
c) 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:
   a) FINE 110, 111, 120, 121, 220, 222, 224, 225;
   b) four additional Fine Arts courses, two of which must be Art History;
   c) four additional term courses in Studio at the third- or fourth-year level.

   Art History Specialization:
   a) FINE 110, 111, 120, 121, 210, 211, 212, 213, 219;
   b) two additional Studio term courses;
   c) six additional Art History term courses on the second- or third-year level, one of which must be 390A;
   d) FINE 490, 491.

   Film Studies Specialization:
   a) FINE 110, 111, 250, 251, 270W, 470, 471, 490A;
   b) at least four term courses from: FINE 350, 351, 352, 353, 360, 361;
   c) 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:
   a) FINE 110, 111, 120, 121, 220, 222, 224, 225, 319;
   b) four additional term courses in Fine Arts, three of which must be in Art History;
   c) at least one course chosen from: FINE 221, 223, 226A or 226B;
   d) four term Studio courses on the third-year level chosen from: FINE 320, 321, 322, 323, 324, 325, 326;
   e) 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:
   a) FINE 110, 111, 120, 121, 210, 211, 212, 213, 219, 319;
   b) two additional Studio term courses;
   c) six additional Art History term courses on the second- or third-year level, one of which must be 390A;
   d) FINE 490, 491.

Film Studies Specialization:
   a) FINE 110, 111, 250, 251, 270W, 470, 471;
   b) two term courses from: FINE 120, 121, 210, 211;
   c) at least five term courses from: FINE 350, 351, 352, 353, 360, 361;
   d) 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;
   e) 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 44 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:
   a) FINE 110, 111, 120, 121, 224, 225;
   b) at least one of the following pairs of courses:
      FINE 220/221; 222/223 or 226A/226B;
   c) two additional term courses in Art History;
   d) four term Studio courses on the 300-level chosen from: FINE 320, 321, 322, 323, 324, 325, 326A;
   d) FINE 472, 473.

Art History Specialization:
   a) FINE 110, 111, 120, 121, 210, 211, 212, 213;
   b) four additional term courses in Art History, one of which must be 390A;
   c) two additional term Studio courses;
   d) FINE 490, 491.
Film Studies Specialization:

a) FINE 110, 111, 250, 251, 470, 471;
b) five term courses from: FINE 350, 351, 352, 353, 360, 361, 380Z, 381Z;
c) two term courses from: FINE 252, 253, 255R, 258W, 271W, 359;
d) 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 of at least 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.

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. The Applied Studies requirements are listed on pages 9:12 and 9:13.
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 the 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 a 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 Studies and by other departments in which discipline courses are taken.

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.

Year Two
FR 200A/B, 251, 252, 283
PSYCH 212
Two term courses in the 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 Three
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 which 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:

<table>
<thead>
<tr>
<th>Anthropology</th>
<th>German</th>
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</thead>
<tbody>
<tr>
<td>Classical Studies</td>
<td>History</td>
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<tr>
<td>Dance</td>
<td>Latin</td>
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<tr>
<td>Economics</td>
<td>Mathematics</td>
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<tr>
<td>English</td>
<td>Music</td>
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<tr>
<td>Environment and</td>
<td>Philosophy</td>
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<tr>
<td>Resource Studies</td>
<td>Political Science</td>
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<tr>
<td>Fine Arts</td>
<td>Psychology</td>
</tr>
<tr>
<td>Geography</td>
<td>Recreation and Leisure Studies</td>
</tr>
<tr>
<td>Religious Studies</td>
<td>Sociology</td>
</tr>
<tr>
<td>Russian</td>
<td>Spanish</td>
</tr>
<tr>
<td>Social Development Studies</td>
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</tbody>
</table>

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 44 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

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%.

Arts
French Studies/Études françaises
Geography
2. A minimum of any 12 term courses in Geography which may include ENV S 178, 195, 200, 278.

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, 278 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 160 Introduction to Cartography and Map Analysis
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 (page 9.7)

Two of:
GEOG 204 Geography of Post Soviet Union
GEOG 205 Africa
GEOG 206 The World Region and World Issues
GEOG 221 The United States
GEOG 223 The Geography of Indonesia
GEOG 226 Rural Resources and Development in the Third World
GEOG 227 Regional Problems of Europe

One of: ENV S 200 Field Ecology GEOG 201 Geomorphology and Soils GEOG 208 Applied Climatology GEOG 309 Physical Climatology

Electives

Year Three
GEOG 381 The Nature of Geography GEOG 393 Professional and Scholarly Practice in Geography

Electives

Year Four
GEOG 490A/B Honours Thesis

Electives

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. Electives: 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. 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. 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.

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
GER 291/292
Three-Year General German
Eligibility for graduation in the General German 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 German.

General Program in German Studies
The requirements for the General Program in German Studies are identical to those of the General German program, except that the 12 term courses in German Studies will normally be as follows:

Stream A
GER 101/102
GER 201/202
GEH 151A/152A (or challenge for language competence by passing a departmental language examination at the level of GER 152A. However, 12 term courses in German studies will still be required.)
GER 272, 292
Six electives from GER 281/282, 300, 381 and elective list below

Stream B
GER 251A/252A
GER 272, 292
Six electives from GER 281/282, 300, 381 and elective list below.

* These two courses will not count toward the required 12.

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 20 term courses must be in German.

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 272
GER 281/282
GER 291/292
GER 272

Stream B
GER 351A/352A
GER 281/282
GER 291/292
GER 272

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.


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
Classical Studies
Drama
Economics
English
French
Geography
History
Mathematics
Music
Philosophy
Political Science
Psychology
Russian
Sociology
Spanish

Eligibility for graduation in the German Joint Honours program includes fulfillment of the following requirements:

1. Successful completion of a minimum of 44 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.

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.)
GER 272
GER 281/282
GER 291/292
GER 272

Stream B
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)

Nine 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)
Arts
German
Greek

GER 252A. However, 18 term courses in German studies will still be required.)

GER 292
GER 272

Six electives from GER 281/282, 300, 381, a German Literature or 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.)
GER 272, 292
Four electives from GER 281/282, 300, 381 and elective list below

Stream B
GER 292
GER 272
GER 281/282
Eight 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 272 is an approved course for Stream B students in German Studies programs.

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. GER 271/272*, 355, and 391/392 are open to all students. However, these courses will normally count toward the Major or Honours requirement for Stream A students only.

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

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:
   a) 250 or 300*
   b) One of 260, 261, 262, 263, 264
   c) One of 253, 254
   d) One of 255, 256, 257, 258
   * 250 should be taken in second year, 300 in third or fourth year of program.

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:
   a) 250 or 300*
   b) One of 260, 261, 262, 263, 264
   c) One of 253, 254
   d) One of 255, 256, 257, 258
   * 250 should be taken in second year, 300 in third or fourth year of program. The Applied Studies requirements are listed on pages 9:12 and 9:13.

History Joint Honours Programs
Joint Honours programs are currently available between History and the following departments:

Anthropology
Classical Studies
Drama
Economics
English
Fine Arts
French
Geography
Arts
History
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:
   a) 250 or 300*
   b) One of 260, 261, 262, 263, 264
   c) One of 253, 254
   d) One of 255, 256, 257, 258
   * 250 should be taken in second year, 300 in third or fourth year of program.

History Joint Honours Programs
Joint Honours programs are currently available between History and the following departments:

Anthropology
Classical Studies
Drama
Economics
English
Fine Arts
French
Geography
Arts
History

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. 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:
   a) 250 or 300*
   b) One of 260, 261, 262, 263, 264
   c) One of 253, 254
   d) One of 255, 256, 257, 258
   * 250 should 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.
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 enrol in 291, 292.

Latin

See Classical Studies.

Management Studies

See page 15:6 for program description.

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 pursuance of a graduate degree.

The Medieval Studies program is administered jointly by the History Department at St. Jerome's College (Dr. J.A. Wahl) and by the Department of Classical Studies (Dr. L.L. Neuru). Interested students may call or write either of these advisors for further information.

Three-Year General Medieval Studies
Eligibility for graduation in the General Medieval 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 14 term courses must be from an approved list of Medieval Studies or related courses, including at least two term courses from each of four of the eight subject fields specified below.

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. The Applied Studies requirements are listed on pages 9:12 and 9:13.

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. At least 14 term courses in Music, including MUSIC:
   a) 100, 270, 271;
   b) 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:
   a) 100;
   b) at least three of 270, 271, 370, 371;
   c) at least three of 253, 254, 255, 256;
   d) at least two other 300- or 400-level courses.

3. Participation in at least five terms of Music Ensemble.

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 75%.

2. At least 20 term courses in Music, including MUSIC:
   a) 100, 253, 254, 255, 256, 270, 271, 370, 371, 490A/B;
   b) At least two other 300- or 400-level courses.

3. Participation in at least six terms of Music Ensemble.

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. The Applied Studies requirements are listed on pages 9:12 and 9:13.

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:

<table>
<thead>
<tr>
<th>Drama</th>
<th>Philosophy</th>
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</thead>
<tbody>
<tr>
<td>English</td>
<td>Political Science</td>
</tr>
<tr>
<td>French</td>
<td>Psychology</td>
</tr>
<tr>
<td>Geography</td>
<td>Recreation and Leisure Studies</td>
</tr>
<tr>
<td>German</td>
<td>Social Development Studies</td>
</tr>
<tr>
<td>Mathematics</td>
<td></td>
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</table>

Eligibility for graduation in the Music Joint Honours program includes fulfillment of the following requirements:

1. Successful completion of a minimum of 44 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:
   a) 100;
   b) at least three of 253, 254, 255, 256;
   c) at least three of 270, 271, 370, 371;
   d) 490A/B (unless the senior honours essay is written in the other discipline).

3. Participation in at least six terms of Music Ensemble.

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:
   a) 100, 270;
   b) 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.

Personnel Studies
See page 15:12 for program description.
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 PHIL:
   a) one of 140, 145, 216, 241, 242, or 440A/B;
   b) 221;
   c) any two of 380 - 387 or 378.

St. Jerome's Philosophy students must meet the basic requirements as listed above, and their PHIL courses must include:
   a) one of 200J, 140, 145, 216, 241, 242, or 440A/B;
   b) 218J or 221;
   c) 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 PHIL:
   a) one of 216, 241, 242, or 440A/B;
   b) 221, 322, 499A/B;
   c) any four of 380 - 387 or 378.

St. Jerome's Philosophy students must meet the basic requirements as listed above, and their PHIL courses must include:
   a) one of 216, 241, 242, or 440A/B;
   b) 218J or 221;
   c) 322, 499A/B;
   d) 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. The Applied Studies requirements are listed on pages 9:12 and 9:13.

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
- Sociology
- Latin
- Spanish
- Mathematics

Eligibility for graduation in the Joint Honours Philosophy program includes fulfillment of the following requirements:

1. Successful completion of a minimum of 44 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 PHIL:
   a) one or two of 140, 216, 241, 242, or 440A/B (depending on program);
   b) 221, 322;
   c) any four of 380 - 387 or 378,
   d) a Philosophy course which is relevant to the other subject (e.g. Aesthetics for Philosophy and English);
   e) a Senior Honours essay in PHIL 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 page 9:36).

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 page 9:36)
Four other term courses

Year Three
Six term courses in Political Science (see Note page 9:36)
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 page 9:36)
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:
   a) ECON 101, 102, PSCI 260A/B, 331;
   b) one of PSCI 332 or 333;
   c) four term courses in Political Science beyond the 100-level which have been designated as Administrative Studies courses by the Department of Political Science;
   d) 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, Personnel Studies, 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 75% in at least two Political Science term courses. The program consists of six 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. The Applied Studies requirements are listed on pages 9:12 and 9:13. 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:

<table>
<thead>
<tr>
<th>Anthropology</th>
<th>Geography</th>
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<tr>
<td>Drama</td>
<td>History</td>
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<td>Economics</td>
<td>Mathematics</td>
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<td>English</td>
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<td>Environment and Resource Studies</td>
<td>Philosophy</td>
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<td>French</td>
<td>Sociology</td>
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</table>

Eligibility for graduation in the Political Science Joint Honours program includes fulfillment of the following requirements:

1. Successful completion of a minimum of 44 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>
</tr>
<tr>
<td>Two introductory term courses in the other discipline</td>
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<table>
<thead>
<tr>
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<tr>
<td>Four term courses in Political Science (see Note page 9:36)</td>
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<td>Four term courses in the other discipline</td>
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<td>Four other term courses</td>
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<table>
<thead>
<tr>
<th>Year Three</th>
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<tbody>
<tr>
<td>Four term courses in Political Science (see Note page 9:36)</td>
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<td>Four term courses in the other discipline</td>
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<td>Four other term courses</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Year Four</th>
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</thead>
<tbody>
<tr>
<td>Four term courses in Political Science, at least two of which must be at the 400-level (see Note page 9:36)</td>
</tr>
<tr>
<td>Four term courses in the other discipline</td>
</tr>
<tr>
<td>Four other term courses</td>
</tr>
</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.
Psychology

Three-Year General Psychology
Eligibility for graduation in the 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 requirements with a cumulative overall average of at least 60%.

2. At least ten term courses must be in Psychology, including:
   a) Discipline Introduction – PSYCH 101;
   b) Methodology Core – PSYCH 200;
   c) Discipline Core
      - at least one of PSYCH 207, 261
      - at least one of PSYCH 211, 253, 257
      - at least one other course from c);
   d) Advanced Course* – at least one Advanced PSYCH course;
   e) four PSYCH electives.

   It is recommended that requirements 2a) to 2c) be completed by the end of Year Two.
   A minimum cumulative Psychology average of at least 65% is required.

   * Advanced PSYCH courses are those not used to fulfill other Psychology requirements and which have prerequisites beyond the 100-level.

Four-Year General Psychology
The purpose of this program is to enable Honours Psychology students who have completed their third year in Honours Psychology, but who are below the 75% average requirement for Honours Psychology, to receive recognition for a fourth year of study.

Students in Honours Psychology who have completed 11 term courses in Psychology, have met the Honours requirements 2a) to 2d), have a cumulative Psychology average of at least 70%, and a cumulative overall average of at least 60%, may transfer to the Four-Year General Psychology program. Students may not combine this program with: Honours; Minors in other than an Arts discipline; Co-op or Applied Studies; or with certain Options.

Students are advised that the Four-Year General Psychology Program is not equivalent to the Honours Psychology Program. For admission to graduate programs in Psychology, an Honours Degree with a thesis is normally required.

Eligibility for graduation in the Four-Year General Psychology program includes fulfillment of the following requirements:

1. Successful completion of a minimum of 40 term courses including the Faculty of Arts Group requirements with a cumulative overall average of at least 60% and a cumulative Psychology average of at least 70%.

2. At least 16 term courses must be in Psychology, including:
   a) Discipline Introduction – PSYCH 101;
   b) Methodology Core¹ – PSYCH 291, 292, 391;
   c) Discipline Core – PSYCH 207, 211, 253, 257, 261;
   d) Research Requirement²
      - one Natural Science Research course from
      - one Social Science Research course from
   e) Advanced Course Requirement³
      - one Advanced PSYCH course from the Natural Science area
      - one Advanced PSYCH course from the Social Science area:
   f) three PSYCH electives not used to meet other Psychology requirements.

Notes
¹ When applying for admission to Honours Psychology, students who have already completed a research methods course and/or a statistics course should check the list of overlapping courses on page 9:7, Item 7 and consult with the Psychology Undergraduate Office.
² Students may not use PSYCH 392 to satisfy both the Natural Science and Social Science Research requirements. Students may substitute PSYCH 465 (Applied Apprenticeship) or PSYCH 466 (Education Apprenticeship) for one of the three-year Research requirements.
³ 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.

Honours Psychology
Students interested in Honours or Joint Honours in Psychology will normally be admitted at the beginning of their second year of study based on their academic performance in at least ten term courses in Year One, including PSYCH 101 and preferably one term course from 2c) below. Application for admission to Honours Psychology is made at the time of pre-registration for Year Two. Normally, only students whose Year One cumulative overall average is at least 70% and whose cumulative 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 higher averages may be required for admission. To remain in good standing in Honours Psychology, students must maintain a cumulative overall average of at least 60% and a cumulative Psychology average of at least 75%. Conditional status for one academic term only may be granted to students who fall below these criteria.

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 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:
   a) Discipline Introduction – PSYCH 101;
   b) Methodology Core – PSYCH 291, 292, 391;
   c) Discipline Core – PSYCH 207, 211, 253, 257, 261;
   d) Research Requirement – one Natural Science Research course from PSYCH 392, 394, 396, 398
   – one Social Science Research course from PSYCH 392, 393, 395, 397
   e) Advanced Course Requirement – one Advanced PSYCH course from the Natural Science area
   – one Advanced PSYCH course from the Social Science area;
   f) Seminar Requirement – one Honours Seminar in Psychology
   g) Three PSYCH electives

Recommended Course Sequence

Year One
PSYCH 101 and one course from 2c)
Eight additional term courses

Year Two
PSYCH 291/292
Three courses from 2c)
Five additional term courses

Year Three
PSYCH 361
One course from 2c)
One Natural Science Research Course
One Social Science Research Course
One Advanced Course in PSYCH
Five additional term courses

Year Four
One Advanced Course in PSYCH
Three PSYCH electives
One Honours Seminar in PSYCH
Five additional term courses

Notes
1. Students entering the Honours Psychology Program in Year Three should consult the Psychology Undergraduate Office for further information.

3. 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.

4. 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 2 g) 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 (Applied Studies Co-op)
Students may combine the Honours Psychology Program with Applied Studies Co-op. Please refer to the Honours Psychology section for application information. Admission will be based on the Psychology and overall averages, with a minimum admission requirement being 75% in Psychology and 70% overall. Admission is limited and will be based on space availability. To remain in good standing students must maintain 60% overall, 75% in Psychology, and 75% in Applied Studies.

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 Requirements, and the Applied Studies requirements. The Psychology requirements are as given for the Honours Psychology program except that two rather than three PSYCH electives are required. The Applied Studies Requirements are listed on pages 9:12 and 9:13.

Thesis
For students doing an Honours Thesis (see Thesis above), the seminar requirement 2 f) may be fulfilled by a fourth-year seminar in Psychology or another discipline. In Psychology, an Honours Seminar meets this requirement. In other disciplines, a fourth-year seminar involving active student participation in the seminar will meet this requirement. Thus, if a student chooses to meet the seminar requirement by taking a fourth-year seminar in another discipline, only 16 term courses in Psychology are required. The procedure to follow to ensure that a seminar in another discipline meets this requirement is available from the Psychology Undergraduate Office.

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 is limited and is based on academic standing
and space availability. 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.

**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
- Kinesiology
- Mathematics
- Music
- Philosophy
- Political Science
- Recreation
- Religious Studies
- Russian
- Social Development
- Studies
- Sociology
- Spanish

Please refer to the Honours Psychology section for application information.

Eligibility for graduation in the Joint Honours Psychology program requires successful completion of a minimum of 44 term courses including 16 term courses in Psychology, the Faculty of Arts Group requirements, and the requirements of the second discipline. The Psychology requirements are as given for the Honours Psychology Program, except that two rather than three PSYCH electives are required. In addition to the normal minimum averages required to remain in good standing in Honours Psychology, if both majors are in the Faculty of Arts, a joint major average of 75% is required. Please consult the department of your second major for their minimum major average requirement.

If both majors require research methods and/or statistics courses, consult the list of overlapping courses, Item 7, page 9:7, and the Psychology Undergraduate Office.

No double counting of Psychology courses across the two majors is allowed, e.g., where PSYCH 101 is required by the student's honours major, PSYCH 101 counts in the minor and an additional term course will be required in the major (at the discretion of the department concerned).

**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:

- **Arts**
  - Psychology
  - Religious Studies

Psychology are required. The procedure to follow to ensure that a seminar in another discipline meets this requirement is available from the Psychology Undergraduate Office.

**Honours Psychology with a BSc Degree**

An Honours Psychology degree program is also available in the Faculty of Science on both a Regular and Co-operative basis. The Psychology requirements are the same as for the Honours Psychology BA students. See Chapter 14 for further details.

**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. The Minor requirements are the same as the Psychology requirements for the Three-Year General Psychology program.

No double counting of Psychology courses between the student's honours major and a Psychology minor is allowed, e.g., where PSYCH 101 is required by the student's honours major, PSYCH 101 counts in the minor and an additional term course will be required in the major (at the discretion of the department concerned).
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:
   a) 100A, 200, 230, 231;
   b) one other course from the RS 100A-K sequence;
   c) 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:
   a) 100A, 200, 230, 231;
   b) one other course from the RS 100A-K sequence;
   c) 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:
   a) 100A, 200, 230, 231, 490A/B;
   b) one other course from the RS 100A-K sequence;
   c) one term course from each of the five RS areas;
   d) at least five term courses at or above the 300-level, not including RS 490A/B.

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 15 rather than 20. The Applied Studies requirements are listed on pages 9:12 and 9:13.

Religious Studies Joint Honours Program
The Religious Studies Department offers Joint Honours programs with the following Departments:

- Anthropology
- Classical Studies
- English
- Environment and Resource Studies
- French
- Germanic and Slavic
- History
- Music
- Philosophy
- Psychology
- Social Development
- Studies
- Sociology

The requirements in Joint Honours programs are the same as the Honours program, except the overall number of Religious Studies courses is 14 instead of 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 details regarding registration procedures and courses available at Wilfrid Laurier University, consult the Undergraduate Officer, Religious Studies.

Russian and Slavic Studies
The Department of Germanic and Slavic Languages and Literature 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 66%.

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.
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.

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.

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 44 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 Honours disciplines.
2. At least 16 term courses must be in Russian.

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 Chapter 16, page 16:78.

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 inter-related 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 coordinator 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 or 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.

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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. Two options are available for completing the Major requirements:
   a) 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
   b) 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% in the Major.

2. At least 18 term courses from the Major.

3. Six 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).

**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 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:
   a) 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
   b) 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.

**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
Three term courses from Theme Area of study
Three additional term courses

Year Three
ISS 320R, SOCWK 326R
Two other term courses from the Major
Three term courses from Theme Area
Three additional term courses

Year Four
ISS 499A/B
Two other term courses from the Major
Six additional term courses

Honours Social Development Studies
(Applied Studies Co-op)
Eligibility for graduation in the Honours Social Development Studies, Applied Studies Co-op program includes completion of the following requirements:
1. A minimum of 42 term courses including the Faculty of Arts Group requirements with a cumulative overall average of at least 60% and a cumulative Major average of at least 75%;
2. 12 to 16 term courses as required for Arts Applied Studies with a minimum overall average of at least 75%;
3. At least 14 term courses from the Major in Social Development Studies including:
   a) four introductory courses from: ISS 131R, 150R, PSYCH 120R, SOC 120R, SOCWK 120R;
   b) ISS 250R, 251R;
   c) ISS 320R, plus five term courses beyond the first-year level;
   d) ISS 499A/B (Senior Honours Essay);
4. Four term courses in subjects related to a Theme Area of Study.

Social Development Studies Joint Honours Program
Joint Honours programs are currently available with:

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<th>English</th>
<th>Psychology</th>
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<tr>
<td>French</td>
<td>Recreation</td>
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<td>Music</td>
<td>Religious Studies</td>
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<td>Philosophy</td>
<td>Sociology</td>
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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. 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%. (The total number of courses will vary according to the number of courses required for the Major being combined with Social Development Studies.)
2. At least 14 term courses from Social Development Studies including:
   a) four term courses from ISS 131R, 150R, PSYCH 120R, SOC 120R, SOCWK 120R;
   b) ISS 250R, 251R;
   c) ISS 320R, plus five term courses beyond the first-year level;
   d) 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 relating to a chosen Theme Area (see number 3 under Honours program).

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 field placement and the following courses: SOCWK 091, 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 requirements apply to the Minor in Social Development Studies:
1. ISS 131R, 150R, SOCWK 120R;
2. seven term courses beyond the first-year level including at least two term courses in each of two different disciplines.

Of the ten term courses required for the Minor, no more than six may be taken in any one discipline.

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, 121R or ISS 150R, SOC 120R; SOCWK 120R, 220R, 221R, 222R;

Three further term courses, including:
1. At least one but not more than two of: SOCWK 320R, 321R, 322R;
2. At least one but not more than two of: ISS 220R, 350R; PSYCH 322R, 323R, 334(R); SOCWK 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:

SOCWK 120R or 350C; ISS 220R; SOCWK 220R, 221R, 320R, 321R, 322R; PSYCH 211; PHIL 220 or ISS 350F; SOCWK 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 or SOCWK 350C; SOCWK 355R, PSYCH 211, PHIL 220 or ISS 350F; SOCWK 357R or 350B.

Note
For this certificate, SOCWK 390A/B may be substituted for any two of: PSYCH 211, PHIL 220, ISS 220 or 350F.

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 for All Programs
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, Renison College, Waterloo, Ontario N2L 3G4.

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:
   a) 101 (introductory course);
   b) 321 (sociological methods course);
   c) 305 (sociological theory);
   students are strongly encouraged to select SOC 280, 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, 405, 406, 407, 408. Students are also strongly encouraged to take at least two seminar courses in Sociology.
Recommended Program

Year One
SOC 101
One other term course in Sociology
Eight term course equivalent electives

Year Two
SOC 280
Four term courses in Sociology
Five term course equivalent electives

Year Three
SOC 305, 321, 322
Three term courses in Sociology
Four term course equivalent electives

Year Four
One of SOC 401, 405, 406, 407, 408
SOC 499/498
Three term courses in Sociology
Four term course equivalent electives

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. The Applied Studies requirements are listed on pages 9:12 and 9:13.

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
- Studies
- Spanish

Eligibility for graduation in the Joint Honours Sociology program includes fulfillment of the following requirements:

1. Successful completion of a minimum of 44 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%.

2. At least 15 term courses must be in Sociology, and these courses are usually distributed as follows:
   - a) A term course in Introductory Sociology (101);
   - b) A term course in Statistics (280);
   - c) Two term courses in research methods (321/322);
   - d) Two term courses in sociological theory (305 and one of 401, 405, 406, 407, 408);
   - e) The equivalent of seven term courses of electives in Sociology plus 499/498 or the equivalent of nine term courses of electives in Sociology plus the equivalent of 499/498 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 65%.

2. At least 12 term courses must be in Spanish of which:
   - a) six term courses are language;
   - b) 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:
   - a) six term courses are language above the 100-level;
   - b) two term courses are Survey of Spanish Literature;
   - c) two term courses are Survey of Latin American Literature;
   - d) 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 201A/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/B), 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. The Applied Studies requirements are listed on pages 9:12 and 9:13.

Spanish Joint Honours Program
The Department of Spanish recognizes combined Honours programs in Spanish and the following:

- Classical Studies
- Latin
- English
- Philosophy
- French
- Psychology
- German
- Sociology
- History

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 44 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.

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:
   a) W S 200, 300, 365 or 475, SOC 101 and 206;
   b) nine other courses from the Women's Studies Approved List on page 15:21 which must include:
      • at least two of the following Humanities courses: CLAS 292, ENGL 108E, 208E, 492B, FR 485, 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: 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

Engineering students planting trees on Green Spirit Day.
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 Chapter 5, 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. These 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 on pages 9 to 12.

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 Chapter 2 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 Chapter 2 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.
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 in issues of safety. The Workplace Hazardous Material Information System (WHMIS) training satisfies this requirement. Except 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 for the first term of study in the program; the credit can be obtained as described in the above paragraph.

Examinations and Promotions
(These regulations apply to students who will graduate in the class of 1990 or thereafter.)

The Faculty constitutes the examining body for all examinations and is responsible for all decisions on grades, promotions, failures, deferred examinations, appeals, and recommendations for the granting of degrees. Students are examined and grades are set for individual courses on the completion of work for those courses. Upon examination of the student's performance at the end of each term, the Examinations and Promotions Committee assigns an academic decision. The possible decisions and their effect on the student's 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, page 10:4).
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
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.

15. Changes to the set of courses which a student is taking in 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 approach 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 on page 1:10 of this Calendar 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.

If the student fails to satisfy this requirement, Continuation in the program is then contingent upon first satisfying this requirement.

2. The English Language Proficiency Requirement may be satisfied by one of the following:
   a) writing and obtaining a grade of 60% or better in the English Language Proficiency Examination (ELPE),
   b) taking an approved English course and obtaining a grade of 60% (C-) or better. A list of approved courses is provided below.
   c) 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.
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:

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Title</th>
<th>Term</th>
</tr>
</thead>
<tbody>
<tr>
<td>English 109</td>
<td>Introduction to Essay Writing</td>
<td>FWS</td>
</tr>
<tr>
<td>English 129R</td>
<td>Introduction to Written English</td>
<td>FW</td>
</tr>
<tr>
<td>English 210C</td>
<td>Report Writing</td>
<td>FWS</td>
</tr>
</tbody>
</table>

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.
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 Requirements

Humanities-based Courses

English: ENGL 105A (F,W,S)
French: FR 195A (F); FR 196A (W)
History: HIST 130 (W,S); HIST 253 (F); HIST 254 (W,S)
Philosophy: PHIL 200A (F,S); PHIL 200B (W);
PHIL 300 (W); PHIL 315 (W) (GEN E 412)

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 (DRAMA): 101A, 101B, 251
East Asian Studies (EASIA): 201R
Economics (ECON): All except 211, 221, 311, 312, 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, 348, 349
History (HIST): All except 400-level courses
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 (SIPAR): All
Personnel Studies (PS): All (cannot be taken if M SCI 211 or 311 taken)
Planning (PLAN): 156, 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
Society, Technology and Values (STV): All
Sociology (SOC): All except 200, 321, 322, 382, 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
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, 415, 452
Kinesiology (KIN): 255
Management Sciences (M SCI): 461
Music (MUSIC): (100 or 150/151), 142, 231, 240, 254, 255, 260, 356, 361
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. 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 Chapter 16 of the UW Undergraduate Calendar under the 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:
   a) 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.
   b) 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:

<table>
<thead>
<tr>
<th>Option</th>
<th>Co-ordinator</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mathematics</td>
<td>G. Heppler, Systems Design</td>
</tr>
<tr>
<td>Physics</td>
<td>W. Huang, Elec. and Computer Engineering</td>
</tr>
<tr>
<td>Computer Engineering</td>
<td>B.R. Preiss, Elec. and Computer Engineering</td>
</tr>
<tr>
<td>Statistics</td>
<td>C. Young, Stat. and Actuarial Science or K. Hipel, Systems Design Engineering</td>
</tr>
<tr>
<td>Water Resources</td>
<td>N. Kouwen, Civil Engineering</td>
</tr>
<tr>
<td>Management Sciences</td>
<td>F. Safayeni, Management Sciences</td>
</tr>
<tr>
<td>Society, Technology and Values</td>
<td>G.E. Schneider, Director of General Studies (Acting)</td>
</tr>
</tbody>
</table>

International Studies in Engineering
Environmental Engineering

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:

   - **Australia**
     - Monash University
     - Queensland University of Technology
     - University of Queensland
     - University of Technology, Sydney

   - **England**
     - University of Hull
     - University of Leeds

   - **France**
     - Institut National Polytechnique de Grenoble
     - Institut National des Sciences Appliques de Lyon
     - Université de Technologie de Compiègne
     - Université de Nantes
     - Ontario/Rhône-Alpes [Grenoble; Lyon]
**Engineering**

**Complementary Studies Requirements**

Germany
- Technische Universität Braunschweig
- Technische Universität Hamburg-Harburg
- Universität Karlsruhe
- Universität Gesamthochschule Paderborn
- Ontario/Baden-Württemberg
  * [Stuttgart; Karlsruhe]*

Japan
- Tottori University

Poland
- Warsaw University of Technology

Northern Ireland
- University of Ulster

South Korea
- Pohang Institute 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 pre-registration 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 Chapter 16 of this calendar under the program prefix of the course e.g. CIV E - Civil Engineering, PHIL - Philosophy, GEN E - General Engineering, etc.

**Details of Designated Options**

**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
  - either
  - PMATH 334 Introduction to Rings and Fields
  - or PMATH 336 Introduction to Group Theory
  - either
  - AM/PMATH 331 Real Analysis
    - or AM/PMATH 332 Complex Analysis

A student must additionally take two courses from the following, subject to availability and timetable constraints.
- AM 331/PMATH 331 Real Analysis
- AM 332/PMATH 332 Complex Analysis
- AM 333/PMATH 365 Differential Geometry and Tensor Analysis
- AM 351 Ordinary Differential Equations
- AM 353 Partial Differential Equations 1
- AM 361 Continuum Mechanics

The list of courses will be subject to change from time to time. For further information contact the Option Co-ordinator.

**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
- ME 250 Thermodynamics
  - or
  - PHYS 358 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
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 480 Water Resources Management
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
Cliff 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 (F,S) 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
SY DE 511 (F) Probabilistic Modelling
SY DE 311 (S) Engineering Optimization

Remote Sensing
GEOG 275 (F) Introductory Air Photo Analysis and Remote Sensing
GEOG 376 (W) Environmental Remote Sensing
GEOG 471 (F,W) Advanced Remote Sensing

Air Pollution
CH E 572 (W) Air Pollution Control
M E 571 (W) Air Pollution

Fluids
M E 362 (F,W) Fluid Mechanics 2
M E 566 (F,S) Fluid Mechanics 3

Other courses may be substituted with permission of the Associate Chair for Undergraduate Studies and the Option
Co-ordinator. Course offerings are subject to change; check with the appropriate department to ensure course availability.

Option in Management Sciences
This designated Option consists of a mixture of courses, some of which are technical in nature, and some of which qualify as complementary studies courses. The Option is available to all Engineering students. It is intended for students interested in the issues, concepts and techniques related to managerial problems, particularly in technology-based organizations. The Option consists of seven courses including four required courses or their equivalents:

- M SCI 251 Probability and Statistics
- M SCI 261 Managerial and Engineering Economics 1
- M SCI 331 Operations Research 1
- M SCI 211* Organizational Behaviour

plus at least two of the following or equivalent:
- M SCI 311* Organizational Design and Technology
- M SCI 431 Operations Research 2
- M SCI 432 Introduction to Production Management
- M SCI 441 Management of Information Systems
- M SCI 452 Decision Making Under Uncertainty
- M SCI 461* Managerial and Engineering Economics 2

and at most one of the following courses:
- ACC 371* Managerial Finance 1
- CS 330 Management Information Systems (may not be taken with M SCI 441)
- ECON 201 Microeconomic Theory
- GEN E 452* Technical Entrepreneurship
- STAT 335 Statistical Process Control

* These courses count toward Complementary Studies requirements.

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 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 Society, Technology and Values
The Society Technology & Values Option promotes an awareness of the relationship between technology and society. The STV Option gives students a high degree of freedom in relating fundamental STV questions, ideas and issues to their own areas of interest. Students may register for individual courses as well as for the Option.

The STV Option consists of six courses in three categories:

Category 1: Students must start with either
- STV 100 Society, Technology and Values: Introduction or

STV 202 Design and Society (no prerequisite)
Both courses are available in the evening.

Category 2: Intervening courses
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 final course, namely
STV 400 Society, Technology and Values: Senior Project is open only to students in the STV Option.

Examples of themes for the Theme Package component of the Option are:
- Technology and the Environment
- Technology, Values and Manufacturing
- Women and Technology
- Design, Values and Technology
- Technology and Communication
- Technology and Artistic Expression
- Computers and Society
- Technology and History
- Biotechnology
- Technology and Health
- Technology and the Workplace
- Society, Technology and Change
- Technology and The Third World
- Ethics and Technology
- Technology and Disability

For more information and advice in choosing possible courses, contact the Centre for Society, Technology and Values (DC 2608, UW ext. 6215) or the Option Co-ordinator, Professor S.C. Lerner, Environment and Resource Studies.

Students who take this Option may meet part of the Complementary Studies requirements of their program subject to the approval of the student's Departmental Associate Chair for Undergraduate Studies.

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
Engineering
Complementary Studies Requirements
Joint Honours Programs in Engineering

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 component 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 Co-ordinator, the Associate Dean of Engineering for 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 department.

Joint Honours Programs 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.

(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 subjects 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.**

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 Co-ordinator, 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 Co-ordinator for credit towards the course requirement.

For further information regarding this Option, contact the Faculty of Engineering, Exchange Program Office, CPH 1320E.
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:

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:
   a) 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;
   b) the graduate program must include at least four (graduate) courses and a thesis, or eight courses and a MASc project.
   c) 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 continuance 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 a 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 a 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.

Postgraduate 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 R 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.

Professional Requirements
In the Faculty of Engineering, all student programs must satisfy the curriculum-content requirements of the Canadian Engineering Accreditation Board (CEAB); accreditation by the CEAB is the mechanism by which graduates qualify for registration as Professional Engineers, subject to appropriate experience requirements and acceptable performance on the Professional Practice (law and ethics) exam, without the need to undertake additional examinations in specific technical subject areas. The Faculty will not graduate any student who does not meet these requirements, even if the student might elect to forgo eventual registration; this would jeopardize the accreditation for the entire program involved. The department/board responsible for the appropriate program will use these requirements in determining the suitability of student elective course selections.
First-Year Engineering Programs

All 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)
Geological 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. (Course descriptions can be found in Chapter 16.)

Table A – First Year Engineering Programs

<table>
<thead>
<tr>
<th>Program</th>
<th>Term 1A</th>
<th>Term 1B</th>
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<tr>
<td></td>
<td>Courses</td>
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<td>PHYS 115</td>
<td>CH E 101</td>
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<tr>
<td></td>
<td>GEN E 165</td>
<td>CSE 1*</td>
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<tr>
<td>Civil</td>
<td>GEN E 170</td>
<td>GEN E 121</td>
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<td>CH E 102</td>
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<td>GEN E 157</td>
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<td></td>
<td>GEN E 165</td>
<td>CIV E 291</td>
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<tr>
<td>Computer and Electrical</td>
<td>GEN E 170</td>
<td>E&amp;CE 150</td>
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<tr>
<td>Environmental (Chemical Branch)</td>
<td>CH E 102</td>
<td>E&amp;CE 100</td>
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<td>MATH 115</td>
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<td>M SCI 261</td>
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<td>GEN E 165</td>
<td>CIV E 291</td>
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<tr>
<td>Environmental (Civil Branch)</td>
<td>GEN E 170</td>
<td>GEN E 121</td>
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<td>CH E 102</td>
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<td>ENV E 120</td>
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<td></td>
<td>GEN E 157</td>
<td>CIV E 291</td>
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<tr>
<td>Mechanical</td>
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<td>M E 126</td>
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* 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 30 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 both to 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 one of the elective themes 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
labatory 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 con-
sistently good cumulative academic record at the end of
the 3A term. See "Combined Bachelor's - Master's
Program in Engineering", page 10:14, 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 con-
trol, 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 empha-
sis is placed on the physics and physical chemistry of poly-
mers, and on the modifications of polymer structure by
physical or chemical means.

Extractive and Process Metallurgy
This involves the application of Chemical Engineering prin-
ciples to metallurgical processes in order to improve many
of the pyrometallurgical, electrolytic and hydrometallurgical
processes presently used in Canada. Chemical metallurgy
is inter-related with these principles for overall process
design and development.

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 manu-
facture 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, out-
side the engineering, sciences and mathematics disci-
plines) must be taken. This requirement is organized on a
Faculty basis and is detailed elsewhere in this Engineering
Chapter (see page 10:7). 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 (see pages 10:10 to
10:14). 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 taking the Management Sciences Option
should take M SCI 211 in 2B, M SCI 311 in 3B, M SCI 461
in 4A, and M SCI 432 or other choice in 4B. M SCI 331
should be taken as an "extra" course in the 3B term.

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 manu-
facture products such as alcoholic beverages, yeasts,
antibiotics, therapeutics, vitamins and enzymes, often
using genetically-engineered organisms, and with waste
treatment and food processing.
# Academic Program

<table>
<thead>
<tr>
<th>Term 1A, Fall</th>
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<tbody>
<tr>
<td>CH E 100</td>
<td>Chemical Engineering Concepts 1 (units and mass balances)</td>
</tr>
<tr>
<td>CH E 102</td>
<td>Chemistry for Engineers (stoichiometry to kinetics)</td>
</tr>
<tr>
<td>MATH 115</td>
<td>Linear Algebra for Engineering (formerly MATH 114)</td>
</tr>
<tr>
<td>MATH 117</td>
<td>Calculus 1 for Engineering (derivatives to applications of integration)</td>
</tr>
<tr>
<td>PHYS 115</td>
<td>Mechanics (statics, kinematics to angular momentum)</td>
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<tr>
<th>Term 1B, Winter and Spring</th>
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<tbody>
<tr>
<td>CH E 101</td>
<td>Chemical Engineering Concepts II (units and energy balances)</td>
</tr>
<tr>
<td>GEN E 121</td>
<td>Digital Computation (computers and Fortran programs)</td>
</tr>
<tr>
<td>GEN E 123</td>
<td>Electrical Engineering (electricity and circuits)</td>
</tr>
<tr>
<td>MATH 118</td>
<td>Calculus 2 for Engineering (power series, O.D.E.'s and multiple integrals)</td>
</tr>
<tr>
<td>PHYS 125</td>
<td>Waves (oscillations, optics and quantum physics)</td>
</tr>
<tr>
<td>CSE XX1</td>
<td>Approved Complementary Studies Elective</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Term 2A, Fall and Winter</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>CH E 021</td>
<td>Transport Processes 1 (separation processes)</td>
</tr>
<tr>
<td>CH E 022</td>
<td>Applied Mathematics 1 (statistics)</td>
</tr>
<tr>
<td>CH E 023</td>
<td>Physical Chemistry 1 (thermodynamics to phase equilibria)</td>
</tr>
<tr>
<td>CHEM 026</td>
<td>Organic Chemistry 1 (aliphatic compounds and preparations)</td>
</tr>
<tr>
<td>MATH 217</td>
<td>Calculus 3 for Chemical Engineering (formerly MATH 210) (gradients to integral theorems)</td>
</tr>
</tbody>
</table>

<table>
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<th>Term 2B, Spring and Fall</th>
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<tbody>
<tr>
<td>CH E 025</td>
<td>Transport Processes 2 (fluid mechanics)</td>
</tr>
<tr>
<td>CH E 026</td>
<td>Physical Chemistry 2 (thermodynamics to kinetics)</td>
</tr>
<tr>
<td>CHEM 036</td>
<td>Organic Chemistry 2 (industrial organic processes)</td>
</tr>
<tr>
<td>MATH 218</td>
<td>Differential Equations (O.D.E.'s and Laplace transforms)</td>
</tr>
<tr>
<td>CSE XX2</td>
<td>Approved Complementary Studies Elective</td>
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<tbody>
<tr>
<td>CH E 030</td>
<td>Transport Processes 3 (heat transfer)</td>
</tr>
<tr>
<td>CH E 031</td>
<td>Process Flowsheeting (modelling and CAD)</td>
</tr>
<tr>
<td>CH E 032</td>
<td>Introductory Biotechnology (foods to genetic engineering)</td>
</tr>
<tr>
<td>CH E 033</td>
<td>Chemical Engineering Thermodynamics (applications)</td>
</tr>
<tr>
<td>CH E 034</td>
<td>Inorganic Process Principles 1 (acids to metallurgy)</td>
</tr>
</tbody>
</table>

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<th>Term 3B, Fall and Winter</th>
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</thead>
<tbody>
<tr>
<td>CH E 035</td>
<td>Transport Processes 4 (mass transfer)</td>
</tr>
<tr>
<td>CH E 036</td>
<td>Chemical Reaction Engineering (theory of reactor design)</td>
</tr>
<tr>
<td>CH E 037</td>
<td>Applied Mathematics 2 (applied ordinary and partial D.E.'s.)</td>
</tr>
<tr>
<td>CH E 038</td>
<td>Inorganic Process Principles 2 (electrolysis to corrosion)</td>
</tr>
<tr>
<td>CSE XX3</td>
<td>Approved Complementary Studies Elective</td>
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</tbody>
</table>

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<thead>
<tr>
<th>Term 4A, Spring and Fall</th>
<th></th>
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</thead>
<tbody>
<tr>
<td>CH E 040</td>
<td>Unit Operations Laboratory (separators and reactors)</td>
</tr>
<tr>
<td>CH E 041</td>
<td>Introduction to Process Control (transfer fns. to computer control)</td>
</tr>
<tr>
<td>CH E 043</td>
<td>Individual Research Project begins</td>
</tr>
<tr>
<td>CH E 044</td>
<td>Engineering Economics (money value to optimal analysis)</td>
</tr>
<tr>
<td>CH E 045</td>
<td>Process Equipment Sizing and Selection</td>
</tr>
<tr>
<td>CSE XX4</td>
<td>Approved Complementary Studies Elective</td>
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</table>

<table>
<thead>
<tr>
<th>Term 4B, Winter</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>CH E 047 or 048</td>
<td>Team Project or continuation of CH E 043</td>
</tr>
<tr>
<td>CH E 5X1</td>
<td>Technical elective from 1 area of specialization below</td>
</tr>
<tr>
<td>CH E 5X2</td>
<td>Technical elective from same area</td>
</tr>
<tr>
<td>CH E 5X3</td>
<td>Technical elective from another area or another department</td>
</tr>
<tr>
<td>CSE XX5</td>
<td>Approved Complementary Studies Elective</td>
</tr>
</tbody>
</table>

1. Transport Processes  
   CH E 512 Separation Processes  
   CH E 514 Fundamentals of Petroleum Production  

2. Mathematical Analysis and Control  
   CH E 522 Advanced Process Control  
   CH E 524 Process Control Laboratory  

3. Reaction Processes (not offered in 1995-96)  

4. Polymer Science and Engineering  
   CH E 542 Polymerization and Polymer Properties (2 course credits)  

5. Extractive and Process Metallurgy (not offered in 1995-96)  
   CH E 552 Extractive Metallurgy 1  
   CH E 554 Extractive Metallurgy 2  

6. Industrial Biochemical Technology  
   CH E 562 Fermentation Engineering  
   CH E 564 Food Process Engineering  

7. Pollution Control Engineering  
   CH E 572 Air Pollution Control  
   CH E 574 Aqueous Inorganic Wastes
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, 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
   a) 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 256 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

   b) Non-Credit Courses
      CIV E 298 Civil Engineering Seminars
      CIV E 299 Civil Engineering Seminars
      CIV E 398 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 undergrad 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

   a) 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 1
      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 483 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.

   b) 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.”
3. Academic Program for Each Term

Term 1A (Fall)
MATH 115 (formerly MATH 114), 117, CH E 102, PHYS 115, GEN E 165, 170

Term 1B (Winter and Spring)
MATH 118, PHYS 125, GEN E 121, 123, CIV E 126, 127, 291**

Term 2A (Fall and Winter)
CIV E 204, 221, 224, 265, 292, 298, 291**; one Complementary Studies Elective

Term 2B (Spring and Fall)
CIV E 205, 222, 253, 280, 299; one Complementary Studies Elective

Term 3A (Winter and Spring)
CIV E 300, 303, 342, 353, 375, 398; one Complementary Studies Elective

Term 3B (Fall and Winter)
CIV E 399; four technical electives; one Complementary Studies Elective. At least one of CIV E 313 and 413 must be taken before graduation.

Term 4A (Spring and Fall)
CIV E 400, 498; four technical electives. At least one of CIV E 313 and 413 must be taken before graduation.

Term 4B (Winter)
CIV E 491, 499; four technical electives.

** CIV E 291 Survey Camp (4 Stream – end of Spring 1B; 8 Stream – prior to Fall 2A).

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. The following three options are of primary interest to Civil Engineering students. (Note. To qualify for these options, the student must achieve a grade of at least 50% in each course and must obtain a cumulative average of 60% or more in these courses.)

Civil 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.

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 (page 10:14).

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 electives must be used to satisfy Faculty of Engineering complementary studies requirements by choosing five suitable elective courses. The remaining two electives are chosen from a list of technical breadth electives discussed below (see Note 2).

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 (see page 10:2).

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 (see page 10:3).

Complementary Studies Electives
Five courses must be chosen to satisfy the Complementary Studies Program described on page 10:7.

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 that an option 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 page 10:12) 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 page 10:11) 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 page 10:11) 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".

Environmental Engineering Option
This is a sequence of five required courses and a two-term project course (see page 10:14) 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 (see page 10:7). The two remaining elective courses are to be chosen from the following list of Technical Breadth Electives (TBE): E&CE 231, 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 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 on page 10:17.

Term 1B (Winter)  
<table>
<thead>
<tr>
<th>Course Code</th>
<th>Credits</th>
<th>Term</th>
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<tbody>
<tr>
<td>E&amp;CE 102 Seminar</td>
<td>1</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>MATH 118 Calculus 1B</td>
<td>3</td>
<td>2</td>
<td>-</td>
</tr>
<tr>
<td>E&amp;CE 150 Introduction to Computing</td>
<td>3</td>
<td>2</td>
<td>-</td>
</tr>
<tr>
<td>F&amp;CE 100 Fundamentals of Electrical Engineering</td>
<td>5</td>
<td>2</td>
<td>3*</td>
</tr>
<tr>
<td>PHYS 125 Physics for Engineers</td>
<td>3</td>
<td>2</td>
<td>-</td>
</tr>
<tr>
<td>M SCI 251 Managerial and Engineering Economics</td>
<td>3</td>
<td>1</td>
<td>-</td>
</tr>
<tr>
<td>Term 2A (Fall)</td>
<td>C</td>
<td>T</td>
<td>L</td>
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<tr>
<td>E&amp;CE 201 Seminar</td>
<td>1</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>MATH 211 (E&amp;CE 205) Advanced Calculus 1 (For Computer Engineers)</td>
<td>3</td>
<td>1</td>
<td>-</td>
</tr>
<tr>
<td>E&amp;CE 209 Electronic and Electrical Properties of Materials</td>
<td>3</td>
<td>1</td>
<td>-</td>
</tr>
<tr>
<td>E&amp;CE 223 Digital Circuits and Systems</td>
<td>3</td>
<td>1</td>
<td>3*</td>
</tr>
<tr>
<td>E&amp;CE 250 Algorithms and Data Structures</td>
<td>3</td>
<td>1</td>
<td>3*</td>
</tr>
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<td>TBE or CSE</td>
<td>3</td>
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<tr>
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<tbody>
<tr>
<td>E&amp;CE 202 Seminar</td>
<td>1</td>
<td>-</td>
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</tr>
<tr>
<td>E&amp;CE 203 Discrete Mathematics</td>
<td>3</td>
<td>1</td>
<td>-</td>
</tr>
<tr>
<td>E&amp;CE 222 Digital Computers</td>
<td>3</td>
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<td>3*</td>
</tr>
<tr>
<td>E&amp;CE 241 Circuit Analysis and Design and Translators</td>
<td>3</td>
<td>1</td>
<td>3*</td>
</tr>
<tr>
<td>TBE or CSE</td>
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<tr>
<th>Term 3A (Winter)</th>
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<tbody>
<tr>
<td>E&amp;CE 301 Seminar</td>
<td>1</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>E&amp;CE 316 Introduction to Probability Theory</td>
<td>3</td>
<td>1</td>
<td>-</td>
</tr>
<tr>
<td>E&amp;CE 324 Microprocessor Systems and Interfacing</td>
<td>3</td>
<td>1</td>
<td>3*</td>
</tr>
<tr>
<td>E&amp;CE 342 Signals and Systems</td>
<td>3</td>
<td>1</td>
<td>-</td>
</tr>
<tr>
<td>E&amp;CE 354 Real-time Operating Systems</td>
<td>3</td>
<td>1</td>
<td>3*</td>
</tr>
<tr>
<td>TBE or CSE</td>
<td>3</td>
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<thead>
<tr>
<th>Term 3B (Fall)</th>
<th>C</th>
<th>T</th>
<th>L</th>
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</thead>
<tbody>
<tr>
<td>E&amp;CE 401 Seminar</td>
<td>1</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>E&amp;CE 427 Digital Systems Engineering</td>
<td>2</td>
<td>1</td>
<td>3*</td>
</tr>
<tr>
<td>TBE or CSE</td>
<td>3</td>
<td>†</td>
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<thead>
<tr>
<th>Term 4A (Spring)</th>
<th>C</th>
<th>T</th>
<th>L</th>
</tr>
</thead>
<tbody>
<tr>
<td>E&amp;CE 411 Digital Communications Networks</td>
<td>3</td>
<td>1</td>
<td>-</td>
</tr>
<tr>
<td>E&amp;CE 428 Computer Communications Networks</td>
<td>3</td>
<td>1</td>
<td>-</td>
</tr>
<tr>
<td>E&amp;CE 435 Semiconductor Devices</td>
<td>3</td>
<td>1</td>
<td>-</td>
</tr>
<tr>
<td>E&amp;CE 438 Digital Integrated Circuits</td>
<td>2</td>
<td>1</td>
<td>3*</td>
</tr>
<tr>
<td>E&amp;CE 446 Linear Systems</td>
<td>3</td>
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<tr>
<td>E&amp;CE 457 Applied Artificial Intelligence</td>
<td>3</td>
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<td>3*</td>
</tr>
<tr>
<td>E&amp;CE 463 Power Electronics</td>
<td>2</td>
<td>1</td>
<td>3*</td>
</tr>
<tr>
<td>E&amp;CE 471 Electromagnetic Waves Design of Digital Control Systems</td>
<td>3</td>
<td>1</td>
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<tr>
<td>E&amp;CE 481 Design of Digital Control Systems</td>
<td>2</td>
<td>1</td>
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<tr>
<td>E&amp;CE 499A Project</td>
<td>-</td>
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<tr>
<th>Term 4B (Winter)</th>
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<tr>
<td>E&amp;CE 402 Seminar</td>
<td>1</td>
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<tr>
<td>TBE or CSE</td>
<td>3</td>
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Four Technical Electives from the following:

- E&CE 309 Introduction to Thermodynamics and Heat Transfer: 3 1 0
- E&CE 332 Electronic Circuits: 3 1 3*
- E&CE 362 Energy Systems and Components: 3 1 3*
- E&CE 412 Digital Communications: 3 1 -
- E&CE 413 Digital Signal Processing: 3 1 -
- E&CE 429 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 Application: 2 1 3*
- E&CE 486 Robot Dynamics and Control: 3 - 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.
‡ 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 (see page 10:2).

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 (see page 10:3).

**Complementary Studies Electives**

Five courses must be chosen to satisfy the Complementary Studies program described on page 10:7.

**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 five 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 or Physics 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
- **E&CE 222** Digital Computers
- **E&CE 223** Digital Circuits and Systems
- **E&CE 250** Algorithms and Data Structures
- **E&CE 251** Programming Languages and Translators
- **E&CE 354** Real-Time Operating Systems

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 (Antireq: E&CE 455)
- **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 (Antireq: E&CE 457)
- **CS 466** Algorithm Design and Analysis (Antireq: E&CE 457)
- **CS 486** Introduction to Artificial Intelligence (Antireq: E&CE 457)

A student must additionally take two courses from the following as a fourth year technical elective, subject to prerequisite, availability and timetable constraints:

- **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 (see page 10:10).

**Management Sciences Option**

This is a sequence of seven courses (see page 10:12) 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 page 10:11) 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 page 10:11) 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".

**Environmental Engineering Option**

This is a sequence of five required courses and a two-term project course (see page 10:14) 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".

---

**Engineering**

**Electrical Engineering**

- 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)
## 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 on page 10:17.

<table>
<thead>
<tr>
<th>Term 1B (8 Winter, 4 Spring)</th>
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<tr>
<td>E&amp;CE 102 Seminar</td>
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<tr>
<td>MATH 118 Calculus 1B</td>
<td>3</td>
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<tr>
<td>PHYS 125 Physics for Engineering</td>
<td>3</td>
<td>2</td>
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<tr>
<td>E&amp;CE 150 Introduction to Computing</td>
<td>3</td>
<td>2</td>
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</tr>
<tr>
<td>E&amp;CE 100 Fundamentals of Electrical Engineering</td>
<td>5</td>
<td>2</td>
<td>3*</td>
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<tr>
<td>M SCI 261 Managerial and Engineering Economics</td>
<td>3</td>
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<table>
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<th>Term 2A (8 Fall, 4 Winter)</th>
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<tr>
<td>E&amp;CE 202 Seminar</td>
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<tr>
<td>MATH 211 (E&amp;CE 206) Advanced Calculus 2 (For Electrical Engineers)</td>
<td>3</td>
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<tr>
<td>E&amp;CE 209 Electronic and Electrical Properties of Materials</td>
<td>3</td>
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<tr>
<td>E&amp;CE 223 Digital Circuits and Systems Structures</td>
<td>3</td>
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<td>3*</td>
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<tr>
<td>E&amp;CE 250 Algorithms and Data Complementary Studies Elective</td>
<td>3</td>
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<tr>
<td>Term 2B (8 Spring, 4 Fall)</td>
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<tr>
<td>E&amp;CE 202 Seminar</td>
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<tr>
<td>MATH 212 (E&amp;CE 206) Advanced Calculus 2 (For Electrical Engineers)</td>
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<tr>
<td>E&amp;CE 231 Electronic Devices</td>
<td>3</td>
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<td>3*</td>
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<tr>
<td>E&amp;CE 241 Circuit Analysis and Design Components 1</td>
<td>3</td>
<td>1</td>
<td>3*</td>
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<tr>
<td>E&amp;CE 261 Energy Systems and Complementary Studies Elective</td>
<td>3</td>
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<td>3*</td>
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<tr>
<td>Term 3A (8 Winter, 4 Spring)</td>
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<tr>
<td>E&amp;CE 301 Seminar</td>
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<tr>
<td>E&amp;CE 316 Introduction to Probability Theory</td>
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<tr>
<td>E&amp;CE 222 Digital Computers</td>
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<tr>
<td>E&amp;CE 342 Signals and Systems</td>
<td>3</td>
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<tr>
<td>E&amp;CE 370 Electromagnetic Fields</td>
<td>3</td>
<td>1</td>
<td>3*</td>
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<tr>
<td>E&amp;CE 309 Introduction to Thermodynamics and Heat Transfer</td>
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</table>

<table>
<thead>
<tr>
<th>Term 3B (8 Fall, 4 Winter)</th>
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<tbody>
<tr>
<td>E&amp;CE 302 Seminar</td>
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<td>E&amp;CE 318 Communication Systems</td>
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<td>1</td>
<td>3*</td>
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<tr>
<td>E&amp;CE 332 Electronic Circuits</td>
<td>3</td>
<td>1</td>
<td>3*</td>
</tr>
<tr>
<td>E&amp;CE 362 Energy Systems and Components 2</td>
<td>3</td>
<td>1</td>
<td>3*</td>
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<tr>
<td>E&amp;CE 380 Analog Control Systems</td>
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<td>Complementary Studies Elective</td>
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<tr>
<td>Term 4A (8 Spring, 4 Fall)</td>
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<tr>
<td>E&amp;CE 401 Seminar</td>
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<tr>
<td>E&amp;CE 304 Numerical Methods</td>
<td>3</td>
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<tr>
<td>E&amp;CE 471 Electromagnetic Waves</td>
<td>3</td>
<td>1</td>
<td>3*</td>
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<tr>
<td>Complementary Studies Elective</td>
<td>3</td>
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</tbody>
</table>

Two Technical Electives from the following:

- E&CE 411 Digital Communications 3 1 3* 
- E&CE 428 Computer Communications Networks 3 1 - 

### Engineering

#### Electrical Engineering

<table>
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<tr>
<th>Term 3B (8 Fall, 4 Winter)</th>
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<tr>
<td>E&amp;CE 302 Seminar</td>
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<td>E&amp;CE 318 Communication Systems</td>
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<td>E&amp;CE 332 Electronic Circuits</td>
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<td>3*</td>
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<tr>
<td>E&amp;CE 362 Energy Systems and Components 2</td>
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<td>E&amp;CE 380 Analog Control Systems</td>
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<tr>
<td>Term 4A (8 Spring, 4 Fall)</td>
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<td>E&amp;CE 304 Numerical Methods</td>
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<td>E&amp;CE 471 Electromagnetic Waves</td>
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</table>

Two Technical Electives from the following:

- E&CE 411 Digital Communications 3 1 3* 
- E&CE 428 Computer Communications Networks 3 1 - 

#### Electrical and Computer Engineering

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<td>E&amp;CE 302 Seminar</td>
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<tr>
<td>E&amp;CE 362 Energy Systems and Components 2</td>
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<td>3*</td>
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<tr>
<td>E&amp;CE 380 Analog Control Systems</td>
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<td>Term 4A (8 Spring, 4 Fall)</td>
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<td>Complementary Studies Elective</td>
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</tr>
</tbody>
</table>

Two Technical Electives from the following:

- E&CE 411 Digital Communications 3 1 3* 
- E&CE 428 Computer Communications Networks 3 1 - 

### Notes

- *indicates laboratory every second or third week, or open lab.
- See Course Descriptions.
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)
This branch of the Environmental Engineering Program is characterized by the strong and extensive process engineering component in the curriculum. With its unique process engineering focus, the program is a modern Environmental Engineering program whose graduates will be identifiably and favourably 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 air, water and soil are eliminated or contained. Incorporation of environmental principles and constraints at the planning and design stage for 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 work in environmentally-related areas. Although a Chemical Engineering degree, perhaps with the Environmental Engineering Option, is adequate for many of these jobs, for many other jobs, an Environmental Engineering curriculum provides a better mix of skills and knowledge. The Faculty believes that it can best serve society and carry out its mandate by offering both Chemical Engineering and Environmental Engineering degree programs.

Civil Engineering Branch (Waste Treatment and Management Theme, and Water and Soil Quality Theme)
This branch of the Environmental Engineering Program is characterized by two distinct areas, the first is in waste treatment and the second in pathways migration of chemicals in the environment. 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, and the Water
and Soil Quality 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, and the Water and Soil Quality Theme.

ACADEMIC PROGRAM

The academic programs for the two branches of the Environmental Engineering Program are presented in the following table. Both the Chemical Engineering Branch and the Civil Engineering Branch will be stream 4 programs.

### Chemical Engineering Branch

**Control and Process Theme**

<table>
<thead>
<tr>
<th>Term 1A (Fall)</th>
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<tbody>
<tr>
<td>CH E 102 Chemistry for Engineers</td>
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<tr>
<td>MATH 115 Linear Algebra for Engineering (formerly MATH 114)</td>
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<tr>
<td>MATH 117 Calculus 1</td>
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<tr>
<td>PHYS 115 Mechanics</td>
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<tr>
<td>ENV E 100 Environmental Engineering Concepts 1 (incl. Graphics)</td>
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<tr>
<td>GEN E 121 Digital Computation</td>
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<tr>
<td>GEN E 123 Electrical Engineering</td>
</tr>
<tr>
<td>MATH 118 Calculus 2</td>
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<tr>
<td>PHYS 125 Physics for Engineers</td>
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<tr>
<td>ENV E 101 Environmental Engineering Concepts 2</td>
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<td>CSE 1 Approved Complementary Studies Elective</td>
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<th>Term 2A (Winter)</th>
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<tbody>
<tr>
<td>*CH E 222 Applied Math 1: Statistics</td>
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<tr>
<td>*MATH 217 Calculus 3 for Chemical Engineering (gradients to integral theorems (formerly MATH 210))</td>
</tr>
<tr>
<td>*CH E 021 Equilibrium Stage Operations</td>
</tr>
<tr>
<td>*CH E 023 Physical Chemistry 1: Thermodynamics and Phase Equilibria</td>
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<tr>
<td>*CHEM 026 Organic Chemistry 1</td>
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<tbody>
<tr>
<td>ENV E 220 Environmental Chemistry and Ecotoxicology</td>
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<tr>
<td>ERS 241 (CSE 2) Introduction to Environmental and Social Impact Assessment</td>
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<tr>
<td>*ENV E 213 Fluid Mechanics</td>
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<td>*MATH 216 Differential Equations</td>
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<td>BIOL 250 Ecology</td>
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<tr>
<td>*CH E 032 Introductory Biotechnology</td>
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<td>*CH E 033 Process Engineering Thermodynamics</td>
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<td>*ENV E 332 Inorganic Environmental Process Principles</td>
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<td>BIOL 454 Environmental Toxicology 1</td>
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<tbody>
<tr>
<td>*CH E 035 Mass Transfer</td>
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<tr>
<td>ENV E 331 Instrumentation and Analysis Methods</td>
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<tr>
<td>*ENV E 321 Applied Math 2: Advanced Math</td>
</tr>
<tr>
<td>*ENV E 333 Chemical Reaction Engineering</td>
</tr>
<tr>
<td>CSE 4 Approved Complementary Studies Elective</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Term 4A (Fall)</th>
</tr>
</thead>
<tbody>
<tr>
<td>*CH E 041 Introduction to Process Control</td>
</tr>
<tr>
<td>ENV E 410 Transport Processes: Environmental Engineering Applications</td>
</tr>
<tr>
<td>*ENV E 422 Economics for CH E/ENV E Students</td>
</tr>
<tr>
<td>ENV E 420 Modelling of the Environment</td>
</tr>
<tr>
<td>ENV E 480 Environmental Engineering Project (0.25 credit)</td>
</tr>
<tr>
<td>Technical elective†</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Term 4B (Winter)</th>
</tr>
</thead>
<tbody>
<tr>
<td>*ENV E 483/481 Environmental Engineering Project (1.0/0.75 credit)</td>
</tr>
<tr>
<td>ENV E 403 (CSE 5) Environment: Regulations and Legal Issues</td>
</tr>
<tr>
<td>*CH E 572 Air Pollution Control</td>
</tr>
<tr>
<td>or</td>
</tr>
<tr>
<td>*CH E 574 Treatment of Aqueous Inorganic Wastes</td>
</tr>
<tr>
<td>Technical elective†</td>
</tr>
<tr>
<td>Technical elective†</td>
</tr>
</tbody>
</table>

† Two of the three technical electives must be 3rd or 4th year courses on environmental topics from Chemical Engineering, other engineering departments or other faculties.

Chemical and Environmental Engineering students in the stream are taught jointly in a single class.

### Civil Engineering Branch

**Waste Treatment and Management (WTM) Theme, and Water and Soil Quality (WSQ) Theme**

<table>
<thead>
<tr>
<th>Term 1A (Fall)</th>
</tr>
</thead>
<tbody>
<tr>
<td>CH E 102 Chemistry for Engineers</td>
</tr>
<tr>
<td>MATH 115 Linear Algebra for Engineering (formerly MATH 114)</td>
</tr>
<tr>
<td>MATH 117 Calculus 1</td>
</tr>
<tr>
<td>PHYS 115 Mechanics</td>
</tr>
<tr>
<td>ENV E 161 Environmental Engineering Concepts 1</td>
</tr>
<tr>
<td>GEN E 170 Engineering Graphics</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Term 1B (Spring)</th>
</tr>
</thead>
<tbody>
<tr>
<td>GEN E 121 Digital Computation</td>
</tr>
<tr>
<td>GEN E 123 Electrical Engineering</td>
</tr>
<tr>
<td>MATH 118 Calculus 2</td>
</tr>
<tr>
<td>PHYS 125 Physics for Engineers</td>
</tr>
<tr>
<td>CIV E 127 Statics</td>
</tr>
<tr>
<td>ENV E 126 Environmental Engineering Concepts 2</td>
</tr>
</tbody>
</table>
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.

It would be preferable to have taken CHEM 026 prior to taking CH E 032.
Geological Engineering with an Option in Water Resources (WRO)
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 (EEO)
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 (formerly MATH 114)
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
GEO 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
CIV E 292 Engineering Economics
GEO E 298 Seminar
Complementary Studies Elective

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

Term 3A (Spring)
CIV E 300 Civil Engineering Project 1
CIV E 353 Geotechnical Engineering 1
CIV E 375 Water Quality Engineering (WRO)
EARTH 323 Petrography
EARTH 338 Introductory Structural Geology
EARTH 390 Methods in Geological Mapping* GEO E 398 Seminar

Term 3B (Winter)
EARTH 438 Engineering Geology
EARTH 333 Introductory Sedimentology
EARTH 390 Methods in Geological Mapping* CIV E 354 Geotechnical Engineering 2
GEO E 399 Seminar

Two technical electives from:
CIV E 381 Hydraulics (WRO)
EARTH 370 Earth Resources
EARTH 358 Environmental Geology for Earth Scientists
ENV E 320 Environmental Resource Management (EEO)

Term 4A (Fall)
EARTH 456 Groundwater Modelling
EARTH 458 Physical Hydrogeology
EARTH 490 Field Course (before term)
GEO E 400 Geological Engineering Thesis 1
GEO E 498 Seminar
Complementary Studies Elective

Technical elective from:
EARTH 331 Igneous Petrology
EARTH 342 Applied Geomorphology
EARTH 359 Flow Through Porous Media
EARTH 421 Geochemistry 2
EARTH 440 Quaternary Geology
EARTH 470 Metallic Mineral Deposits
CIV E 472 Waste Water Treatment
CIV E 486 Hydrology (WRO)

Term 4B (Winter)
CIV E 491 Engineering Law
EARTH 437 Rock Mechanics
GEO E 401 Geological Engineering Thesis 2
GEO E 499 Seminar

Two technical electives from:
EARTH 427 Crustal Evolution
EARTH 433 Applied Sedimentology
EARTH 435 Advanced Structural Geology
EARTH 459 Chemical Hydrogeology (WRO)
EARTH 460 Applied Geophysics 2
ENV E 420 Modelling of the Environment (EEO)
CIV E 422 Finite Element Analysis
Notes
1. The availability of some elective courses is contingent upon sufficient demand, scheduling constraints, and teaching resources.
2. Each proposed program of studies 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.
3. Each approved program of studies must include at least three EARTH technical electives and two CIV E technical electives from 3B on.
4. It is recommended that EARTH 342 or 440 be taken before graduation.
5. WRO refers to Water Resources Option
   EEO refers to Environmental Engineering Option

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 in Chapter 16). 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, ME 202, SY DE 213
- M SCI 261 Managerial and Engineering Economics 1 (W,S) equivalents CH E 044, CIV E 292, SY DE 231
- M SCI 211 Organizational Behaviour (F,W,S) equivalent to PSYCH 338
- 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 461 Managerial and Engineering Economics 2 (S,F)
- M SCI 431 Operations Research 2 (W) equivalent to SY DE 511
- M SCI 432 Introduction to Production Management (F,W,S)
- M SCI 311 Organizational Design and Technology (F,W)
- M SCI 441 Management of Information Systems (W)

and at most one of the following courses:
- ACC 371 Managerial Finance
- CS 330 Management Information Systems (may not be taken with M SCI 441)
- ECON 201 Microeconomic Theory
- GEN E 452 Technical Entrepreneurship
- STAT 335 Statistical Process Control

+ These courses can be counted as part of the Complementary Studies requirements.

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
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 BASc 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, where 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 encouraged, that individual students should take a majority 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.

Engineering Materials and Manufacturing
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, applications of fluid power and industrial noise control.

Mechanical Engineering Core with an Option in Management Sciences
A student may acquire a BASc 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
ME 220 Mechanics of Deformable Solids 2
ME 250 Thermodynamics 1
ME 262 Introduction to Microprocessors and Digital
Logic
ME 269 Electromechanical Devices and Power
Processing
ME 304 Numerical Analysis
ME 305 Partial Differential Equations
ME 321 Kinematics and Dynamics of Machines
ME 322 Mechanical Design 1
ME 330 Control of Properties of Materials
ME 340 Manufacturing Processes
ME 351 Fluid Mechanics 1
ME 353 Heat Transfer 1
ME 354 Thermodynamics 2
ME 360 Introduction to Control Systems
ME 362 Fluid Mechanics 2
b) Non Credit Courses
ME 200/A/B Seminar
ME 300/A/B Seminar
ME 400/A/B Seminar

2. Elective Courses
a) 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 fac-
ulty basis and detailed in this Calendar under the sec-
tion “Complementary Studies Requirements, Options
and Electives for Engineering Students”.

b) Technical Electives
Nine technical Elective courses are required in addi-
tion to the core courses listed above to fulfill the
requirements of the Mechanical Engineering program.
In the final year, a project course, ME 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 desig-
nated 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:

i) Fluid Mechanics and Thermal Engineering
ME 452 Energy Transfer in Buildings
ME 456 Heat Transfer 2
ME 459 Energy Conversion

ME 557 Combustion 1
ME 559 Finite Element Methods
ME 563 Turbomachines
ME 564 Aerodynamics
ME 565 Gas Dynamics
ME 566 Fluid Mechanics 3
ME 568 Noise Analysis and Control
ME 569 Fluid Mechanics - Design Topics
ME 580 Basic Tribology

ii) Environmental Fluid Mechanics
ME 469 Dynamics of the Atmospheric Boundary
Layer
ME 559 Finite Element Methods
ME 566 Fluid Mechanics 3
ME 568 Noise Analysis and Control
ME 571 Air Pollution 1

iii) Machine Design and Solid Mechanics
ME 423 Mechanical Design 2
ME 435 Industrial Metallurgy
ME 524 Advanced Dynamics
ME 525 Mechanical Vibrations in Machines
ME 527 Mechanics of Deformable Solids 3
ME 544 Welding
ME 559 Finite Element Methods
ME 568 Noise Analysis and Control
ME 580 Basic Tribology

iv) Engineering Materials and Manufacturing
ME 432 Deformation and Fracture of Engineering
Materials
ME 435 Industrial Metallurgy
ME 527 Mechanics of Deformable Solids 3
ME 531 Microstructural Changes in Engineering
Alloys
ME 533 Composite Materials
ME 534 Non-metallic Materials
ME 541 Deformation Processes
ME 543 Metal Casting Processes
ME 544 Welding
ME 559 Finite Element Methods

v) Production and Automation
ME 435 Industrial Metallurgy
ME 447 Advanced Manufacturing Technologies
ME 541 Deformation Processes
ME 542 Machine Tool Analysis
ME 543 Metal Casting Processes
ME 544 Welding
ME 546 Theory of Solid Modelling
ME 547 Robot Manipulators: Kinematics, Dynamics, Control
ME 548 Numerical Control of Machine Tools 1
ME 559 Finite Element Methods
ME 561 Fluid Power Control Systems
ME 568 Noise Analysis and Control
ME 580 Basic Tribology

vi) 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 (F,W) M SCI 251†(M E 202)

2A/2B/4A/4B M SCI 331 and M SCI 211* plus at least two of the following or equivalents:
M SCI 311*, M SCI 431, M SCI 432, M SCI 441,
M SCI 461†; and at most one of the following:
ACC 371*, CS 330+, ECON 201*,
GEN E 452*, STAT 335.
† course is part of the Mechanical Engineering core program
* Complementary Studies course
+ may not be taken with M SCI 441

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</td>
</tr>
<tr>
<td>1B (W,S)</td>
<td>GEN E 121</td>
</tr>
<tr>
<td>2A (F,W)</td>
<td>M E 200A</td>
</tr>
<tr>
<td>2B (S,F)</td>
<td>M E 200B</td>
</tr>
<tr>
<td>4A (S,F)</td>
<td>M E 400A</td>
</tr>
<tr>
<td>4B (W)</td>
<td>M E 400B</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 undergraduate program in Systems Design Engineering at Waterloo is a study of those basic skills required for system analysis, simulation, optimization and design. Numerous examples may be cited where these systems design fundamentals may be applied: transportation, engineering design, computer applications, water resources engineering, production, planning and scheduling, environmental pollution, education. Of course the importance of specialized expertise in these areas should not be minimized, but these skills usually work most effectively toward problem solutions when operating within an overall systems context.

**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), the Systems Design Engineer may apply for registration as a Professional Engineer. If a Masters degree (MASc) 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.
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. 2600

High School Liaison Officer
Department of Systems Design Engineering
University of Waterloo
Waterloo, Ontario, N2L 3G1
(519) 885-1211, Ext. 3182 or Ext. 2600

Footnotes
1 BSc 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 described on page 10:7.

**Systems Design Engineering Undergraduate Core Curriculum (Listed by Terms)**

<table>
<thead>
<tr>
<th>1A (Fall)</th>
<th>SY DE 101 Tutorial</th>
<th>SY DE 111 Calculus 1</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>SY DE 121 Digital Computation</td>
<td>SY DE 161 Introduction to Systems Design Engineering</td>
</tr>
<tr>
<td></td>
<td>SY DE 181 Physics 1 (Statics)</td>
<td>SY DE 183 Chemistry</td>
</tr>
<tr>
<td>1B (Spring)</td>
<td>SY DE 102 Tutorial</td>
<td>SY DE 112 Calculus 2</td>
</tr>
<tr>
<td></td>
<td>SY DE 114 Linear Algebra</td>
<td>SY DE 142 Introduction to Human Systems</td>
</tr>
<tr>
<td></td>
<td>SY DE 182 Physics 2 (Dynamics)</td>
<td>SY DE 192 Digital Systems</td>
</tr>
<tr>
<td>2A (Winter)</td>
<td>SY DE 201 Tutorial</td>
<td>SY DE 211 Differential Equations</td>
</tr>
<tr>
<td></td>
<td>SY DE 213 Probability</td>
<td>SY DE 221 Software Design</td>
</tr>
<tr>
<td></td>
<td>SY DE 281 Mechanics of Deformable Solids</td>
<td>SY DE 283 Physics 3 (Electricity, Magnetism, and Optics)</td>
</tr>
<tr>
<td>2B (Fall)</td>
<td>SY DE 202 Tutorial</td>
<td>SY DE 214 Statistics</td>
</tr>
<tr>
<td></td>
<td>SY DE 252 Linear Systems and Signals</td>
<td>SY DE 282 Fluid Mechanics</td>
</tr>
<tr>
<td></td>
<td>SY DE 292 Circuits, Instrumentation, and Measurements</td>
<td>SY DE 292 Circuits, Instrumentation, and Measurements</td>
</tr>
<tr>
<td>3A (Spring)</td>
<td>SY DE 301 Tutorial</td>
<td>SY DE 311 Engineering Optimization</td>
</tr>
<tr>
<td></td>
<td>SY DE 331 Engineering Economics</td>
<td>SY DE 351 Systems Models 1</td>
</tr>
<tr>
<td></td>
<td>SY DE 351 Systems Models 1</td>
<td>SY DE 351 Systems Models 1</td>
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<tr>
<td></td>
<td>SY DE 381 Introduction to Design</td>
<td>SY DE 381 Thermodynamics</td>
</tr>
<tr>
<td>3B (Winter)</td>
<td>SY DE 302 Tutorial</td>
<td>SY DE 312 Numerical Methods</td>
</tr>
<tr>
<td></td>
<td>SY DE 352 Introduction to Control Systems</td>
<td>SY DE 392 Systems Design Workshop 1</td>
</tr>
<tr>
<td></td>
<td>SY DE 392 Systems Design Workshop 1</td>
<td>1 Technical Elective</td>
</tr>
<tr>
<td></td>
<td>1 Complementary Studies Elective</td>
<td>1 Complementary Studies Elective</td>
</tr>
</tbody>
</table>

**4A (Fall)**

<table>
<thead>
<tr>
<th>SY DE 401 Tutorial</th>
<th>SY DE 461 Systems Design Workshop 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>2 Technical Electives</td>
<td>2 Complementary Studies Electives</td>
</tr>
</tbody>
</table>

**4B (Winter)**

<table>
<thead>
<tr>
<th>SY DE 402 Tutorial</th>
<th>SY DE 462 Systems Design Workshop 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>3 Technical Electives</td>
<td>1 Complementary Studies Elective</td>
</tr>
</tbody>
</table>

**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
- Society, Technology and Values
- 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 earlier 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 modeling 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

**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 modeling (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)**
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 spe-
cialize 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

4A (Fall)
SY DE 453 Time Domain Models for Physical Systems
SY DE 513 Linear Graph Theory and Applications
SY DE 521 Computer Aided Design
SY DE 551 Stability of Systems
SY DE 553 Advanced Dynamics
SY DE 555 Modelling of Continuum Systems
SY DE 575 Image Processing

4B (Winter)
SY DE 372 Introduction to Pattern Recognition
SY DE 432 Numerical Optimization
SY DE 452 Analysis of Large Systems
SY DE 454 Computer Simulation of Systems
SY DE 536 Environmental Systems Models

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 stu-
dents interested in the issues, concepts and techniques
related to managerial problems, particularly in technologi-
cally-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&CE 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&CE 411 Data Communication
E&CE 412 Digital Communication
E&CE 413 Digital Signal Processing
E&CE 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

Environment and Resource Studies students audit waste.
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.

Degrees may be obtained in the following program areas:

<table>
<thead>
<tr>
<th>Program</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>BES</td>
<td>Pre-professional Architecture (3-1/3 years on rotating work/study co-operative scheme)</td>
</tr>
<tr>
<td>BArch</td>
<td>Professional Architecture (2-2/3 years with co-operative work terms following completion of the BES Pre-professional Architecture)</td>
</tr>
<tr>
<td>BES</td>
<td>Honours Environment and Resource Studies (4 years)</td>
</tr>
<tr>
<td>BES</td>
<td>Honours Co-operative Environment and Resource Studies (4-2/3 years with rotating work/study terms)</td>
</tr>
<tr>
<td>BES</td>
<td>Honours Geography (4 years)</td>
</tr>
<tr>
<td>BES</td>
<td>Honours Co-operative Geography (4-2/3 years with rotating work/study terms)</td>
</tr>
<tr>
<td>BES</td>
<td>General Geography (3 years)</td>
</tr>
<tr>
<td>BES</td>
<td>Honours Urban and Regional Planning (4 years)</td>
</tr>
<tr>
<td>BES</td>
<td>Honours Co-operative Urban and Regional Planning (4-1/3 years with rotating work/study terms)</td>
</tr>
<tr>
<td>MA</td>
<td>Geography</td>
</tr>
<tr>
<td>MA</td>
<td>Regional Planning and Resource Development</td>
</tr>
<tr>
<td>MES</td>
<td>Environment and Resource Studies</td>
</tr>
<tr>
<td>MAES</td>
<td>Local Economic Development</td>
</tr>
<tr>
<td>MES</td>
<td>Geography</td>
</tr>
<tr>
<td>PhD</td>
<td>Geography</td>
</tr>
<tr>
<td>PhD</td>
<td>Regional Planning and Resource Development</td>
</tr>
</tbody>
</table>

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 Chapter 2 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
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 Chapter 1.

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.

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.

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.

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.

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.

Selected applicants to the School of Urban and Regional Planning are normally required to come to the University for an interview as part of the admission process. Selection for the interview is based on Grade 12 and university entrance level academic records. Admission is based on the results of the interview, letters of reference, a 'Personal Information Form', and secondary school achievement. Contact the School of Urban and Regional Planning for further details.

Studies. For applicants to the School of Architecture, English or Français, Physics, Calculus, Algebra and Geometry (OAC) or equivalent are required. Finite Mathematics is recommended.

Other Universities (Letter of Permission)
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 proper 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:
   a) 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;
   b) 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-ASSESSMENT 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 Associate Dean, Assistant Registrar, University Secretariat and/or the Ombudsperson.

Please refer to page 1:10 for more information on the Student Grievance Policy (UIW Policy #70).

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 on page 1:8. 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 490A and 490B). The mark indicates that the course is "In Progress" and that when completed, a final grade will be assigned to both of the 'A' and 'B' halves of the course (usually the same grade). The mark "IP" will automatically revert to F- after eight months, if a final grade is not submitted.

4. 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; or
   - students should consult their Undergraduate Officer or refer to the current Undergraduate Handbook.

5. To be considered in good standing in the Honours programs, a student must maintain a cumulative overall average of at least 65.0% and a cumulative major average of at least 70.0%. If an Honours program candidate's average falls below the prescribed minimum, the individual can be given conditional standing for two consecutive academic terms if in the opinion of the School or Departmental Promotions Committee the person can attain Honours standing before graduation. If not, the student, upon request, may be considered as a candidate for a degree in the General Geography program and the regulations in #7. below will apply.

6. To be considered in good standing in Honours Co-operative programs, in addition to maintaining the required minimum cumulative averages, students must complete and submit satisfactory Co-op work reports at the completion of their first four Co-op work terms. A minimum of four satisfactory work reports are required for the Honours Co-operative degree.

7. To be considered in good standing in the General Geography programs, a student must maintain a cumulative overall average of at least 60.0% as well as an average of at least 65.0% in Geography. If at any time a student's cumulative overall average falls below 60.0% or the average in the major subjects below 65.0%, the individual may be granted conditional status for two consecutive academic terms during which period he/she must obtain good standing or he/she will be asked to withdraw.

8. There are three-year programs in the Department of Geography and the School of Architecture. The latter is a Pre-professional program, on a Co-operative basis, which prepares for and leads into the two-year Professional BArch program.

9. 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.

10. 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.

11. 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.

12. 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. PLAN 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 ( withdrew 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 this noted on 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 page 3:3 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 Chapter 15 of the Calendar for more information on Interdisciplinary Programs.

Environmental Studies Minor

The Environmental Studies Minor consists of ten courses, as follows:

- ENV S 195
- 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, 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):
   a) Five core courses selected from: ACC 121, BUS 121W or ACC 131/132, BUS 352W, 388W, 454W or PERST 200.
   b) 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 PERST 300, BUS 208W, 362W, 383W, 385W, 398W, 452W, 458W, 462W, 464W, 468W, 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.

Parks Option
The Parks Option has been approved for students in all departments/schools in the Faculty of Environmental Studies.

Required Courses
Five term courses: GEOG 102, ENV S 200 or BIOL 250, ENV S 334/REC 334, ENV S 433/REC 433, ENV S 434/REC 434

One of the following two courses: ERS 241, ENV S 201
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 (Chapter 5) 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.

Environmental Studies
Architecture

BACHELOR OF ARCHITECTURE

The BArch program is intended to prepare students to take their place in the professional world of architectural practice and discourse. An increased emphasis is placed on architectural design and theory, with students taking on greater 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 studios. A special series of courses addresses professional aspects of architecture.

Theme Areas

In both programs studios are focussed into four main areas of endeavour:

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 is integrated into a major individual statement, the design thesis.

Culture

Courses in cultural history give the student a critical and imaginative understanding of the basic ingredients of all creative work, recognizing the seemingly unrelated forces for change in the cultural history of man, and comprehending the present as part of the historical past.

Technology

The study of the technical aspects of building and design begins with courses in the history and theory of architectural technology, and in mathematical and computer applications in architecture. These establish a basis for the main sequence of courses in building construction, structures and the mechanics of environmental control. In the BArch program, courses address specifications, financial and legal aspects and professional practice and management.
# 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>
</tr>
</thead>
<tbody>
<tr>
<td>1A Fall</td>
<td>ARCH 112 Mathematics</td>
<td>ARCH 124 Landscape Design</td>
<td>ARCH 142 Cultural History 1</td>
<td>ARCH 192 Design Studio</td>
</tr>
<tr>
<td>2A Fall</td>
<td>ARCH 262 FE</td>
<td>ARCH 246 Cultural History 3</td>
<td>ARCH 292 Design Studio</td>
<td></td>
</tr>
<tr>
<td>3A Winter</td>
<td>ARCH 362 Steel: Design, Structure and Construction</td>
<td>ARCH 392 Design Studio (4 term courses)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1B Winter</td>
<td>ARCH 113 Computer Usage in Architecture</td>
<td>ARCH 143 Cultural History 2</td>
<td>ARCH 193 Design Studio</td>
<td></td>
</tr>
<tr>
<td>3B Fall</td>
<td>ARCH 363 Concrete: Design, Structure and Construction</td>
<td>ARCH 393 Design Studio</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Course Descriptions

- **ARCH 112 Mathematics**: Introduction to Mathematics
- **ARCH 171 Theories and Technologies of Building**: Theories and Technologies of Building
- **ARCH 124 Introduction to Landscape Design**: Introduction to Landscape Design
- **ARCH 142 Cultural History 1**: Cultural History 1 (2 term courses)
- **ARCH 143 Cultural History 2**: Cultural History 2 (2 term courses)
- **ARCH 144 Cultural History 3**: Cultural History 3 (2 term courses)
- **ARCH 145 Cultural History 4**: Cultural History 4 (2 term courses)
- **ARCH 192 Design Studio**: Design Studio (3 term courses)
- **ARCH 193 Design Studio**: Design Studio (3 term courses)
- **ARCH 199 Design Studio**: Design Studio (3 term courses)
- **ARCH 276 Timber: Design, Structure and Construction**: Timber: Design, Structure and Construction
- **ARCH 225 The Architecture of the Urban Environment**: The Architecture of the Urban Environment
- **ARCH 247 Renaissance to Revolution**: Renaissance to Revolution (2 term courses)
- **ARCH 266 Foundations of Europe (Building Construction 2)**: Foundations of Europe (2 term courses)
- **ARCH 262 FE**: Foundations of Europe
- **ARCH 246 Cultural History 3**: Cultural History 3 (2 term courses)
- **ARCH 292 Design Studio**: Design Studio (3 term courses)
- **ARCH 372 Building Services 1**: Building Services 1
- **ARCH 392 Design Studio**: Design Studio (4 term courses)
- **ARCH 373 Building Services 2**: Building Services 2

### Notes

- Students are free to use the off-term as they wish. The Department of Co-operative Education does not provide its normal services to arrange employment for students in this term. (See Chapter 5.)

### Co-op Work Term Descriptions

- **1A Fall (Work Term 1)**: For all Co-op terms, job interviews are arranged on campus during the preceding study term by the Department of Co-operative Education, which maintains liaison with prospective employers. The experiences a student may have during this work term might include: the introduction to office procedures, assisting in design presentations and model building, minor drafting assignments.

- **2B Spring (Work Term 2)**: The types of experiences a student may have during this work term might include: assisting in design presentation and model building, assisting in the preparation and corrections to site plans, floor plans and elevations, on-site measurements.

- **3A Winter (Work Term 3)**: The types of experiences a student may have during this work term might include: design research, detailed design developments, design presentation, assisting in the preparation of site plans, floor plans and elevations, building cross-sections.
## 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>
</tr>
</thead>
<tbody>
<tr>
<td>Co-op Work Terms</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4 &amp; 5 Winter and Spring</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>
<td></td>
<td></td>
</tr>
<tr>
<td>4A Fall</td>
<td>ARCH 348 Italian Renaissance</td>
<td>ARCH 446 Italian Urban History</td>
<td>ARCH 492Z (Rome)</td>
</tr>
<tr>
<td>Sept.-Dec.</td>
<td>Architecture or</td>
<td>or</td>
<td>Design Studio</td>
</tr>
<tr>
<td>TOTAL 7 term courses</td>
<td>The Development of Modern Italian Architecture</td>
<td>FE (2)</td>
<td>(4 term courses) or</td>
</tr>
<tr>
<td>or</td>
<td></td>
<td></td>
<td>ARCH 492 (Waterloo)</td>
</tr>
<tr>
<td>4B Winter</td>
<td>ARCH 451 (0.25) The Financial Aspects of Architecture</td>
<td>FE (2)</td>
<td>Design Studio Options</td>
</tr>
<tr>
<td>Jan.-April</td>
<td>ARCH 452 (0.25) Specifications</td>
<td></td>
<td>(4 term courses)</td>
</tr>
<tr>
<td>or</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Spring</td>
<td>See Note 4 below</td>
<td></td>
<td></td>
</tr>
<tr>
<td>May-Aug.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>TOTAL 7 term courses</td>
<td>ARCH 499</td>
<td></td>
<td></td>
</tr>
<tr>
<td>or</td>
<td>ARCH 493</td>
<td></td>
<td></td>
</tr>
<tr>
<td>or</td>
<td>ARCH 492 (Rome)</td>
<td></td>
<td></td>
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<tr>
<td>or</td>
<td>Design Studio</td>
<td></td>
<td></td>
</tr>
<tr>
<td>or</td>
<td>(4 term courses)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5A Winter</td>
<td>See Note 4 below</td>
<td>FE</td>
<td>ARCH 592</td>
</tr>
<tr>
<td>Jan.-April</td>
<td></td>
<td></td>
<td>Design Studio</td>
</tr>
<tr>
<td>TOTAL 7 term courses</td>
<td></td>
<td></td>
<td>(6 term courses)</td>
</tr>
<tr>
<td>5B Spring</td>
<td>See Note 4 below</td>
<td></td>
<td>ARCH 593</td>
</tr>
<tr>
<td>May-Aug.</td>
<td></td>
<td></td>
<td>Design Studio</td>
</tr>
<tr>
<td>TOTAL 7 term courses</td>
<td></td>
<td></td>
<td>(6 term courses)</td>
</tr>
<tr>
<td>TOTAL 28 term courses</td>
<td></td>
<td></td>
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</tr>
</tbody>
</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.

### 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.
Ecology
Architecture has an essential relationship with its context, and can never avoid being part of a larger reality. Understanding these 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, page 11.9.

Additional Regulations, Examinations and Promotions
In order to proceed unconditionally from one term* to the next in the BCS 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.

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 "Required to Withdraw."
- 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.

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 (Pre-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, page 11.4.

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 on the charts in Chapter 5.

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 develop within the student practical skills essential for the practicing architect today.

Work opportunities are developed in private architectural departments, and construction and development companies. Drafting abilities, methods of construction, division of sub trades, construction supervision, real problem solving, and the disciplines of time and money will be learned during the work terms.

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 buildings, sufficient ability and adequate mature judgment to assume responsibility for any medium-sized building project.

Environmental Studies
Architecture
Environment and Resource Studies

Professional Recognition
The Waterloo School of Architecture is 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

Note

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 inter-relationships 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 Co-operative 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 post-graduate work in programs such as urban 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 beginning on page 2:2 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), Administration, Canadian Studies, Legal Studies, Management Studies, Peace and Conflict Studies. These are listed in the Calendar in Chapter 15, under “Interdisciplinary Programs”. A Business Option, offered jointly with Wilfrid Laurier University, is also available. The requirements of the Business Option are outlined on page 11:7 of the calendar.

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

**Year One**

- ARTS 000 English Language Proficiency Exam (not a course)
- ENV S 195 Introduction to Environmental Studies
- ERS 100 Analysis of Environmental Problems 1
- ERS 101 Analysis of Environmental Problems 2
- ENV S 178 Introduction to Environmental Research Methods

**plus electives for a total of ten term courses**

**Year Two**

- ENV S 200 Field Ecology
- ERS 218 Introduction to Sustainable Environmental and Resource Systems
- ERS 285 Greening the Campus

**plus electives for a total of ten term courses**

**Year Three**

- ERS 390A Environmental Research Project
- ERS 390B Environmental Research Project
- ERS 395 Development of Environmental Thought

**plus electives for a total of ten term courses**

**Year Four**

- ERS 490A Senior Honours Project
- ERS 490B Senior Honours Project
- ERS 496 Environmental Thought and Strategies for Sustainability

**plus electives for a total of ten term courses**

### 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**
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. 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 on page 11:16.

The formal admission requirements of the program are listed beginning on page 2:2 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 on page 11:17. 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 (page 9:28).

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**
- GEOG 101 Geography and Human Habitat
- GEOG 102 Geography and Our Planetary Environment
- GEOG 160 Introduction to Cartography and Map Analysis
- Electives (see notes below)

**Year Two**
- GEOG 201 Geomorphology and Soils
- GEOG 202A Location of Economic Activities
- ENV S 200 Field Ecology

One of:
- GEOG 208 Applied Climatology
- GEOG 303 Geographical Hydrology
- GEOG 309 Physical Climatology

One of:
- GEOG 204 Geography of the Post Soviet Union
- GEOG 205 Africa
- GEOG 206 The World Regions and World Issues
- GEOG 221 The United States
- GEOG 223 The Geography of Indonesia
- GEOG 226 Rural Resources and Development in the Third World
- GEOG 227 Regional Problems of Europe

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, 150 taken in Year One or ENGL 209, 210A, 210C taken in Year Two. A term course in English is a 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 7 term courses above the 100-level.

5. **Other Comments**
   - See notes 4, 5 and 6 on four-year programs.

### Four-Year Honours Program Requirements (Regular and Co-op)

**Year One**
- GEOG 101 Geography and Human Habitat
- GEOG 102 Geography and Our Planetary Environment
- GEOG 160 Introduction to Cartography and Map Analysis
- ENV S 178 Introduction to Environmental Research Methods
- Electives including a term course in English, either one of ENGL 109, 129R, 140R, 150 taken in Year One or ENGL 209, 210A, 210C taken in Year Two. A term course in English is a requirement.

**Year Two**
- GEOG 201 Geomorphology and Soils
- GEOG 202A Location of Economic Activities
- GEOG 202B The Geography of Economic Development
- GEOG 275 Introductory Air Photo Analysis and Remote Sensing
- ENV S 200 Field Ecology
- ENV S 278 Advanced Environmental Research Methods
One of:
GEOG 208 Applied Climatology
GEOG 303 Geographical Hydrology
GEOG 309 Physical Climatology

One of:
GEOG 204 Geography of the Post Soviet Union
GEOG 205 Africa
GEOG 206 The World Region and World Issues
GEOG 221 The United States
GEOG 223 The Geography of Indonesia
GEOG 226 Rural Resources and Development in the Third World
GEOG 227 Regional Problems of Europe

If desired, two of the required courses above may be taken in Year Three.

Electives (see notes below)

Year Three
GEOG 361 The Nature of Geography
GEOG 391 Field Research (not required for Co-op)
GEOG 393 Professional and Scholarly Practice in Geography

Electives (see notes below)

Year Four
GEOG 490A/B Senior Honours Thesis

Electives to fulfill degree requirements.
(see notes below) (Co-op students, see note 7)

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 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 85.0% 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 391 (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.

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 Undergraduate Office.

8. First-Year Term Courses
For a four-year Honours degree a student must have at least 27 term courses above the 100-level.

Co-op Course Scheduling Recommendations

Year One
GEOG 101, 102, 160
ENV S 178

Year Two
Fall Term 2A
GEOG 201 Geomorphology and Soils
GEOG 275 Introductory Air Photo Analysis and Remote Sensing
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, 150 taken in Year One or ENGL 209, 210A, 210C preferably taken in Spring term 2B

Winter Work Term 1
Environmental Studies
Geography
Urban and Regional Planning

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/WLU BUSINESS OPTION
A Business Option, offered jointly with Wilfrid Laurier University, is available. The requirements of the Business Option are outlined on page 11:7 of the calendar.

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 term of Year Two. 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. Finite is 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 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 on page 11:7 of the calendar.

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
ENGL 109 Introduction to Academic Writing
PLAN 110 Graphics for Planners
PLAN 130 Social Concepts for Planners
ENV S 178 Introduction to Environmental Research Methods
ENV S 200 Field Ecology
ARTS 000Y English Language Proficiency Program
(No credit)

Year One Elective Courses (3)
Choose one elective from each of the three areas listed below.
1. Biophysical
2. Economics/Politics
3. General Interest

For a listing of the courses included under each area, 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 except ENV S 200. 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.

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 201 Introduction to Environmental and Planning Law
ENV S 278 Advanced Environmental Research Methods

Year Two Elective Courses (5)
Choose two or more second year Planning courses and any other electives, for a total of 10 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 10 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 10 term courses. For a listing of the fourth year Planning courses see current School Undergraduate Program Manual.
Independent Studies Program

Students participate in individualized programs.
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.

Most credit courses offered at the University of Waterloo are available to Independent Studies students. However, students are encouraged to tailor their programs to their learning needs which for some may mean taking few if any courses.

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:

a) The completion of the Ontario Secondary School Diploma (OSSD) including a minimum of six Ontario Academic Course (OAC) credits or the equivalent (refer to Chapter 2 for details on admission categories, requirements, and procedures);

b) The successful completion of some university-level courses;

c) Written information from a teacher or professor attesting to this;

d) Other evidence such as independent scholarly work.

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
University of Waterloo campus. The Board is assisted in its assessment of each degree candidate by a committee of supervisors, appointed by the Board to advise and evaluate the students during the Thesis Phase.

Students may make application to the Academic Board for entry into the Thesis Phase of the Program after successfully completing a minimum of two terms in Independent Studies and at least four terms of post-secondary university work. Applicants must submit, in writing, a thesis proposal which details their post-secondary academic history, the proposed program of study and a timetable for completion. This document is prepared in consultation with the proposed academic supervisors who must approve the thesis proposal before it is submitted to the Academic Board, and with advice from the Contact Person appointed from the Academic Board.

The decision to accept an applicant for Thesis Phase is based on an assessment of (a) the applicant's general preparedness for BIS degree level studies, this is to do at least third-year undergraduate work, and (b) the suitability of the degree studies proposal with respect to academic level and the University's capability to support such studies and examine the resulting work.

On acceptance of a student's thesis proposal, the Board formally appoints the academic supervisors (degree committee) including at least two members of the University of Waterloo's regular faculty. Over a period of at least eight months, the student meets regularly with the supervisors to carry out the approved program. When the work is completed, the supervisors are required to submit written evaluation of the candidate's performance as a basis for recommending the awarding of the BIS degree.

### Standing - Pre-Thesis Phase

A student who has satisfactorily completed the work specified in the term plan and who has submitted a satisfactory term report will be allowed to proceed to the next term as long as the limit on number of terms allowed in the Pre-Thesis Phase of the Program has not been reached.

A student who either has not submitted a term report or has not satisfactorily progressed in the work specified in the term plan will not be able to proceed in the Program.

A student may be granted conditional status. This indicates borderline performance in meeting term objectives. Performance must improve in the next term to remain in the Program. In some instances, conditions may be specified for continuing in the next term.

### 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.

### BASc-BIS Combined Program

A joint BASc degree program in Engineering with a BIS program in Independent Studies is available. This program is designed for students who excel academically and would benefit from non-traditional modes of instruction.

A student in the combined program completes all requirements of the Engineering program in which he/she is enrolled and also the requirements for a degree in Independent Studies. The combined program requires time in addition to that required for completion of the BASc degree. However, by doing additional academic work during academic terms and co-op work terms, it may be possible to complete the combined degree in the time frame required to complete the BASc degree.

Admission to the combined program is after the 1B term in Engineering. Some clear indication of the student's ability to handle the Engineering program at a high level of proficiency is required before admission is considered. Admission could be delayed even further with the understanding of the student that additional time will be required to meet the joint degree requirements.

### Appeal Procedures

If a student wishes to appeal a grade, academic status or standing, the student should (as soon as possible and at the latest within six months of receipt of a decision) try to work the matter out informally with the instructor, officer or University authority concerned. If the problem cannot be resolved in this way, the student may submit a Request for a Formal Review to the Provost's Advisor on Interdisciplinary Programs.

Whether or not a student wishes to proceed informally or formally, advice and assistance may be secured either from the Director of Independent Studies, Registrar's Office, University Secretariat, and/or the Ombudsperson.

See page 1:10 for more information on the Student Grievance Policy (UW Policy #70).

### Petition Procedures

A petition should be used in those instances where a student seeks relief from normal Program or University rules and regulations because of special circumstances such as illness or bereavement. Types of requests include requests to: drop or add courses after the appropriate faculty deadlines, or reconsider an academic decision. A statement from a physician, counsellor, etc., must accompany all petitions based on health-related grounds. Petition forms are available at the Independent Studies office and the Registrar's Office.
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 page 3:3 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 Math 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 Chapter 2 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 page 13:20 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
- 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 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 BMath) are described on page 13:21.

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 page 13:23).

2. The Math/Accounting and Teaching Option programs are restricted-enrolment programs.

3. With the exceptions of Applied Math/Engineering, 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 '94 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 Program</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>
</tbody>
</table>

English Writing Skills: All BMath degree candidates must satisfy an English Writing Skills Requirement. See below.

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 Optimizations), 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 on pages 13:22 - 13:23.

**Cumulative Average** — See sections 1 and 3 on pages 13:22 - 13:23.

**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 on page 13:25 for further details.
Table II - Required Faculty Core Courses - Honours Programs

<table>
<thead>
<tr>
<th>Course</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>MATH 135</td>
<td>(or MATH 145) Algebra</td>
</tr>
<tr>
<td>MATH 136</td>
<td>(or MATH 146) Linear Algebra 1</td>
</tr>
<tr>
<td>MATH 235</td>
<td>(or MATH 245) Linear Algebra 2</td>
</tr>
<tr>
<td>MATH 137</td>
<td>(or MATH 147) Calculus 1</td>
</tr>
<tr>
<td>MATH 138</td>
<td>(or MATH 148) Calculus 2</td>
</tr>
<tr>
<td>MATH 237</td>
<td>(or MATH 247) Calculus 3</td>
</tr>
<tr>
<td>STAT 230</td>
<td>(or STAT 240) Probability</td>
</tr>
<tr>
<td>STAT 231</td>
<td>Statistics</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.
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 a 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 offer 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 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 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 Programming (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 or higher math half-credits

All of

ECON 102 Introduction to Macro-economics
MTHEL 305A General Life Insurance 1
MTHEL 305B General Life Insurance 2

Joint Honours Actuarial Science

See page 13:2 for a complete description of Joint program requirements.

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 Programming
CS 337 Introduction to Numerical Analysis
MTHEL 305B General Life Insurance 2
STAT 330 Statistical Theory and Methods
STAT 331 Applied Linear Models

Honours 'X' with Actuarial Science Minor

See 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

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, analyse 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 belief that graduates from any of our programs will find their career opportunities to be excellent and varied.

The Applied Mathematics Department offers four Honours programs, each consisting of the common requirements listed below, plus specific other requirements as given in the individual program descriptions following.

Requirements Common to All Honours Applied Mathematics Programs

In conjunction with the common degree requirements in Table I on page 13:4, all Honours Applied Mathematics programs must include the Faculty core courses outlined in Table II on page 13:5 and the following courses:

All of
AM 231 Calculus 4
AM 261 Newtonian Mechanics
AM/PMATH 332 Complex Analysis
AM 351 Ordinary Differential Equations
AM 353 Partial Differential Equations

All of
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

Note
CS 370 may be counted as equivalent to an AM 3xx credit towards an Honours Applied Mathematics degree.

Honours Applied Mathematics

In conjunction with the common degree requirements in Table I on page 13:4, this program requires at least 26 math half-credits. These overall requirements must include the courses common to all Honours Applied Mathematics programs as given above and the following courses:

Three 400-level AM half-credits
Three additional 300- or 400-level AM half-credits

One additional half-credit chosen from:
CS 370 Numerical Computation
AM/PMATH 331 Real Analysis

Joint Honours Applied Mathematics

See page 13:2 for a complete description of Joint program requirements.

All of
AM 231 Calculus 4
AM 261 Newtonian Mechanics
AM/PMATH 332 Complex Analysis
AM 351 Ordinary Differential Equations
AM 353 Partial Differential Equations

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
All of
PHYS 121 Mechanics, Wave Motion and Heat 1
PHYS 122 Mechanics, Wave Motion and Heat 2

Honours Applied Mathematics with Engineering Electives (Co-operative only)
In conjuntion with the common degree requirements in Table I on page 13.4, this program requires at least 26 math half-credits. These overall requirements must include the courses common to all Honours Applied Mathematics programs as given above and the following courses:
Three 400-level AM half-credits
Three additional 300- or 400-level AM half-credits
All of
CS 230 Introduction to Computers and Computer Systems
One additional half-credit chosen from:
CS 370 Numerical Computation
AM/PMATH 331 Real Analysis
Two additional half-credits chosen from:
AM/PMATH 331 Real Analysis
CS 334 Data Types and Structures
CS 370 Numerical Computation
C&O 355 Linear Programming
C&O 370 Deterministic OR Models
PMATH 336 Introduction to Group Theory
STAT 333 Applied Probability
STAT 371 Stochastic OR Models
STAT 433 Stochastic Processes

Non-math courses required in Year One
Groups D and E require E&CE 100 in either term 1B or 2A. Group F requires CH E 100/101.

Non-math courses required in Years Two, Three and Four
One course per term from the chosen Engineering Group, normally selected from the following. (Consult the Applied Mathematics Undergraduate Handbook for more detailed listings, including course titles and terms in which the courses are normally taken.)

Group A
M E 219, 220;
Four of M E 351, CIV E 303, 313, 403, 404, 405, 413, 414

Group B
SY DE 252, 281, 372, 381
Two of SY DE 442, 444, 452, 533, 543

Group C
M E 219, 250, 351
Three of M E 353, 354, 452, 456, 459, 469, 557, 563

Group D
E&CE 100, 241

Group E
E&CE 100, 241
Four of E&CE 261, 342, 362, 370, 380, 463, 465, 481, 482

Group F
Six of CH E 100, 101, 021, 023, 025, 026, 030, 035, 036, 041
Optional Courses: CH E 033, 034, 038, 044, CHEM 026, 036

Mathematics
Applied Mathematics
Combinatorics and Optimization

Honours Applied Mathematics with Physics Electives
In conjunction with the common degree requirements in Table I 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:
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
CHEM 120 Physical and Chemical Properties of Matter
CHEM 123 Chemical Reactions, Equilibria, Kinetics

Honours 'X' with Applied Mathematics Minor
See 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 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 on page 13:5 and the following courses:

- **All of**
  - C&O 230 Introduction to Combinatorics

- **One of**
  - C&O 350 Linear Programming
  - 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 367 Nonlinear Optimization
  - C&O 430-466

- **All of**
  - PMATH 336 Introduction to Group Theory

- **Two of**
  - AM/PMAh 331 Real Analysis
  - AM/PMAh 332 Complex Analysis
  - PMATH 334 Introduction to Rings and Fields
  (AM/PMAh 331 may be replaced by one of CS 337, 370)

**Honours ‘X’ with Combinatorics and Optimization Minor**

See 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 Programming
  - 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 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 on page 13:5 and the following courses:

One of
C&O 350 Linear Programming
C&O 355 Mathematical Optimization

All of
C&O 361 Network Flow Theory
C&O 370 Deterministic OR Models
CS 230 Introduction to Computers and Computer Systems
CS 330 Management Information Systems
   (Alternate: CS 480)
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
ACC 121 Understanding and Using Financial Accounting Information
ECON 101 Introduction to Microeconomics
M SCI 211 Organizational Behaviour

Two of
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 page 13:15.)

Mathematics
Combinatorics and Optimization
Computer Science

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 centred 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 both 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, 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.

The Computer Science Department is considering introducing a continuation requirement for Computer Science majors. If approved by the Faculty and the University, it will apply to students entering the program in Fall, 1994 and later.

Honours Computer Science

In conjunction with the common degree requirements in Table I on page 13:1, 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 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

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 Numerical Solution of Differential and Integral Equations
- 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 Programming
- 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 page 13:2 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 351 Digital Design and Architecture
- CS 342 Concurrent Programming
- CS 360 Introduction to the Theory of Computing
- CS 370 Numerical 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

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 on page 13:1, 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 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 452 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 Programming
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

All of
E&CE 241 Circuit Analysis and Design
E&CE 222 Digital Computers
E&CE 223 Digital Circuits and Systems
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 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 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 448 Introduction to Database Management
CS 482 Techniques in Systems Analysis

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
C&O 350 Linear Programming

One of
C&O 342 Introduction to Graph Theory
C&O 370 Deterministic OR Models
STAT 331 Applied Linear Models
STAT 332 Sampling

Honours 'X' with Computer Science Minor
See 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.

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" described on page 13:21.
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 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 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 432, 444, 446, and 446 is required

Notes
The following requirements and recommendations also apply for the Joint Honours partners indicated:

1. AM: PMATH 353 required; PMATH 451, 453 strongly recommended
2. C&O: PMATH 444, 446, 448 at least one 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 page 13:3 for a complete description of Minor program requirements.

All of
PMATH 344 Abstract Algebra 2
PMATH 351 Real Analysis
PMATH 352 Complex Analysis

Three additional 300- or 400-level Group 2 PMATH half-credits.

One of
PMATH 441 Algebraic Number Theory
PMATH 444 Non-Commutative Algebra
PMATH 446 Group Theory
PMATH 448 Commutative Algebra
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 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 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 Programming
CS 337 Introduction to Numerical Analysis

Mathematics

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 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, 211, 311, 432, 452, 461

Mechanical

M E 215, 219, 250, 321, 341 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, 384, 432, 544, 555
PHYS 121/122

* Details are available in the Statistics Undergraduate Studies Handbook.
An Option in Statistics for students in the Faculty of Engineering is described on page 10:12.

Honours 'X' with Statistics Minor
See 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.

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/Business 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 (see page 13:9) and Computer Science/Information Systems (see page 13:12), 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 (see pages 13:17 and 13:18).

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).

Note
Because the current cross-registration agreement between UW and WLU applies only for students who are carrying a full-time course load at their home institution, UW students in programs requiring WLU BUS courses should plan their term-by-term course selection to ensure that they will be simultaneously enrolled in at least three UW half-credit courses whenever they are registering for one or more WLU BUS courses.

BUSINESS ADMINISTRATION
The Mathematics/Business Administration program provides an opportunity to combine courses in Actuarial Science, Computer Science, Optimization, and Statistics with courses in Accounting, Business, Economics, and Management Science. Graduates of this program 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 Program
In conjunction with the common degree requirements in Table I 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 on page 13:5, one of the course packages (a)-(d) listed below, and the following non-math courses:

All of
ACC 121 Understanding and Using Financial Accounting Information
ACC 122 Understanding and Using Managerial Accounting Information
ACC 371 Managerial Finance 1
ACC 372 Managerial Finance 2
BUS 111W Introduction to Business Organization
BUS 121W Functional Areas of the Organization
BUS 352W Marketing I
BUS 454W Human Resources Management in Canada
BUS 481W Business Policy I
BUS 491W Business Policy II
ECON 101 Introduction to Microeconomics
ECON 102 Introduction to Macroeconomics
M SCI 211 Organizational Behaviour
M SCI 311 Organizational Design and Technology
MTHEL 100 Commercial and Business Law for Mathematics Students

On entering Year Three of this program, students must register for one of packages (a)-(d) below:

a) Information Systems Package

All of
C&O 350 Linear Programming
CS 230 Introduction to Computers and Computer Systems
CS 330 Management Information Systems
CS 338 Computer Applications in Business: Databases
CS 432 Business Systems Analysis
STAT 331 Applied Linear Models
One of
C&O 367 Nonlinear Programming
C&O 370 Deterministic OR Models
C&O 453 Network Design
C&O 454 Scheduling
PMATH 380A Introduction to Information Theory

One of
STAT 332 Sampling
STAT 333 Applied Probability
STAT 335 Statistical Process Control
STAT 443 Forecasting

One additional 300- or 400-level CS half-credit

One additional 300- or 400-level math half-credit

All of
BUS 362W Marketing II
M SCI 432 Introduction to Production Management

b) Optimization Package

All of
C&O 350 Linear Programming
C&O 351 Network Flow Theory
C&O 370 Deterministic OR Models
CS 330 Management Information Systems
CS 338 Computer Applications in Business: Databases
STAT 331 Applied Linear Models

Two of
C&O 367 Nonlinear Programming
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

One of
STAT 332 Sampling
STAT 333 Applied Probability
STAT 335 Statistical Process Control
STAT 443 Forecasting

One additional 300- or 400-level math half-credit

All of
BUS 362W Marketing II
M SCI 432 Introduction to Production Management

c) Statistics Package

All of
C&O 350 Linear Programming
CS 330 Management Information Systems
CS 338 Computer Applications in Business: Databases
STAT 331 Applied Linear Models
STAT 332 Sampling
STAT 335 Statistical Process Control
STAT 443 Forecasting

One of
C&O 367 Nonlinear Programming
C&O 370 Deterministic OR Models

Mathematics

One of
C&O 453 Network Design
C&O 454 Scheduling

One of
STAT 333 Applied Probability
STAT 430 Experimental Design
STAT 440 Statistical Computing

One additional 300- or 400-level math half-credit

All of
BUS 362W Marketing II
M SCI 432 Introduction to Production Management

d) Risk Management and Insurance Package

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 Programming
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
MTHEL 305A General Life Insurance 1
MTHEL 305B General Life Insurance 2

Recommended courses
DRAMA 223 Public Speaking (for all four packages)
ACTSC 221 Mathematics of Investment (for packages (a)-(c) above)

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 on page 54). Students are exempted from paying co-op fees for their 1A and 1B terms.
During their first three terms of study, Math/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 Program (Co-operative only)
In conjunction with the common degree requirements in Table I 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 on page 13:5 and the following courses:

All of
C&O 350 Linear Programming
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)

All of
ACC 128 Core Concepts of Accounting Information 1
ACC 131 Management 1
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 BMaMath/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 through 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 (CAV) and major average (MAV) requirements specified in Table I on page 13:4 (which includes the degree requirements common to all BMaMath Honours programs) and described in detail in sections 1 through 4 on pages 13:22 and 13:23.

4. There is virtually no flexibility for altering the academic/work-term sequences prescribed for the Mathematics/Accountancy programs (see page 5:4) because of limited term offerings and structured prerequisites for most ACC courses. Since deviations from these sequences 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 Standing and Promotions Committee and the Department of Co-operative Education and Career Services, to gain employment for all four available work terms, but are unsuccessful 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 Standing and Promotions Committee, be granted a Regular Honours BMaMath/Accounting degree.
Eligibility for UW's Master of Accounting (MAcc - CA Studies) Program

BMath 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 BMath undergraduate program.

a) All of
   M SCI 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

b) 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 in (a) 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 take 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 Program (Co-operative only)

In conjunction with the common degree requirements in Table I 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 on page 13:5 and the following courses:

All of
   C&O 350 Linear Programming
   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)

One English writing-skills course (one of ENGL 210C, 210E, 210F, or an approved equivalent)

All of
   ACC 128 Core Concepts of Accounting Information 1
   ACC 131 Management 1
   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 454 Comprehensive/Operational Auditing
   ACC 465 Taxation Decision Making
   BUS 352W Marketing I
   ECON 101 Introduction to Microeconomics
   ECON 102 Introduction to Macroeconomics
   M SCI 211 Organizational Behaviour
   M SCI 432 Introduction to Production Management
   MTHEL 100 Commercial and Business Law for Mathematics Students

Notes
1. Notes 1 through 9 following the degree requirements for the Honours Mathematics/Chartered Accountancy program also apply to Honours Mathematics/Management Accountancy.

2. After completion of their University course work, Ontario students seeking their Certified Management Accountant (CMA) professional designation must write the Professional Studies Entrance Examination of the Society of Management Accountants of Canada (SMAC). Successful candidates are then eligible to enter the first year of the two-year Professional Program presented by the Society of Management Accountants of Ontario (SMAO), concluding with a CMA designation. The Professional Program is taken simultaneously with holding full-time employment.
within an accounting/business environment approved by the SMAO.

At the time of this Calendar printing, the Mathematics/Management Accountancy program requirements listed above include all the formal University course work presently required to challenge the SMAC's Entrance Examination. There are, however, a number of further courses that Accounting professionals feel provide very valuable additional background for the SMAO's Professional Program and a subsequent career in Management Accounting. In fact, in the near future, it is anticipated that two of the courses in question, ACC 480 and ACC 487, may become required courses to challenge the SMAC's Entrance Examination. For these reasons, it is strongly recommended that graduates of the Mathematics/Management Accountancy program who are planning to seek their CMA designation should include ACC 480, ACC 487 and at least three further courses, from the following list, in their undergraduate course work. 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.

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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 the University of Western Ontario. 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 Chart on page 5:4.) Details concerning this and the Faculty of Education component are available from the Academic Advisors or the Co-ordinator for this Option.

Honours Mathematics/Teaching Option (Co-operative only)

In conjunction with the common degree requirements in Table I 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 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 Programming

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
Mathematics
Teaching Option
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 1 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 on page 13:5 and the following courses:

All 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 Programming

All of
- CS 230 Introduction to Computers and Computer 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

One of
- PMATH 330 Introduction to Mathematical Logic
- PMATH 340 Elementary Number Theory
- PMATH 360 Geometry

One of
- AM/PMATH 331 Real Analysis
- AM/PMATH 332 Complex Analysis

One of
- PMATH 334 Introduction to Rings and Fields
- PMATH 336 Introduction to Group Theory

One of
- STAT 331 Applied Linear Models
- STAT 332 Sampling
- STAT 333 Applied Probability

All of
- MTHEL 206A Introduction to Mathematics Education
- SOC 207 Sociology of Education

Recommended non-math half-credits include
- PSYCH 212 Educational Psychology
- PSYCH 213 Exceptional Children
- PHIL 311 Philosophy of Education 1
- PHIL 312 Philosophy of Education 2
- MTHEL 102 Uses and Abuses of Statistics

Notes
1. Successful completion of the academic requirements for any of the Departmental Honours programs 'X' in the Faculty of Mathematics will be accepted as a replacement for the math course requirements listed above. Students who elect this option will be designated by a program label such as "Honours 'X'/Teaching Option" rather than "Honours Math/Teaching Option". (Since 3B and 4B courses are not normally offered in the Spring term, it will be difficult to satisfy this alternative.)

2. The Bachelor of Education requirements are completed during a four-month academic term at the Faculty of Education at the University of Western Ontario in London. This term occurs after all other components of the program have been completed.

3. The selection of courses required for the BMath Teaching Option must include a second teaching subject in one of the following disciplines: Biology, Chemistry, Computer Science, Environmental Studies, General Science, or Physics. Six half-credits are required to qualify for a second teaching subject, except for Computer Science, which requires only four half-credits.
Mathematics
Three-Year General Program
Combination Honours Programs

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 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
C&O 127 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
C&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
CS 212 Programming Principles and Practice
or
CS 212 Programming Principles and Practice
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 Officer of the appropriate department in the Faculty of Mathematics for advice in selecting their "additional" math half-credits.
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.

Note
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.

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:

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

FACULTY POLICIES

The degree requirements described below apply only to students whose initial registration as BMath degree candidate 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.

a) 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.

b) 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.

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.
c) For all Joint and Double Honours programs within the Faculty that involve Computer Science as one of the major disciplines, there will be two major averages, a CS major average and a 300/400-level math major average, both calculated as above. The major average graduation requirement in Table 1 on page 34 and the continuation requirement in section 4 below will apply to both averages in such programs.

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.
   a) if CAV ≥ 60%, a student is "In Good Standing";
   b) if CAV < 60%, a student is "On Academic Probation."
3.4 a) After a full-time term on academic probation, 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 2.1.
   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 BMth 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 Chapter 1 of this calendar, 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 exami-
nation 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 stu-
dent is concerned that he/she will otherwise fail the
course. A grade of INC which is not cleared by the dead-
line set by the instructor, which will be no later than eight
months after the end of term, will be automatically convert-
ed 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 stu-
dent 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 MU0. 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 con-
cerns 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 pol-
icy. Students who voluntarily withdraw prior to or during the
full refund period (see page 3:3) will not have the term
recorded on their academic record. Students who volun-
tarily 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 reg-
istered 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 insti-
tutions attended in the interim, must be included. If the stu-
dent 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 con-
sidered by the S&P Committee, which consists of a represen-
tative 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 certifi-
cate). 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 appropri-
ate action immediately. Petitions of this nature must be
made before the end of the lecture period.

12.2 Illness During the Exam Period
i) If a student becomes ill during the exam period and as
a result misses an exam, he/she must provide a medici-

cal certificate to the Mathematics Undergraduate Office
(MU0) as soon as possible, but no later than the end
of the exam period. The MU0 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 (i). 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.

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 80% 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 less 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 Overlap 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 table on page 5:6). 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

Science students obtain hands-on experience in labs related to their studies.
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 a three-year General non-specialized program. 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.

Admission

The admission categories, requirements and procedures for all programs are outlined in Chapter 2 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 on page 14:6.

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 page 3:3 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 not to duplicate subject matter. Credit will only be given for one of such overlapping courses (e.g. CHEM 266 or 264; PHYS 111/112 or 121/122).

This rule 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 taken during the fourth year of an undergraduate program provided this course is not used for credit toward her/his undergraduate degree. Prior approval of the Faculty Graduate Studies Committee must be obtained for students wishing to do so.

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. Further details concerning University Examination Regulations can be found in Chapter 1.

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 fifteen, Year Three; and those with at least fifteen, 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 average. 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 reports 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
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 re-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 (also see chapter 16).

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 80%, 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 prevented completion of a course. Petitions must be presented within six months after the end of the term in which the event or events which led to the submission of the petition took place.
A re-assessment of an examination may be requested by a student who is convinced that the mark assessed is unreasonable. Whenever possible, an informal approach to the person whose judgement is being questioned should precede a formal appeal or request for a re-assessment. Properly documented reasons must be provided for all petitions, formal appeals or requests for a re-assessment. Mere dislike of a low mark is not a sufficient reason to request a re-assessment. Please refer to Student Grievance Policy (UW Policy #70) page 1:10 for more details.

### 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 127/128, PHYS 121/122, 121L/122L</td>
</tr>
<tr>
<td>Chemical Physics (see Note 5)</td>
<td>CHEM 121/125, 120L/123L, 129, PHYS 101, 121/122, 121L/122L, 123, MATH 127/128, 125 or 136</td>
</tr>
<tr>
<td>Environmental Chemistry</td>
<td>CHEM 121/125, 120L/123L, 129, PHYS 121/122, 121L/122L, 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 PHYS 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>Optometry (consult page 14:34 for full list of prerequisites for admission to Optometry) (see Note 5)</td>
<td>BIOL 230, 231, 250, 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 101, 121/122, 121L/122L, 123, 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 page 14:8 and 14:9.)</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</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>Applied Chemistry (see Note 2)</td>
<td>CHEM 121/125, 120L/123L, 129, MATH 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>Applied Earth Sciences (Environmental Hydrogeology Option) (see Note 3)</td>
<td>EARTH 121/122, 121L/122L, CHEM 120/123, 120L/123L, PHYS 121/122, 121L/122L, MATH 107/108, CS 102</td>
</tr>
<tr>
<td>Applied 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</td>
</tr>
<tr>
<td>Applied Earth Sciences (Geophysics Option) (see Note 3)</td>
<td>EARTH 121/122, 121L/122L, MATH 127/128, PHYS 121/122, 121L/122L, CHEM 120/123, 120L/123L, CS 102, MATH 115 or 125</td>
</tr>
<tr>
<td>Co-op 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-op 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>Applied Physics (see Notes 1, 2 and 5)</td>
<td>PHYS 010, 121L/122L, 121L/122L, 123, 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.

   Students wishing a Biophysics Option with the Honours Physics program are advised to include BIOL 111/112 in their program.

   Students wishing any of the Business Administration Options with the Honours Physics program are advised to select ECON 101/102.

2. Students in the Co-operative Biology, Biochemistry, Chemistry, and Physics programs have two methods of taking Year One:

   (a) two terms in a row "8-stream" (September-April) or (b) Fall term on campus "4-stream" (September-December), Winter term at work (January-April) and Spring term on campus (May-August).

   Only 8-stream is available for students in Co-operative Environmental Chemistry and Environmental Science, Programs 1 and 2.

3. CS 100 must be taken before CS 102 by students with no computing background from high school.

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
   - **Chemistry (Math Option):** (This program begins in Year Two.) MATH 125 in Year One and one CS elective in Year One or Year Two
   - **Chemical Physics:** ENGL 109, 140; PHIL 215
   - **Environmental Science Programs 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.
   - **Honours Psychology/Science:** One of PSYCH 207, 211, 253, 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:
   a) 14.0 must be lecture credits;
   b) 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;
   c) at least 7.5 must be at or above the 200-level;
   d) 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.

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, 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 page 14:18).
Program 4: Earth Sciences specialization (see page 14:30).
Honours Science and Business (see page 14:9).
Honours Environmental Science Programs 1 and 2 (see page 14:10).

**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:
   a) at least 19.0 credits must be lecture credits;
   b) 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 111/112 or two 200-level Biology courses;
   b) CHEM 120/123 plus labs or CHEM 121/125 plus labs;
   c) EARTH 121/122 plus labs;
   d) PHYS 111/112 plus labs or PHYS 121/122 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 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:
   a) at least 20.0 credits must be lecture credits;
   b) 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 300-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; MATH 107/108; CS 100 or elective**, CS 102, SCI 040 (BUS)

   **Year Two**
   - ECON 101/102; ACC 121/122 (or BUS 227W/247W instead of ACC 121/122); CS 212; one first-year Science course*, SCI 040 (BUS)

   **Year Three**
   - M SCI 211, 331; CS 330, SCI 040 (BUS)
   - Year Three or Four
   - SCI 333
   - Year Four
   - M SCI 431 or 432, SCI 040 (BUS)

   * first-year Science course sequences are:
   a) any two 200-level Biology courses
   b) CHEM 120/123 plus labs or 121/125 plus labs
   c) EARTH 121/122 and 121/122L
   d) PHYS 121/121L, 122/122L or 111/111L, 112/112L, or 121/121L, 112/112L
   At least three of the course sequences (a), (b), (c) and (d) 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 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 300-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 and EARTH 121L Introduction to Earth Science 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 211 Introductory Vertebrate Zoology
- BIOL 221 Plant Biology 2 – The Diversity of Plants
- CHEM 237 Introductory Biochemistry
- CHEM 266 Basic Organic Chemistry 1
- CHEM 223 Analytical Chemistry
- CHEM 223L Analytical Chemistry Laboratory 1
- ENS 201 Introduction to Environmental and Social Impact Assessment
- GEOG 201 Geomorphology and Soils or EARTH 342 Applied Geomorphology
### Environmental Science Program 2

#### Year One
- **PHYS 111/112**, **111L/112L** replaces **BIOL 211** and one elective, from Program 1.

#### Year Two
- **AM 250** or **MATH 228**, **BIOL 230, 241**; **CHEM 223/223L**, **266**; **PHYS 222, 223**, **SCI 040 (ENS)**;
- Three electives (1.5 credits)

#### Recommended Electives: **PHYS 259**, **ERS 241**, **GEOG 102**, **ENV S 185** and **ENV S 201**; Any of **ENGL 210C, 210E or 210F**. Three electives (1.5 credits)

#### Years Three and Four
- **BIOL 454**; **CHEM 237, 254**, **303, 305**; **EARTH 123, 358**; **SCI 040 (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

#### Fall
- **Year 1A**
  - **BIOL 240, 250**
  - **CHEM 120/120L**
  - **EARTH 121/121L**
  - **MATH 107**
  - **SCI 040 (ENS)**

- **Year 2A**
  - **BIOL 210**
  - **CHEM 266**
  - **ENVS 201**
  - **GEOG 201** or **EARTH 342**
  - One elective (0.5)*

#### Winter
- **Year 1B**
  - **BIOL 211**
  - **CHEM 123/123L**
  - **CHEM 129**
  - **MATH 108**
  - **SCI 040 (ENS)**

- **Year 2B**
  - **BIOL 221**
  - **CHEM 237**
  - **CHEM 223/223L**
  - **ERS 241**
  - One elective (0.5)*

#### Spring
- **Work Term**
  - **SCI 040 (ENS)**

### Work Term
- **Year 3A**
  - **CHEM 357**
  - **CIV E 375**
  - **EARTH 358**
  - Two electives (1.0)

#### Year 3B
- **Electives (2.5)**
- **SCI 040 (ENS)**

#### Year 4A
- **Electives (2.5)**
- **SCI 040 (ENS)**

### Note
- **BIOL 240** should be completed by the end of Year Two.
- **Year One** Recommended Electives: **BIOL 273; CS 102; STAT 202, GEOG 102**
- **Year Two** Recommended Electives: **BIOL 241, any of ENGL 210C, 210E or 210F**
- **Year Three** Recommended Electives: **BIOL 447, 450, 455, 456; CHEM 254; CIV E 472, 486; EARTH 456, 458, EARTH 436A/B**
- **Courses shown in 3A and 3B can be interchanged with courses taken in 4A and 4B.**

### HONOURS CO-OPERATIVE ENVIRONMENTAL SCIENCE - PROGRAM 2

#### Fall
- **Year 1A**
  - **CHEM 120/120L**
  - **PHYS 111/111L**
  - **MATH 107**
  - **EARTH 121/121L**
  - **BIOL 240**
  - **SCI 040 (ENS)**

- **Year 1B**
  - **CHEM 123/123L**
  - **PHYS 112/112L**
  - **MATH 108**
  - **CHEM 129**
  - **SCI 040 (ENS)**

- **Year 2**
  - **Elective (0.5)*

#### Winter
- **Work Term**
  - **SCI 040 (ENS)**

#### Spring
- **Work Term**
  - **SCI 040 (ENS)**

(continued on next page)
Departmental Programs – Biology

The Honours Chemistry programs (including Co-op Applied Chemistry and Honours Biochemistry) are normally limited by the available physical facilities to the best qualified students. Those who have failed core courses should not expect to proceed in any Honours Chemistry program.

Enrolment is limited to approximately 45 students in Year Two of all Earth Sciences programs. Selection is made on the basis of academic standing in Year One, including standing in EARTH 121 and 122.

Refer to the specific departmental sections for the degree requirements of the above programs.

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 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, D. Barton, 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 266/266L 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 and PHYS 301

**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 (see page 14:27). 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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**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 continuation in, Honours Biochemistry requires a cumulative average of 60% and a cumulative average of 60% in Chemistry courses and 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 428, 432X, 433X, 434, 436, 439, 440, 441, 442, 499A/B

CHEM 432, 433, 434, 435, 492A/B

† Students contemplating a "Minor in Chemistry" must take Honours-level Chemistry courses (see page 14:27). 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 (Biototechnology Option)
For program information see page 14:17.

Honours Biology and Chemistry
For program information see page 14:17.

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;
   a) 9.0 credits approved by the Department of Biology;
   b) 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.

<table>
<thead>
<tr>
<th>Year One</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.0 Biology credits from: BIOL 210, 211, 220, 221, 230, 239, 240, 241, 250, 273</td>
</tr>
<tr>
<td>CHEM 120/120L and 123/123L</td>
</tr>
<tr>
<td>ECON 101 and 102</td>
</tr>
<tr>
<td>ACC 123</td>
</tr>
<tr>
<td>CS 102*</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Year Two</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.0 Biology credits from: BIOL 210, 211, 220, 221, 230, 239, 240, 241, 250, 273</td>
</tr>
<tr>
<td>CHEM 266/266L and 237/237L</td>
</tr>
<tr>
<td>ECON 201, 202, 211 and 221</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Year Three</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.5 credits in Biology at the 400-level</td>
</tr>
<tr>
<td>ECON 231, and 355 or 344*</td>
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<tr>
<td>ACC 231</td>
</tr>
<tr>
<td>0.5 credit from the following: ECON 301, 302, 321, 341, 344, 345, 351, 401, 402, 403, BUS 352W†** plus 0.5 credit elective (ENGL 209 is recommended)</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Year Four</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.5 credits in Biology at the 400-level</td>
</tr>
<tr>
<td>2.0 credits from ECON 301, 302, 321, 341, 344, 345, 361, 401, 402, 403, BUS 352W †** plus 0.5 credit elective</td>
</tr>
</tbody>
</table>

* 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 continuance 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. Of the 21.0 credits required, 7.0 credits must be approved by the Biology Department, and 6.5 credits must be in the appropriate department of the Faculty of Environmental Studies, or equivalent.
3. STAT 202 and CS 102.
4. CHEM 120/120L, 123/123L, 266/266L and 237/237L.
5. In exceptional cases for truly outstanding students, this program may be taken as a Co-operative option; however, it is the intention of the Biology Department that no more than five students be enrolled in any given year.
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 D. Barton, 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 Chapter 5.

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 continuance 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 2B, students should have completed the ten introductory Biology courses at the 200-level, and CS 102.
3. 13 400-level Biology courses.
4. Four satisfactory work-term 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 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.

Stream 8

(Students who take Year 1B during Winter Term)

<table>
<thead>
<tr>
<th>Fall</th>
<th>Winter</th>
<th>Spring</th>
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</thead>
<tbody>
<tr>
<td>Year 1A</td>
<td>Year 1B</td>
<td>Work Term</td>
</tr>
<tr>
<td>BIOL 230</td>
<td>BIOL - 1.0 or 1.5</td>
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</tr>
<tr>
<td>BIOL 240</td>
<td>200-level credits</td>
<td></td>
</tr>
<tr>
<td>CHEM 120/120L</td>
<td>CHEM 123/123L</td>
<td></td>
</tr>
<tr>
<td>Electives - 1.0 credit</td>
<td>Electives - 1.0 or 0.5 credit</td>
<td></td>
</tr>
<tr>
<td>Year 2A</td>
<td>Work Term</td>
<td>Year 2D</td>
</tr>
<tr>
<td>BIOL - 1.0 200-level credit</td>
<td>BIOL - 1.0 or 1.5 200-level credits</td>
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<tr>
<td>CHEM 266T/266L</td>
<td>CHEM 226t</td>
<td></td>
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<tr>
<td>CHEM 237T/237L</td>
<td>Electives - 1.0 or 0.5 credit (CHEM 267T is recommended)</td>
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<tr>
<td>STAT 202</td>
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Work Term | Year 3A  |
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<tbody>
<tr>
<td>BIOL - 1.5 or 2.0 400-level credits</td>
<td>Electives - 0.5 credit (Biochemistry courses are recommended)</td>
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</tbody>
</table>

Stream 4

(Students who take Year 1B during Spring Term)

<table>
<thead>
<tr>
<th>Fall</th>
<th>Winter</th>
<th>Spring</th>
</tr>
</thead>
<tbody>
<tr>
<td>Year 1A</td>
<td>Work Term</td>
<td>Year 1B</td>
</tr>
<tr>
<td>BIOL 230</td>
<td></td>
<td>BIOL - 1.0 or 1.5</td>
</tr>
<tr>
<td>BIOL 240</td>
<td></td>
<td>200-level credits</td>
</tr>
<tr>
<td>CHEM 120/120L</td>
<td>CHEM 123/123L</td>
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<tr>
<td>Electives - 1.0 credit</td>
<td>Electives - 1.0 or 0.5 credit</td>
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</tr>
<tr>
<td>Work Term</td>
<td>Year 2A</td>
<td>Work Term</td>
</tr>
<tr>
<td>BIOL - 1.0 or 1.5 200-level credits</td>
<td>BIOL - 1.5 or 2.0 400-level credits</td>
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</tr>
<tr>
<td>CHEM 266T/266L</td>
<td>CHEM 226t</td>
<td></td>
</tr>
<tr>
<td>STAT 202</td>
<td>Electives - 1.0 credit</td>
<td>Electives - 0.5 credit</td>
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</tbody>
</table>

Work Term | Year 3A  |
<table>
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<tr>
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</thead>
<tbody>
<tr>
<td>BIOL - 1.5 or 2.0 400-level credits</td>
<td>Electives - 0.5 credit (CHEM 267T or CHEM 333 are recommended)</td>
</tr>
</tbody>
</table>
Stream 4 and Stream 8

<table>
<thead>
<tr>
<th>Fall</th>
<th>Winter</th>
</tr>
</thead>
<tbody>
<tr>
<td>Year 4A BIOL - 1.5 400-level credits</td>
<td>Year 4B BIOL - 1.5 400-level credits</td>
</tr>
<tr>
<td>Electives - 1.0 credit</td>
<td>Electives - 1.0 credit</td>
</tr>
<tr>
<td>(Biochemistry courses are recommended)</td>
<td>(Biochemistry courses are recommended)</td>
</tr>
</tbody>
</table>

Since some fourth-year courses are offered in alternate years only, Biology major students are advised to plan their third-and fourth-year courses simultaneously.

† Students contemplating a “Minor in Chemistry” must take Honours-level Chemistry courses (see page 142). 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 a Minor with the Undergraduate Officer in Chemistry.

* Only students in stream 8, Cooperative Biology may take CHEM 237/237L concurrently with 266/266L. Students in this stream may opt to defer CHEM 237/237L to a later term if they do not wish to take additional biochemistry courses.

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 4 and Stream 8

Fall | Winter | Spring
--- | --- | ---
Year 4A | Year 4B | Year 4C
Electives* (2.5 credits) from Groups below | Electives* (2.5 credits) from Groups below | Electives* (2.5 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)

Honours Co-operative Biochemistry (Biotechnology Option)
Program Advisors: Professor L.J. Brubacher (Chemistry) and Professor M. Globus (Biology)

The Biotechnology Option comes into effect in Year Three. Although this Option is set up in Co-operative format, it is also available for students in the Regular system of study.

Stream 8
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.

Fall | Winter | Spring
--- | --- | ---
Year 3A | Work Term | Year 3A
BIOL 436 | BIOL 437 | BIOL 440
BIOL 439 | BIOL 454 | BIOL 458
CHEM 357 | CHEM 333 | CHEM 368/368L
CHEM 368/368L | | 
PhyS 381 | Work Term |

Work Term | Year 3B | Work Term
--- | --- | ---
BIOL 436 | BIOL 439 | CHEM 357/333L
| | Electives* (0.5 credits) from Groups below
| | Elective (0.5 credits)

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
(Student who take Year 1B in Winter Term)

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<td>PHYS 121/121L or 111/111L</td>
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Honours Co-operative Biology/Business Economics
Program Advisors: Professor M. Globus (Biology) and Professor E. Carvalho (Economics). See page 14:14.

HONOURS SCIENCE PROGRAM 2
(With Specialization in Biology)
Program Advisors: Professors B. Barton, W.R. Hawthorn, M. Griffith, H. Smith, and Mr. N. Scott.

Admission to, and continuance in, Honours Science Program Two 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
   a) at least 19.0 must be lecture credits,
   b) 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 (see page 14:27). 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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**HONOURS SCIENCE PROGRAM 2**

(Pre-Health-Professions Option)

*Program Advisors: Professors D. Barton, W.R. Hawthorn, M. Griffith, R. Smith and Mr. N. Scott.*

This program combines the Honours Science Program Two 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, 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 Two (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:
   a) at least 19.0 must be lecture credits;
   b) 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, consult page 14:34 for requirements.

(continued on next page)
## HONOURS SCIENCE PROGRAM 2 (PRE-HEALTH-PROFESSIONS OPTION)

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<thead>
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<th>Year 1 (Winter)</th>
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<td>PHYS 112/112L</td>
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<td>HLTH 101, PSYCH 101</td>
<td>HLTH 102, SOC 101</td>
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<td>CHEM 266†/266L</td>
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<td>KIN 300, HLTH 341, 349</td>
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<td>PSYCH 361, 335, 357</td>
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<tr>
<td>HLTH 442</td>
<td>KIN 410, 416, HLTH 407, BIOL 439, PHYS 481</td>
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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 (see page 14:27). 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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## 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.
Chemistry

The following programs are offered in the Chemistry department:

**Honours Major Programs**

Regular:
Honours Biochemistry (joint with Biology Department, see page 14:13)*

Honours Biochemistry (Biotechnology Option) (joint with Biology Department, see page 14:17)*

Honours Biology and Chemistry (joint with Biology Department, see page 14:17)*

Honours Chemistry*

Honours Chemistry (with Options)
  a) Mathematics Option*
  b) Thesis Option*

Honours Chemical Physics (joint with Physics Department)*

Honours Environmental Chemistry*

Co-operative:

Honours Co-operative Biochemistry (joint with Biology Department, see page 14:16)*

Honours Co-operative Biochemistry (Biotechnology Option) (joint with Biology Department, see page 14:17)*

Honours Co-operative Biology and Chemistry (joint with Biology Department, see page 14:17)*

Honours Co-operative Applied Chemistry*

Honours Co-operative Applied Chemistry (with Options)
  a) Mathematics Option*
  b) Thesis Option*

Honours Co-operative Chemical Physics (joint with Physics Department)*

Honours Co-operative Environmental Chemistry*

**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: CH EM 218, 219, 228, 266, 267, 316, 366.

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.
## Technical Electives with Chemistry Content

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### Other Recommended Electives

- **Statistics**: STAT 204, 304, MTHEL 102
- **Environment**: ERS 337
- **Management Science**: MSC 211
- **Economics**: ECON 101, 102, 201, 202
- **Computing**: CS 212, 230, GEN E 121
- **Microprocessors**: E & CE 222, 223, 427, PHYS 353

- **Writing**: ENGL 210C or E
- **Law**: PSCI 291, 292, ENV S 201, ACC 231
- **Business (WLU)**: BUS 352, 362, 382, 383
- **Accounting**: ACC 121, 122
- **Critical Thinking**: PHIL 145
Honours Major Programs Regular

Honours Biochemistry
(see page 14:13)

Honours Biochemistry (Biotechnology Option)
(see page 14:17)

Honours Biology and Chemistry
(see page 14:17)

Honours Chemistry
Program Advisor: Professor G.E. Toogood

 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 page 14:22).

3. In Year Two, one of PHYS 222/252L, 252/252L, 256/256L, 259/259L.

4. Students are encouraged to include in their program an ethics course such as STV 100, PHIL 215, 226, 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 121/120L
PHYS 121/121L
MATH 127
Two electives (1.0 credit)

Winter
CHEM 125/123L, 129
PHYS 112/112L
MATH 123
One elective (0.5 credit)

Year Two
Fall
CHEM 10, 223/223L, 254/254L, 264
MATH 228
PHYS elective (0.75 credit) (Fall or Winter, see note 3 above)

Winter
CHEM 10, 212, 224L, 256, 265/265L
Two electives (1.0 credit)

Year Three
Fall
CHEM 10, 312/312L, 359, 362
Two electives (1.0 credit)

Winter
CHEM 10, 313, 323, 358/358L, 368/368L
One elective (0.5 credit)

Year Four
CHEM 10, 492A/B (1.5 credits)
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 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 McCourt (Chemistry) and to Mr. R.A. Pullin of the Department of Co-operative Education and Career Services.

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 222/252L 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 121/120L
PHYS 121/121L
MATH 127, 125 (or 115 or 136, Winter)
One CS elective (0.5 credit)

Winter
CHEM 125/123L, 129
PHYS 112/112L
MATH 128
One elective (0.5 credit) (MATH 126 recommended)

Year Two
Fall
CHEM 10, 223/223L, 254/254L, 294
MATH 226, 227P (or 217, or AM 231)

Winter
CHEM 10, 212, 224L, 256, 265/265L
PHYS elective (0.75 credit) (Fall or Winter, see note 2 above)
One elective (0.5 credit)

Year Three
Fall
CHEM 10, 312, 358
CS 212
PHYS 364
One elective (0.5 credit)

Winter
CHEM 10, 312L, 358L, 359
PHYS 365
Three electives (1.5 credits)

Year Four
CHEM 10, 492A/B (1.5 credits)
Three Chemistry electives (1.5 credits) mainly from 400-level courses
Three Mathematics electives (1.5 credits) from 300- or 400-level courses
Two other electives (1.0 credit)

HONOURS CHEMISTRY (Thesis Option)
Program Advisor: Professor S. Collins

Students who have achieved an average of 80% in all Chemistry courses, and 80% over all courses 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

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.

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.

For students enrolled in any Honours Chemical Physics Program at the end of Year Two:

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 continuation 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.
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 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.
<table>
<thead>
<tr>
<th>Year One</th>
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<tbody>
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<td><strong>Fall</strong></td>
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<tr>
<td>PHYS 10</td>
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<tr>
<td>CHEM 121/120L</td>
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<tr>
<td>PHYS 121/121L, 123</td>
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<tr>
<td>MATH 127, 125 or 136</td>
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<td><strong>Winter</strong></td>
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<tr>
<td>CHEM 125/123L, 129</td>
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<tr>
<td>PHYS 122/122L</td>
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<tr>
<td>MATH 128</td>
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<tr>
<td>One elective (0.5 credit)</td>
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<tr>
<td><strong>Recommended Year One Electives</strong></td>
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<tr>
<td>ENGL 109, 140R</td>
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<td>PHIL 215</td>
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<tr>
<td>CHEM 212, 254</td>
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<tr>
<td>PHYS 252/252L</td>
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<td>MATH 228</td>
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<td>One elective (0.5 credit)</td>
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<td><strong>Winter</strong></td>
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<tr>
<td>CHEM 10 or PHYS 10</td>
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<tr>
<td>CHEM 256 or PHYS 234</td>
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<tr>
<td>PHYS 253/253L</td>
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<td>MATH 217 or 227P</td>
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<td>Two electives (1.0 credit)</td>
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<tr>
<td><strong>Recommended Year Two Electives</strong></td>
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<tr>
<td>AM 251</td>
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<tr>
<td>CHEM 223/223L, 224L, 264</td>
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<tr>
<td>PHYS 256/256L, 259/259L, 263</td>
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<th>Year Three</th>
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<td><strong>Fall</strong></td>
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<tr>
<td>CHEM 10 or PHYS 10</td>
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<tr>
<td>CHEM 359</td>
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<tr>
<td>PHYS 360A or CHEM 254L</td>
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<tr>
<td>PHYS 364</td>
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<td>Three electives (1.5 credit)</td>
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<tr>
<td><strong>Winter</strong></td>
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<tr>
<td>CHEM 10 or PHYS 10</td>
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<tr>
<td>CHEM 313/312L, 450</td>
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<tr>
<td>PHYS 359 or CHEM 358</td>
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<tr>
<td>PHYS 360B or CHEM 358L</td>
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<tr>
<td>Three electives (1.5 credit)</td>
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<tr>
<td>or Two electives (1.0 credit)</td>
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<th>Year Four</th>
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<td><strong>Fall</strong></td>
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<tr>
<td>CHEM 10 or PHYS 10</td>
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<td>CHEM 312 or PHYS 435</td>
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<td>CHEM 452C or PHYS 434</td>
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<tr>
<td>CHEM 492A or PHYS 437A</td>
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<tr>
<td>One elective (0.5 credit)</td>
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<table>
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<tr>
<th>Winter</th>
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<tbody>
<tr>
<td>CHEM 10 or PHYS 10</td>
<td></td>
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<tr>
<td>CHEM 492B or PHYS 437B</td>
<td></td>
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<tr>
<td>Three electives (1.5 credits)</td>
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<tr>
<td><strong>Recommended Year Three and Year Four Electives</strong></td>
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<tr>
<td>AM 252</td>
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<tr>
<td>CHEM 323, 451, 454</td>
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<tr>
<td>PHYS 334, 352/352L, 353/353L, 365, 371A/B, 454</td>
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<table>
<thead>
<tr>
<th>Honours Environmental Chemistry</th>
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<tbody>
<tr>
<td>Program Advisor: Professor J.J. Sloan</td>
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</tr>
<tr>
<td>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:</td>
<td></td>
</tr>
<tr>
<td>1. 22.75 credits including 3.75 lab credits.</td>
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<tr>
<td>2. Students are encouraged to include in their program an ethics course such as STV 100, PHIL 215, 226, SCI 263, 265.</td>
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<tr>
<td>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.</td>
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<tr>
<td>4. Mandatory courses as listed below.</td>
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<th>Year One</th>
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<td><strong>Fall</strong></td>
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<tr>
<td>CHEM 121/120L</td>
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<tr>
<td>ENV S 195</td>
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<tr>
<td>MATH 127</td>
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<tr>
<td>PHYS 121/121L</td>
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<tr>
<td>One 200-level Biology elective (0.5 credit)</td>
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<tr>
<td>(BIOL 230, 240, recommended)</td>
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<tr>
<td><strong>Winter</strong></td>
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<tr>
<td>CHEM 125/123L, 129</td>
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<tr>
<td>MATH 128</td>
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<tr>
<td>PHYS 112/112L</td>
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<tr>
<td>BIOL 250 or ENV S 200</td>
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<tr>
<th>Year Two</th>
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<td><strong>Fall</strong></td>
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<tr>
<td>CHEM 10, 223/223L, 254, 264</td>
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<tr>
<td>MATI 1 or AM 250</td>
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<tr>
<td>ENV S 201</td>
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<tr>
<td><strong>Winter</strong></td>
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<tr>
<td>CHEM 10, 212, 224L, 256, 265/265L</td>
<td></td>
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<tr>
<td>ERS 241</td>
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<tr>
<td>One elective (0.5 credit) (any of ENGL 210C, 210E, 210F strongly recommended)</td>
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</table>

(continued on next page)
Year Three

Fall
CHEM 10, 237/237L (Fall or Winter), 359
GEOG 309
STAT 204
One elective (0.5 credit)

Winter
CHEM 10, 303, 323
Three electives (1.5 credits)

Year Four
CHEM 10, 305, 492A/B
Seven electives (3.5 credits)

The electives must include:
Four additional Chemistry courses (2.0 lecture credits)
(Recommended are: CHEM 312, 368, 412)
Four additional environmentally-related courses (2.0 credits) (Recommended are: BIOL 461; CH E 572, 574; ENV S 220; M E 469, 571; PHYS 480)

HONOURS MAJOR PROGRAMS CO-OPERATIVE

Honours Co-operative Biochemistry
(see page 14:16)

Honours Co-operative Biochemistry (Biotechnology Option)
(see page 14:17)

Honours Co-operative Biology and Chemistry
(see page 14:17)

Honours Co-operative Applied Chemistry
Program Advisor: Professor G.E. Toogood

This program, which offers the Honours Chemistry courses integrated with six four-month work terms, extends over four and two-thirds years. Information about the Co-operative system and the Department of Co-operative Education and Career Services can be found in Chapter 5. 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.

Admission to, and continuance in, Honours Co-operative Applied Chemistry requires an overall cumulative average of 60%. In addition, students must achieve a 60% average in all Chemistry lecture courses each term.

In order to graduate with an Honours Co-operative Applied 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 page 14:22).
3. Normally, full-time enrollment in one of Years Two and Three.

Stream 8

<table>
<thead>
<tr>
<th>Fall</th>
<th>Winter</th>
<th>Spring</th>
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<tbody>
<tr>
<td>CHEM 121/120L, 123/123L, 129</td>
<td>MATH 127</td>
<td>MATH 128</td>
</tr>
<tr>
<td>PHYS 121/121L</td>
<td>PHYS 112/112L</td>
<td>One elective</td>
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<tr>
<td>Two electives</td>
<td>(1.0 credit)</td>
<td>(0.5 credit)</td>
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<tr>
<td>Work Term</td>
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<td>Year 2B</td>
</tr>
<tr>
<td>CHEM 10, 212, 233/233L, 254/254L, 264</td>
<td>MATH 228</td>
<td>Two electives</td>
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<td>Two electives</td>
<td>(1.0 credit)</td>
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Stream 4

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<tr>
<th>Fall</th>
<th>Winter</th>
<th>Spring</th>
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<tbody>
<tr>
<td>CHEM 121/120L, 123/123L, 129</td>
<td>MATH 127</td>
<td>MATH 128</td>
</tr>
<tr>
<td>PHYS 121/121L</td>
<td>PHYS 112/112L</td>
<td>One elective</td>
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<tr>
<td>Two electives</td>
<td>(1.0 credit)</td>
<td>(0.5 credit)</td>
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<tr>
<td>Work Term</td>
<td></td>
<td>Year 2B</td>
</tr>
<tr>
<td>CHEM 10, 212, 233/233L, 254/254L, 264</td>
<td>MATH 228</td>
<td>Two electives</td>
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<td>Two electives</td>
<td>(1.0 credit)</td>
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Both Stream 4 and Stream 8

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<tr>
<th>Fall</th>
<th>Winter</th>
<th>Spring</th>
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<tbody>
<tr>
<td>CHEM 10, 313, 323, 358/358L, 368/368L</td>
<td>One elective</td>
<td>(0.5 credit)</td>
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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.

MINOR IN CHEMISTRY
In order to graduate with a Minor in Chemistry the following requirements must be met.

A student with more than three 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, 120U/123L, 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 Applied Earth Sciences (Environmental Hydrogeology Option)
Co-op Applied Earth Sciences (Geology Option)
Co-op Applied Earth Sciences (Geophysics Option)

Honours Science Program Four (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:

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<tr>
<td>100-level Science/</td>
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<td>200-level or higher</td>
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<td>Mathematics, Science, Engineering</td>
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<td>Geography/</td>
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<tr>
<td>Non-credit field courses</td>
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</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 E 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 121/122 and 121U/122L
- CHEM 120/123 and 120U/123L
- PHYS 121/122 and 121U/122L
- CS 102
- MATH 107/108
- One elective (0.5 credit)

**Year Two**
- EARTH 221, 231, 232, 235, 236, 238, 260
- ENGL 210C
- Two electives (1.0 credits)

**Year Three**
- EARTH 331, 332, 333, 336, 342, 345, 355, 370, 390
- Four electives (2.0 credits)

**Year Four**
- EARTH 427, 436A/B, 440, 490
- 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 on page 14:28, 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**
- EARTH 121/122, 121U/122L
- CHEM 120/123 and 120U/123L
- GEOG 101/102
- CS 102
- either PHYS 111/112 and 111U/112L or BIOL 111/112 or equivalent, plus one elective (0.5 credit)

**Year Two**
- EARTH 221, 231, 232, 235, 236, 238
- ENV S 200
- GEOG 202A and one of GEOG 208, 275 or 309
- One elective (0.5 credit)

**Year Three**
- EARTH 331, 332, 333, 336, 342, 345, 370, 390
- ENGL 210C
- Two Geography electives (1.0 credit)
- Two unrestricted electives (1.0 credit)

**Year Four**
- EARTH 427, 436A/B, 440, 490, 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 APPLIED EARTH SCIENCES

The Co-operative Applied 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. See Chapter 5 for further information regarding the Co-operative system of study, and page 54 for the Co-op chart outlining the normal progression for Co-operative Earth Sciences students.

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 Applied Earth Sciences (Geology Option)**

**Year One**
- EARTH 121/122 and 121U/122L
- CHEM 120/123 and 120U/123L
- PHYS 121/122 and 121U/122L
- CS 102
- MATH 107/108
- One elective (0.5 credit)

**Year Two**
- 2A
- EARTH 231, 235, 236, 260
- One elective (0.5 credit)

- 2B
- EARTH 221, 232, 238
- ENGL 210C
- One elective (0.5 credit)

**Year Three**
- 3A
- EARTH 332, 333, 345, 370, 390
- Two electives (1.0 credit)

- 3B
- EARTH 331, 336, 342, 355
- Two electives (1.0 credit)

**Year Four**
- Identical to the regular program in Honours Earth Sciences (see page 14:29)
Co-operative Applied 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 geotechnical careers.

Year One
EARTH 121/122 and 121L/122L
PHYS 121/122 and 121L/122L
CHEM 120/123 and 120L/123L
CS 102
MATH 127/128, 115 or 125

Year Two
2A
EARTH 231, 235, 260
MATH 227P or CIV E 221
ENGL 210C
One elective (0.5 credit) from Physics, Chemistry, Mathematics, Computer Science, Engineering or Geography Remote Sensing

2B
EARTH 221, 232, 238
MATH 228 or CIV E 222
One elective (0.5 credits) from Physics, Chemistry, Mathematics, Computer Science, Engineering or Geography Remote Sensing

Year Three
3A
EARTH 333, 358, 360, 370, 390
One elective (0.5 credit) from Physics, Chemistry, Mathematics, Computer Science, Engineering or Geography Remote Sensing

3B
EARTH 236, 355, 458
One elective (0.5 credit) from Physics, Chemistry, Mathematics, Computer Science, Engineering or Geography Remote Sensing
One Arts elective (0.5 credit)
One unrestricted elective (0.5 credit)

Year Four
EARTH 427, 436A/B, 438, 440, 456, 458, 459, 490
Two electives* (1.0 credit)

Recommended Electives
PHYS 246, 252, 253, 256, 259, 352, 353, 364, 365
CS 212, 230, 316
CIV E 375, 381, 472, 473, 486
CHEM 212, 219, 254, 264, 311, 312, 313, 354
GEOG 275, 375, 376

Co-operative Applied Earth Sciences
(Environmental Hydrogeology Option)

Year One
EARTH 121/122 and 121L/122L
CHEM 120/123 and 120L/123L
PHYS 121/122 and 121L/122L
MATH 107/108
CS 102
One elective (0.5 credit)

Year Two
2A
EARTH 231, 235, 260
EARTH 223
CIV E 221 or MATH 217

2B
EARTH 221, 232, 238
CIV E 222 or MATH 228
One elective* (0.5 credit)

Year Three
3A
EARTH 333, 358, 390
ENGL 210C
CIV E 353
Two electives* (1.0 credit)

3B
EARTH 355, 359
CHEM 266 or BIOL 240
RIOU 250 or ENV S 200 or ENV S 201

Year Four
EARTH 342, 436A/B, 438, 440, 456, 458, 459, 490
Two electives* (1.0 credit)

Notes
1 New EARTH courses.
2 Six electives are prescribed of which two must be from MATH/SCI courses, two from Faculty of Arts courses, and two are unrestricted.
3 Or other approved Fluid Mechanics course (see program advisor).

HONOURS SCIENCE PROGRAM FOUR
(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 on table page 14:30.

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.

**Year One**
Students entering Year One must take a total of ten term courses, which must include:
- EARTH 121/122 and 121L/122L
- CHEM 120/123 and 120L/123L
- PHYS 111/112 and 111L/112L, or BIOL 111/112 or two 200-level Biology term courses
- MATH 107/108
- CS 102

**Year Two**
Students entering Year Two must take a total of ten term courses, which must include:
- EARTH 221, 231, 232, 235, 236, 238
- ENGL 210C
- Two other Science term courses (1.0 credit)

**Year Three**
Students entering Year Three must take a total of 12 term courses, which must include:
- Six or eight term courses from: EARTH 260, 331, 332, 333, 336, 342, 345, 355 or 460, 370
- Two other Science term courses (1.0 credit)
- Two or one Arts term courses (1.0 credit)

**Year Four**
Students entering Year Four must take a total of ten term courses, which must include:
- EARTH 427, plus three to five term courses from EARTH 300- or 400-level courses

---

**MINOR IN EARTH SCIENCES**
In order to graduate with a Minor in Earth Sciences, the following requirements must be met:

1. Successful completion of 5.0 credits in Earth Sciences, with a cumulative average of 65% in all Earth Sciences courses.

2. The required credits must include:
   a) EARTH 121/122 and 121L/122L in Year One;
   b) 2.0 credits from: EARTH 221, 231, 232, 235, 236, 238 in Year Two;
   c) 1.0 or 1.5 credits from: EARTH 331, 332, 333, 336, 342, 345, 355, 358, 368, 369, 370 in Year Three;
   d) 0.5 or 1.0 credit from: EARTH 421, 432, 433, 434, 435, 438, 440, 458, 459, 470 in Year Four.

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**Science**
Earth Sciences

**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 Applied 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 PHYS 121/122 and MATH 125/126, 127/128 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*
- PHYS 10, 121/121L
- MATH 125, 127
- CHEM 120/120L
- One elective (0.5 credit)*

*Winter*
- PHYS 10, 122/122L, 123
- MATH 126, 128
- CHEM 123/123L

**Year Two**

*Fall*
- PHYS 10, 252/252L, 256/256L
- MATH 227P, 228
- One elective (0.5 credit)

*Winter*
- PHYS 10, 234, 253/253L, 263
- Two electives (1.0 credit)

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(continued)

Year Three
Fall
PHYS 10, 334, 358, 360A, 364
Electives totalling at least 0.75 credits

Winter
PHYS 10, 355, 359, 365
Two electives (1.0 credit)
One elective 300-level Physics lab (0.25 credit)

Year Four
Students entering Year Four must take a total of 5.0
credits, which must include the following: PHYS 10, 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 plan-
ing to do graduate work in Theoretical Physics, at least
two from PHYS 444, 463, 464 and 475 are recommended.

† 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 page 14:2).

* Students with little computer programming experience are
recommended to take CS 110 in the Fall term before taking
PHYS 123 in the Winter term.

** Students specializing in Astrophysics or Biophysics may substi-
tute 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-op Applied Physics programs allow a
great variety of combinations of courses to be taken. By
judicious selection of elective courses, students can
depth 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 adminis-
tration, 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 page 14:24)

HONOURS MAJOR PROGRAM CO-OPERATIVE

Honours Co-op Applied Physics
Applied 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 inter-
est whether in some specific field in physics or in some
other subject area. Some examples are given above under
the heading 'Elective Programs'.

Above the Co-operative part of the program Applied
Physics students have the opportunity of exposure to prac-
tical 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, pro-
vide 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 contribu-
tion to the development of a scientist which cannot be
learned in lecture courses, and helps prepare an individual
to apply a fundamental physics background to the solution
of practical problems.

Further information about the Co-operative work terms
and the Department of Co-operative Education and Career
Services can be found in Chapter 5.

Admission to, and continuance in, Honours Co-op
Applied 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 aver-
age of at least 65% in PHYS 121/122 and MATH 125/126,
127, 128 in order to be admitted to Year Two.

In order to graduate with an Honours Co-op Applied
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
1A (Fall)
PHYS 10, 121/121L
MATH 125, 127
CHEM 120/120L†
One elective (0.5 credit)*

1B (Winter or Spring)
PHYS 10, 122/122L, 123
MATH 126, 128
CHEM 123/123L†

Year Two
2A (Fall)
PHYS 10, 252/252L, 256/256L
MATH 227P, 228
One elective (0.5 credit)

2B (Spring)
PHYS 10, 234, 253/253L, 263
Two electives (1.0 credit)

Year Three
3A (Spring)
PHYS 10, 334, 358, 360A, 364
Electives totalling at least 0.75 credits

3B (Winter)
PHYS 10, 355, 359 365
Two electives (1.0 credit)
One elective 300-level Physics lab (0.25 credit)

(continued on next page)
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 10, 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.

<table>
<thead>
<tr>
<th>MINOR IN PHYSICS</th>
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<tbody>
<tr>
<td>In order to graduate with a Minor in Physics, the following requirements must be met:</td>
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<tr>
<td>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.</td>
</tr>
<tr>
<td>2. Lecture credits must include: PHYS 121/122 and at least 2.5 other credits in core Physics subjects.</td>
</tr>
<tr>
<td>3. Lecture credits must include at least 1.5 credits from 300- or 400-level Physics courses.</td>
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</tbody>
</table>

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Honours 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, neuroscience, cognitive science, 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% 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. 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 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 requirements (8.5 credits) as given for the Honours Psychology BA program listed on page 9:38.
3. A total of 5.0 Science credits over Years Two to Four including:
   a) no more than 2.0 SCI credits.
   b) at least 2.0 credits at the 300- or 400-level, exclusive of SCI credits.

**Recommended Course Sequence**

<table>
<thead>
<tr>
<th>Year One</th>
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<tbody>
<tr>
<td>Two 200-level term courses in Biology</td>
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<tr>
<td>CHEM 120/123, 120L/123L</td>
</tr>
<tr>
<td>PHYS 111/112,111L/112L or 121/122,121L/122L</td>
</tr>
<tr>
<td>MATH 107/108</td>
</tr>
<tr>
<td>PSYCH 101, and one of 207, 211, 253, 257, 261</td>
</tr>
</tbody>
</table>

<table>
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<tr>
<th>Year Two</th>
</tr>
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<tbody>
<tr>
<td>PSYCH 291/292</td>
</tr>
<tr>
<td>Three of 207, 211, 253, 257, 261</td>
</tr>
<tr>
<td>Four Science Electives (2.0 credits)</td>
</tr>
<tr>
<td>Three Unspecified Electives (1.5 credit)</td>
</tr>
</tbody>
</table>

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Year Three
PSYCH 391
One of 207, 211, 253, 257, 261
One Natural Science Research Course from PSYCH 392, 394, 396, 398
One Social Science Research Course from PSYCH 392, 393, 395, 397
One Natural Science Advanced PSYCH3
One Social Science Advanced PSYCH3
Four Science Electives (2.0 credits)
Two unspecified Electives (1.0 credit)

Year Four
Three PSYCH Electives
One Honours Seminar in PSYCH
Two Science Electives (1.0 credit)
Four Unspecified Electives (2.0 credits)

Notes
1 When applying for admission to Honours Psychology, students who have already completed a research methods course and/or a statistics course should check the list of overlapping courses on page 9.7 Item 7 and consult with the Psychology Undergraduate Office.
2 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.
3 Advanced PSYCH courses are those not used to fulfill either 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.
4 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 Year Four above. Students doing an Honours Thesis may substitute PSYCH 465 (Applied Apprenticeship) or PSYCH 466 (Education Apprenticeship) for one of the third year Research Requirements.

Honours Psychology Co-operative Program
Students who have been accepted to the Honours Psychology program may apply for admission to the Co-op program in November of Year Two. Admission is limited and is based on academic standing and space availability. For those accepted, the first work term will be at the end of Year Two. 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.

Science
Psychology
Optometry

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 OD 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, 121L/122L, General Physics; (students without OAC Physics must take PHYS 111/112
and PHYS 111/112L; 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 248/248L, 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 50 and that in 1994 there were approximately 350 applications for those places. Consequently, neither acceptance 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.

While offers of admission are made to well qualified applicants from all the provinces, prospective candidates are advised that some preferential consideration is given to Ontario residents. 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 resi-

dents 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 from the Optometry Admissions Office after October 15. 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 seven 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 and BIOL 301 A/B) 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.

Science
Optometry

<table>
<thead>
<tr>
<th>Year One</th>
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<tbody>
<tr>
<td>Fall</td>
<td>OPTOM 100, 104, 105, 106, 109</td>
<td>BIOL 301A</td>
</tr>
<tr>
<td>Winter</td>
<td>OPTOM 111, 114, 115, 149</td>
<td>BIOL 301B</td>
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<td></td>
<td>PHYS 246</td>
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<td>Fall</td>
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<td>Winter</td>
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<th>Year Three</th>
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<td>Fall</td>
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<td>Winter</td>
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<tr>
<th>Year Four</th>
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<tr>
<td>Spring</td>
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* Two elective courses are required. Students can substitute other University courses for their electives with approval from the Undergraduate Officer.

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:
   a) 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;
   b) 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 or they may be eligible for NSERC undergraduate scholarships. 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 regis-
ter 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 follow-
ing 4th year. The requirements of OPT 441/451 must be
met. The thesis must contain a substantial research con-
tribution in addition to that submitted for credit in OPT
441/451, such that the total normal research require-
ments of OPT 441/451 and the MSc thesis are met.

Granting of Degree
The OD degree will be granted at the normal time, i.e. at
the Spring Convocation following the 4th year. The pro-
gram, however, culminates in the MSc A minimum of two
terms fulltime enrollment in the MSc is required subse-
tuent 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 pro-
grams. They are also eligible for Optometry and NSERC
undergraduate scholarships during the summer terms.

Withdrawal or Failure
Students may remain in the combined OD - Master's pro-
gram 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 require-
ments and these marks included in the 4th year aver-
ages as appropriate. Should the student have then
satisfied 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 pro-
gram. 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

Students enjoying a break.
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.

Latin American Studies, 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:

- select the Option, e.g. International Studies, Middle East Studies, in Year Two;
- choose courses in consultation with the respective Program Director or designated advisor; and
- 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.
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 University of Waterloo.

Requirements for General Degree

14 courses made up of:
- six CDN ST courses: 101 or 102; 201, 202 and three from among 301, 302, 311, 313, 365D, ECON 310, ERS 352, SOC 407
- at least two Humanities Approved Canadian Content Courses (ACCC) electives including at least one term course in French Language, or French Canadian Literature, or French Canadian Culture
- at least two Social Science (ACCC) electives
- at least two faculty of Environmental Studies (ACCC) electives
- at least two additional Approved Canadian Content Courses

16 elective courses to be chosen in consultation with advisors. Group A and B and all Arts Faculty Requirements must be met.

Note

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 page 15:4)
• 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, 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 page 15:4)

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 on page 15:4
• 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 the “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 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)
101 Landforms and Mindscapes
102 Canadian Cultural Narratives
201 Social Regionalism
202 Cultural Regionalism
301 Regionalism: West
302 Regionalism: East
310 Les Francophones hors Québec
311 Canadian Women and Religion
313 Canadian Traditional and Popular Culture
355 Special Topics
365 Native Women of Canada in Historical Perspective
365D Reading Course
370 Issues in Contemporary Native Communities in Canada
400A/B Research Essay

LIST OF DISCIPLINE BASED INTERDISCIPLINARY CANADIAN STUDIES COURSES
ECON 310 History of Canadian Economic Development
ERS 352 Current Issues in the Canadian North
SOC 407 Canadian Sociological Thought
LIST OF PRINCIPAL CANADIAN CONTENT COURSES OFFERED BY PARTICIPATING DEPARTMENTS

The list below indicates courses tentatively scheduled for 1995-96. Refer to previous and forthcoming Undergraduate Calendars for other Canadian content courses.

Anthropology (ANTH)
102 Introduction to Social and Cultural Anthropology
203 North American Prehistory
222 Prehistoric Cultures in the Great Lakes Area
230 Indians of Canada
233 Inuit & Eskimo Cultures
241 The Contemporary Canadian Indian Scene
322 Prehistoric Cultures in the Great Lakes Area
351 Comparative Policies on Native Minorities
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 Interregional Economics
351 Labour Economics
355 Economics of Energy and Natural Resources
363 Contemporary Canadian Problems

English (ENGL)
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 Topics 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
152 Basic French
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
375 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
340 Towns and Villages of Rural Canada
341 Historical Geography of Canada
422 Canada
461 Land Dereliction, Rehabilitation and New Landscape Creation

History (HIST)
102C Origins of War in the 20th Century
102E Canadian History
204 Life on the Ontario Frontier
206 History of Canadian Minorities
207 Canadian Labour History
209 Health Diseases and Medicine in Canadian History, 1500-1984
215A Canadian Women in Historical Perspective: Forming Identities, 1600-1910
215B Canadian Women in Historical Perspective: Breaking Through. 1600-1910
221 Race Relations in Canada: An Historical Perspective
234 The Catholic Church in Canada Since Confederation
247 Mennonite History: A Survey
249 History of Canadian-American Relations Since 1914
253 Canadian History: The Colonial Period
254 Canadian History: The National Period
273 Canadian Social History 1
274 Canadian Social History 2
320 The History of Modern Quebec
325 History of Native Peoples in Canada to 1870
326 Native Peoples in Canada: An Historical and Contemporary Perspective
373 Canadian Social History: The Victorian Period and Beyond
374 Canadian Social History: The Modern Experience
385 Canada From Macdonald to Laurier
387 Ontario History Since Confederation
389 Canada in World Affairs: From Laurier to Trudeau
390 Shaping the Canadian City, 1880-1990
397A Social History of Rural Ontario since 1850
403A/B Senior Seminar: Canadian History
Native Studies
370 Issues in Contemporary Native Communities in Canada

Political Science (PSCI)
102M Contemporary Issues in Canadian Public Policy
231 Government and Business in Canada
260A/B Canadian Government and Politics 1/2
291 The Canadian Legal Process
292 Issues in Canadian Criminal Law
295 Public Sector Management
331 Public Administration 1
332 Public Administration 2
333 Administrative Law
341 Provincial Politics
342 Politics in Quebec
343 Canadian Municipal Government
344 The Politics of Local Government
351 Federal and Consociational Political Systems
363 Canadian Constitutional Law
372 Political Parties and Interest Groups
422 Conflict of Political Ideas in Canada
428 The State and Economic Life
431 Canadian Public Policy
435 The Politics of Canadian Resource Development
442 Politics in Ontario
443 Politics in Western Canada
461 Problems in Canadian Politics 1
462 Problems in Canadian Politics 2

Sociology (SOC)
101 Introduction to Sociology
102 Social Problems
200 Marriage and the Family
204 Sociology of Adolescence
206 Gender Relations
210 Sociology of Sport
214 Class, Status and Power
221 Social Change in Canadian Society
222 Juvenile Delinquency
223 Deviance: Perspectives and Processes
226 Juvenile Justice
227 Criminology
228 Sociology of Corrections
232 Technology and Social Change
236 Social Movements
241 Introduction to the Sociology of Work
242 Industrial Sociology
246 Mass Communication
248 Health, Illness and Society
249 Sociology of Mental Disorders
252 Migration and Society
253 Population in Canadian Society
256 Ethnic and Racial Relations
265 Political Sociology
275 The Mennonites as a Sociological Community
333 Canadian Multiculturalism
342 Sociology of Industrial Relations
366 Urban Sociology
378 Sociology of Women

Environmental Economics
For program description, see page 9:22.

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
- SOCI 232 Technology and social change
- SOCI 256 Ethnic and racial relations
- PACS 201* Roots of conflict and violence
- PACS 202* Conflict resolution
- PACS 102F* Politics in the third world
- PACS 102K* Mass political violence
- PACS 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. 5138.

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**Latin American Studies**

The Latin American Studies Option is an Interdisciplinary Program designed for students in any faculty of the university who have an interest in Latin America and the Caribbean. The courses listed below are taught by instructors with research in the area or by those whose interests are in or moving towards that direction. The Latin American content may be total or partial depending on the discipline and instructor. All courses are regular 0.5 credit courses and count towards fulfillment of requirements for graduation.

**Requirements**
Students must complete ten term courses from those listed below, of which at least six term courses must be selected from disciplines other than the student's Honours program. To graduate with the Latin American Studies Option indicated on the diploma, students must have an overall average of 65% in the Latin American Studies Option courses.

**Courses**
- PACS 301A Liberation and Nonviolence in Latin America
- PACS 302D The Roots of Violence in Central America
- PSCI 102F Politics in the Third World
- PSCI 350A Politics of the Developing Areas 1
- PSCI 350B Politics of the Developing Areas 2
- PSCI 453/651 Comparative Politics of Latin America
- PSCI 454/652 Comparative Politics II
- SPAN 217 Latin American Civilization 1 (in English)
- SPAN 218 Latin American Civilization 2 (in English)
- SPAN 227 Survey of Latin American Literature 1 (in Spanish)
- SPAN 228 Survey of Latin American Literature 2 (in Spanish)
- SPAN 101 Language
- SPAN 102 Language
- SPAN 201A Language
- SPAN 201B Language
- SPAN 251A Language
- SPAN 251B Language
- SPAN 351A Language
- SPAN 351B Language

**Further Information**
Please contact the Program Director, M. Gutierrez, ext. 3658.
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 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 will choose 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 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.

Interdisciplinary Programs
Legal Studies
Liberal Science
Management Studies

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 102M 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
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
SOC 329 Crime as Business

Further Information
Please contact the Director of Legal Studies through the Philosophy Department secretary, HH 365, ext. 2449.

Liberal Science

For program description, see page 14:8.

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 or 123
   - 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 210E or 210F
   - PHIL 216
   - PERST 200 or PSYCH 339
   - 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

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**Middle East Studies**

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:
   a) MES 200 *Introduction to the Middle East.*
   b) One or more term courses from the series MES 302A-D *Directed Studies on the Middle East.*
   c) 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
ECON 335 Economic Development
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 230 The Politics of Nonviolence
PHIL 329 War, Peace and Justice
PS 231 International Politics
PS 282 Foreign Policy
PS 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
W S 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 Chapter 17.

Further Information
Please contact the Director, L.A. Curchin, ML 238, ext. 6883.

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 either of the first two 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:

a) PACS 201, 202, 301, and 302.

b) 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.

a) 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.)
b) six term courses chosen from among the PACS Content Courses offered by the student's department (eight term courses if joint honours in two participating departments). These courses may also be used to meet the department's honours requirements if approved as such by the department.

c) three term courses chosen from among any of the PACS Content Courses. (Students should use their first year to take lower-level prerequisites for PACS Content Courses in those departments where they have special interests.)

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
301D Inter-National Conflict and Alternative World Orders
301E Societal Conflict in the former Soviet Union: Past and Present Trends
302A Community Conflict Resolution
302B Quest for Peace in Literature and Film
302C Creative Conflict Resolution in the Schools
302D The Roots of Violence in Central America
302E Global Development Education
302F Advanced Conflict Resolution in the Schools
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. Full course descriptions are found in Chapter 16.

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 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)
101 Issue Analysis and Problem Solving for Environmental Studies 2
231 Environmental Issues in Global Perspective
241 Introduction to Environmental and Social Impact Assessment
338 Social Impact Assessment
352 Current Issues in the Canadian North
401 Environmental Law

Geography (GEOG)
205 Africa
206 The World Regions and World Issues
225 Urbanization in the Third World
226 Rural Resources and Development in the Third World
326 Gender Roles and Development Alternatives in the Third World
332 Health and Disease in the Third World
425 Africa

History (HIST)
102C The Origins of Wars in the 20th Century
130 Modern World in Historical Perspective
206 History of Canadian Minorities
208 The Cold War: American-Russian Relations Since November, 1917
221 Race Relations in Canada: An Historical Perspective
222 History of Modern Revolutions
263 Europe: 1789-1945
325/326 History of Canadian Indians
345 Minorities in an International Perspective
348 Radical Reformation

Interdisciplinary PACS (PACS)
230 The Politics of Nonviolence
271 Introduction to Peace Research 1
272 Introduction to Peace Research 2
350 Canada and the Nuclear Crisis
390 A/B Field Studies in Peace and Conflict
398/399 Directed Readings in Peace and Conflict Studies

Philosophy (PHIL)
216 Rational Behaviour and Decision-Making
243 Conflict, Contract and Choice
327A Philosophy of Law 1
329 War, Peace, and Justice
422 Political Philosophy 1
423 Political Philosophy 2

Political Science (PSCI)
101A Introduction to Politics
102F Politics in the Third World
102K Mass Political Violence
102N The Politics of Nationalism and Ethnicity
Interdisciplinary Programs
Peace and Conflict Studies
Personnel Studies

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
PLAN 260 Urbanization in the Third World
PLAN 361 Special Topics in Development of the Third World
SY DE 433 Conflict Analysis

Further Information
Please contact the Director, R.J.R. Mathies, Conrad Grebel College, 885-0220.

Personnel Studies
Personnel 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. The program is designed to provide exposure to those academic disciplines which provide the theoretical background for current management practice. 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 or personnel 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 Personnel Studies. 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 Personnel Studies Minor and tailor their work terms to this field to add a Personnel 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 (six)
ACC 121 or 123
M SCI 211 or PSYCH 338
PERST 200
PERST 300
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.
Interdisciplinary Programs
Print Journalism

3. Elective courses (four to be chosen)
CS 100
ENGL 210E or 210F
ECON 351
M SCI 311 or SOC 340
PSCI 331
PSYCH 253
PSYCH 254
PSYCH 334
PSYCH 392
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 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.

Print Journalism
(with Conestoga College)

Professional journalists need two types of knowledge. They need the technical skills to write or produce material for the mass media. And, in order to prepare well-grounded, analytical articles, they need a strong understanding of the world, its peoples, institutions, processes and problems.

The University of Waterloo and Conestoga College of Applied Arts and Technology offer a concurrent Bachelor's degree/Diploma in Journalism available to students in many faculties of the University of Waterloo. By fulfilling the requirements of both programs, students gain broad knowledge and depth in a major subject (at the General or Honours level) as well as the technical skills required for careers in print journalism.

The Faculties of Applied Health Sciences, Arts, Environmental Studies, Mathematics and Science participate in this concurrent program. The requirements of both the University of Waterloo degree and the Conestoga College Journalism Diploma have been combined to avoid duplication of course content and to permit completion of the two certificates normally within four (for the three-year General major student) or five (for the four-year General major or Honours student) years. This represents a reduction of one year were a student to complete the bachelor's degree and the diploma separately.

Students in the five participating faculties who are enrolled in General Major or Honours (Regular) programs in which ten term course electives required by the Journalism Option may be included, may apply for admission to the Journalism Option following completion of Year One. Decisions regarding admission to the Option will be made by the Option Academic Board, composed of members of the University and Conestoga College and including the Director of the Option. The Option will have a limited enrolment with intake numbers as determined by the Board.

The Journalism Option requires completion of a minimum 25 University of Waterloo courses (for the three-year General major) to 35 University of Waterloo courses (for the four-year General major or Honours), including ten term courses required for the Option (five basic courses and five specialization courses, and 71 to 75 hours of courses (normally completed in three semesters) plus a one-month work placement to complete the requirements of the Journalism Diploma at Conestoga College. The Journalism program at Conestoga College must be completed before the degree or the diploma will be conferred.

In consultation with the Director, students will proceed through the Option in their second through fourth or fifth years by choosing an appropriate pattern of study alternating terms at the University of Waterloo and at Conestoga College. It is expected that one of the following patterns will be ordinarily selected:

1. University of Waterloo – Conestoga College – University of Waterloo: This pattern is suggested for honours students.
2. University of Waterloo – Conestoga College: This pattern is suggested for general students.

Option 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. 5 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)
   - MTHEL 192 The Uses and Abuses of Statistics
   - PHIL 145 Critical Thinking
   - One of:
     - CDNST 201 Social Regionalism
     - PSCI 260A Canadian Government and Politics
     - SOC 221 Canadian Society
   - ECON 101 Introduction to Microeconomics
   - ECON 102 Introduction to Macroeconomics
   - A student must achieve an average in the 5 term-course requirements of at least 65%.
3. A five-term-course specialization in a specific subject area. Ordinarily this requirement would be 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.

A student must achieve an average in the five term-course specialization of at least 65%.

4. Completion of the Conestoga College journalism program with a standing of B. See course requirements below.

Students may have to exceed the minimum requirements 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.

Course Requirements - Conestoga College

<table>
<thead>
<tr>
<th>Semester 1</th>
<th>Hours/Week</th>
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<tbody>
<tr>
<td>Journalism A</td>
<td>5</td>
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<tr>
<td>Basic Photography</td>
<td>4</td>
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<tr>
<td>Typing</td>
<td>1</td>
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<tr>
<td>Word Processing</td>
<td>2</td>
</tr>
<tr>
<td>Graphics - Journalism</td>
<td>3</td>
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<tr>
<td>Newspaper Production A</td>
<td>5</td>
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<th>Semester 2</th>
<th>Hours/Week</th>
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<td>Journalism B</td>
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<td>Press Photography</td>
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<td>Desktop</td>
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<tr>
<td>Newspaper Production B</td>
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<th>Hours/Week</th>
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<td>Journalism C</td>
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<tr>
<td>Newspaper Production C</td>
<td>5</td>
</tr>
<tr>
<td>One of: Writing for Broadcast</td>
<td>5</td>
</tr>
<tr>
<td>Magazine Production</td>
<td>5</td>
</tr>
<tr>
<td>Newspaper Production</td>
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<td>15</td>
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Also: (in any order) Hours/Week

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<tbody>
<tr>
<td>English (if not part of UW curriculum)</td>
<td>3</td>
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<tr>
<td>Media Studies</td>
<td>3</td>
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<tr>
<td>Interviewing</td>
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<td>Advertising</td>
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<td>Public Relations</td>
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<td>Freelance Workshop</td>
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<tr>
<td>Special Projects</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>15</td>
</tr>
</tbody>
</table>

One month Work Term upon completion of all courses.

Further Information

Please contact the Director of Print Journalism, A. Ages, ML 335, ext. 2181.

Russian and East European Studies

Since its establishment in early 1989 the Waterloo-Laurier Centre for East European and Russian Studies has provided a forum for the activities of scholars at the University of Waterloo and Wilfrid Laurier University 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 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. Furthermore, a) 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; b) at least eight of these term courses must be above the First Year level; c) 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
452 Comparative Civil-Military Relations: Soviet Union and Eastern Europe

Economics and Geography
ECON 461A Comparative Economic Systems
ECON 463B The Soviet Economy
GEOG 206 The World Regions and World Issues
GEOG 204 Geography of Post Soviet Union
GEOG 423 Central and Eastern Europe
GEOG 424 The Soviet Union

Culture
RUSS 271 Russian Thought and Culture (to 1905)
RUSS 272 Russian Thought and Culture (1905 to the Present)
UKRAN 271 Ukrainian Civilization (to 1800)
UKRAN 272 Ukrainian Civilization (1800 to the Present)
FINE 351 Central and East European Film
RUSS 371 Masterpieces of Russian Literature and Opera
RUSS 381 Peoples of the Soviet Union 1
RUSS 381 Peoples of the Soviet Union 2
CROAT 371 Croatian Culture and Literature

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 either:
STV 100 Society, Technology and Values: Introduction
or
STV 202 Design and Society
Both are introductory level courses, offered in the evening, with no pre-requisites.

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.
Acting Director and Option Co-ordinator: Prof. S.C. Lerner

Speech Communication
For program description, see page 9:17.

Studies in the French Language/Programme d'études en langue française

CERTIFIDE D'ÉTUDES EN LANGUE FRANÇAISE
This certificat, available to students in all faculties, certifies that the student has successfully completed university courses, normally in disciplines other than French Studies, in which the language of the course, e.g., lectures, readings, discussions and written work, is in French.

Students who live for an academic term in a French speaking milieu and are given transfer credit by their home department for courses taken while on an approved study program elsewhere may be eligible for a certificat in studies in the French language.

Upper level language and linguistic courses taught in the Department of French Studies may be considered for eligibility for a certificat.

The certificat d'études en language française is administered under the auspices of the UW Interdisciplinary Program board and is granted when the University degree is awarded.

Certificat d'études en langue française
Level 1: Four term courses from an approved list, with a 65% average
Level 2: Seven term courses from an approved list, with a 65% average.

Students must pass a proficiency test in French before receiving the certificat upon graduation.

Interdisciplinary Programs
Speech Communication
Studies in the French Language
Studies in Personality and Religion (SIPAR)

Further Information
For general information, contact the Director, Dr. C. Abbott, at St. Jerome's College. For information on the exchange program with the University of Paris, contact the Chair of the French Department.

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.

OPTIONS
There are two options 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, level one: SIPAR 270, 271, 372
- Two approved core courses, level two, of following:
  - SOC 264 Sociology of Religion
  - PHIL 201 Love
  - PSYCH 211 Development Psychology
  - RS 200 Study of Religion
- One approved course offered by participating departments (listed on the reverse side of this brochure).
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, level one: SIPAR 270, 271, 372
- Three approved core courses, level two, of following:
  SOC 264 Sociology of Religion
  PHIL 201 Love
  PSYCH 211 Development Psychology
  RS 200 Study of Religion
- One core course, level three, 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
(Refer to page 16:106 for 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 a 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.

Religious Studies (RS)
- 100C Religious Quests
- 200 Study of Religion
- 221 Sects, Cults and Religious Movements
- 236 Human Sexuality and Christian Morality
- 202 Women in the Church
- 370 Dreams in Religious Experience
- 371 Religion and Suicidal Behaviour
- 375 Religion and Psychotherapy

Psychology (PSYCH)
- 211 Developmental Psychology
- 254 Interpersonal Relations
- 334 Theories in Counselling Psychology
- 355 Personality Theory
- 357 Psychopathology

Philosophy (PHIL)
- 102C Philosophy of Life
- 201 Love
- 202 Philosophy of Women and Men
- 210J Philosophy of Human Nature
- 236 Magic, Mysticism and the Occult
- 237 Introduction to Philosophy of Religion
- 318J Philosophy of the Family

Sociology (SOC)
- 102 Social Problems
- 204 Sociology of Adolescence
- 206 Gender Relations
- 209 Family Origin and Personal Identity
- 233 Social Psychology of Beliefs and Attitudes
- 234 Social Psychology and Everyday Life
- 247 Death and Society
- 264 Sociology of Religion

Gerontology (GERON)
- 206 The Literature of Aging
- 344 Sociology of Aging

Peace and Conflict Studies (PACS)
- 201 Roots of Conflict and Violence
- 202 Conflict Resolution
- 302A Community Conflict Resolution

Sexuality, Marriage and the Family (SMF)
- 202A/B Introduction to Marriage and the Family
- 303A/B Introduction to Marriage and Family Therapy

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

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:

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. 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 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 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 316J Philosophy of the Family
PSYCH 235 Psychological Perspectives on Gender and Sex
PSYCH 236 A Psychological Analysis of Human Sexuality
PSYCH 254 Interpersonal Relations
RS 235 Human Sexuality and Christian Morality
RS 382 Theology of Marriage
SOC 200 Sociology of the Family
SOC 206 Gender Roles
SOC 209 Family Origin and Personal Identity
SOCWK 321R Social Work with Families

One of
SOCWK 355R Child Maltreatment
SOCWK 357R Family Violence
SOCWK 390A Family Violence: Advanced Seminar
SOCWK 390B Family Violence: Advanced Seminar

W S 200 Introduction to Women's Studies
W S 300 Seminar in Women's Studies
SMF 204/205 Introduction to Sexuality and Sex Education 1 and 2
SMF 206/207 Introduction to Marriage and the Family 1 and 2
SMF 304/305 Advanced Study of Sexuality and Sex Education 1 and 2
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 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, W S 300, W S 365 or W S 475, SOC 101 and SOC 206

Nine other courses from the Women's Studies Approved List on page 15:21 of the Undergraduate Calendar which must include:

at least two of the following Humanities Courses: CLAS 292; ENGL 108E, 208E, 492B; FR 485; 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. 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:
4. 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.

WLU Humanities Courses: CL 218; EN 225, 226, 325; FI 310, 311; HI 325, 326; PY 233; RE 103, 224, 346, 348, 372 and WS 201.
WLU Social Sciences Courses: SL 201, 202, 302; SY 201, 204, 233, 234, 403, 452i.
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
W S 200 Introduction to Women's Studies
W S 300 Seminar in Women's Studies

Approved Courses
Select six from the "Approved Courses List" (see page 15:21)

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 350 Culture and Sexuality
ANTH 404 Human Development in a Cross-Cultural Perspective
CDN ST 311 Canadian Women and Religion
CLAS 292 Modern Issues in the Ancient World (=WLU Classics 218)
ENGL 108E Women in Literature (=WLU English 225)
ENGL 208E Women Writers of the 20th Century
ENGL 492B Theory and Practice of Feminist Criticism
FR 485 French Women Writers
GEOG 326 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
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
PHIL 202 Philosophy of Women and Men
PHIL 220 Moral Issues
PHIL 402/670M Modern Feminism
PSYCH 236 A Psychological Analysis of Human Sexuality
RS 236 Human Sexuality and Christian Morality
RS 292A Women and the Church 1
RS 292B Women and the Church 2
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
W S 365 A-U Special Topics in Women's Studies
W S 475 A-D Directed Readings in Women's Studies

(The above courses are described fully in Chapter 16.)

Wilfrid Laurier University
Anthropology 221 Kinship, Marriage and Gender
Classics 218 Women in Greece and Rome
(Classics 292)
English 209X Feminist Theory and Cultural Practice: Fiction by Minority Women
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 233 Sociology of Women (=UW SOC 378)
Sociology 234 Sociology of Gender (=UW SOC 206)
Sociology 204 Social Inequality
Sociology/Anthropology 338 (= UW Geography 326) Women and Development
Sociology 403 Feminist Theory
Sociology 452 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.
The big day has finally arrived.
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 and the hours/type of instruction may vary somewhat from the listings in the Calendar. Furthermore, circumstances may warrant changes to the term(s) when courses are made available. To be assured of complete information for preregistration, students must consult the University Course Offerings List for the appropriate term, and any other information distributed by their Department/Faculty, as well as the Calendar, before arranging their programs of study.

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 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>
<th>Credit weight</th>
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<tr>
<td>STAT 333</td>
<td>F,W,S</td>
<td>3C</td>
<td>0.5</td>
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</table>

**Course Name** — Applied Probability

**Course Description** — Review of basic probability. Generating functions. Theory of recurrent events, Markov chains, Markov processes, and their applications.

**Additional information about course requirements**

**Prereq:** 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
  - fdlab: field lab
  - P: practicum

**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.

- **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.

**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.
## Course Abbreviations

<table>
<thead>
<tr>
<th>Course Name</th>
<th>Course Abbreviation</th>
<th>Course Name</th>
<th>Course Abbreviation</th>
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<td>Accounting</td>
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<td>Personnel Studies</td>
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<td>Independent Studies</td>
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<td>Women’s Studies</td>
<td>WS</td>
</tr>
</tbody>
</table>
Accounting

Undergraduate Officer
D.T. Carter, Hf 290, ext. 2747

Courses not offered in the current academic year are listed at the end of this section.

Introductory Notes
1. All accounting courses except
   ACC 121, 122, 123, 131, 132 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, stu-
   dents 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, 132
   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 prac-
tices underlying the historical-cost income
determination model.
Restricted to Honours Accounting
students with no accounting OAC.
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 to help them understand and
analyze financial statements.
Antireq: ACC 101, 123

ACC 122 W,S 3C, 1T 0.5
Understanding and Using Managerial
Accounting Information
This course is designed for non-accounting
majors. The use of accounting information
to assist in planning, control and manage-
rial decision-making will be examined.
Antireq: ACC 121
Antireq: ACC 123, 280, 281

ACC 123 W 3C 0.5
Accounting Information for Managers
This course is designed for non-account-
tants who will use accounting information
for planning, control and decision making.
Antireq: ACC 101, 121/122

ACC 128 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
Antireq: ACC 291, 381

ACC 131 F 3C 0.5
Management 1
The functional areas of business: finance,
personnel administration, production,
marketing and accounting are examined
within differing organizational structures.
Coverage also includes study of the princi-
plies of effective management and the
financial system in Canada as a source of
Corporate capital.
May be subject to priority enrolment

ACC 143 W 3C 0.5
Creative Thinking and Problem Solving
for Accountants
This course comprises three modules:
problem-solving techniques, including intu-
itive and formal methods for considering
risk, uncertainty and value, individual and
group processes for generating and
evaluating alternatives; data organization,
analysis and presentation, and decision
support and expert systems.
Antireq: PHIL 443

ACC 228 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 sup-
port the development of such accounting
information. Managerial accounting, finan-
cial accounting, auditing, taxation, and
information technology concepts and
applications are an integral part of this
course.
Prereq: ACC 128
Antireq: ACC 241, 251

ACC 231 S 3C 0.5
Business Law
Particular attention is given to the law
relating to contracts and business organi-
izations. 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 223

ACC 371 F 3C 0.5
Managerial Finance 1
Analytic techniques for financial decision-
making will be considered within a con-
ceptual 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.
Prereq: One course in Statistics and
either ACC 121 or 228 or permission of
School of Accountancy
Antireq: ECON 371

ACC 372 W,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 determi-
nation, capital markets, and risk/return
characteristics of financing alternatives.
Prereq: ACC 371
Antireq: ECON 372

ACC 382 W,S 3C 0.5
Cost Management Systems
Consideration of more complex topics in
management planning and control.
Emphasis is on cost accumulation sys-
tems, performance evaluation, control
models and case analysis of situations
involving complex management
accounting systems.
Prereq: ACC 228
**Course Descriptions**

**Actuarial Science**

**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,W 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** W,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** W 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 453** F 3C 0.5  
*Control and Audit of Computer-Based Systems*  
An examination of the weaknesses in computer-based systems and compensating controls and their effect on the auditor's study and evaluation of internal control, and the utilization of computer-assisted audit techniques.  
*Prereq: ACC 442 or CS 330*

**ACC 445** 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 446** 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 448** 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 442*

**ACC 449** 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 1995-96**

**ACC 132** Management 2  
**ACC 241** Accounting Information Systems 1  
**ACC 251** Auditing 1  
**ACC 291** Financial Accounting 1  
**ACC 381** Costs Management Systems 1  
**ACC 402** Taxation 1  
**ACC 406** Tax Policy  
**ACC 465** Taxation Decision Making  
**ACC 471** Investments  
**ACC 480** Selected Problems and Cases in Managerial Accounting  
**ACC 481** Selected Topics in Managerial Accounting

**ACC 457** Management Accounting Policy and Integration  
**ACC 488** Project

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**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.**

**Introductory 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 insurances and annuities in both the discrete and continuous case.  
*Prereq: ACTSC 231, MTHEL 305A, 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

ACTSC 332 F 3C 0.5
Life Contingencies 2
Insurance models including expenses. Nonforfeiture benefits and dividends. Introduction to pension mathematics. Miscellaneous topics.
Prereq: ACTSC 331

ACTSC 338 W 3C 0.5
Graduation of Life Tables
Theory and methods of data graduation with particular reference to life tables.
Prereq: ACTSC 232

ACTSC 363 F 3C 0.5
Introduction to Casualty Insurance
Prereq: ACTSC 231

ACTSC 431 F, S 3C 0.5
Risk Theory
Prereq: STAT 333

ACTSC 432 F, S 3C 0.5
Loss Distributions and Credibility Theory
Methods of estimation for the distribution of the size of a single loss. Mixing and parameter uncertainty. Deductibles and other applications. Credibility theory.
Prereq: STAT 330

ACTSC 433 W 3C 0.5
Analysis of Mortality Data
Methods of analysis to produce rates for mortality and other decrements.
Prereq: ACTSC 222, STAT 330

ACTSC 435 F 3C 0.5
Introduction to Demographic Statistics
Topics in demography with emphasis on population projections, mortality theories, and construction of life tables.
Prereq: ACTSC 232

ACTSC 453 F, S 3C 0.5
Basic Pension Mathematics
Theory and practice of pension plan funding. Assumptions, basic actuarial functions and population theory applied to private pensions. Concepts of normal costs, supplemental liability, unfunded liability arising from individual accrued benefit and projected benefit cost methods.
Prereq: ACTSC 232

ACTSC 454 W 3C 0.5
Pension Funding
Group and other generalized cost methods for pension plans. Effects of early retirements, plan design and actuarial assumptions on pension costs. Cost forecasts applied to private and public pension plans— in particular to the CPP.
Prereq: ACTSC 453

ACTSC 455 W 3C 0.5
Analysis of Financial Statements
Topics of insurance financial reporting including assets, liabilities, surplus, amortization of gains, the Policy Premium method of actuarial reserves, investment and currency reserves, and the analysis of gains and losses.
Prereq: ACTSC 331

ACTSC 462 W 3C 0.5
Casualty Insurance
Prereq: ACTSC 363

COURSES NOT OFFERED 1995-96
ACTSC 222 Contingencies
ACTSC 223 Group Life and Health Insurance
ACTSC 335 OR Applications in Actuarial Science
ACTSC 337 Finite Differences
ACTSC 391 Topics in Actuarial Mathematics
ACTSC 441 Advanced Topics in Actuarial Mathematics
ACTSC 451 Selection of Risks 1
ACTSC 452 Selection of Risks 2
ACTSC 456 Taxation of Life Insurance
ACTSC 458 Insurance Law
ACTSC 484 Topics in Casualty Insurance
ACTSC 491 Seminar in Actuarial Mathematics 1
ACTSC 492 Seminar in Actuarial Science 2

Anthropology

Undergraduate Officer
T.S. Abler, PAS 2009, ext. 3044

Courses 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 archaeological evidence concerning the origins and development of culture from the earliest tool making through the beginnings of civilization.

ANTH 102 F, W 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 W 3C, 1L 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 222 W 3C 0.5
Prehistoric Cultures of the Great Lakes Area— A Survey
A general survey of the archaeological evidence for prehistoric cultures in the Great Lakes area from their arrival ca. 11,000 years ago to the coming of the Europeans. Cultural ecology and cultural evolution will be stressed.
This course is taught in conjunction with ANTH 322.
Honours Anthropology students should take ANTH 322.
<table>
<thead>
<tr>
<th>Course Code</th>
<th>Title</th>
<th>Prerequisites</th>
</tr>
</thead>
<tbody>
<tr>
<td>ANTH 230</td>
<td>F 3C 0.5 Indians of Canada</td>
<td>The cultures of Canadian Indians are described as they existed when initially contacted by Europeans. Consideration is given to economic adaptation, social organization, political structure, material culture, ritual, and mythology. Prereq: Second-year standing</td>
</tr>
<tr>
<td>ANTH 232</td>
<td>W 3C 0.5 Prehistoric Cultures of the Great Lakes Area</td>
<td>An in depth study of the archaeological evidence for prehistoric cultures in the Great Lakes area from their arrival ca. 11,000 years ago to the coming of Europeans. Cultural ecology and cultural evolution will be stressed. Prereq: ANTH 203 or consent of instructor</td>
</tr>
<tr>
<td>ANTH 233</td>
<td>F 3C 0.5 Inuit and Eskimo Cultures</td>
<td>An examination of Inuit and Eskimo cultures of Alaska, Canada and Greenland from their prehistoric origins to the present. Administrative systems imposed upon the Inuit and Eskimo will be analysed and compared, as will the contemporary problems these communities face. Prereq: Second-year standing</td>
</tr>
<tr>
<td>ANTH 241</td>
<td>F 3C,1L 0.5 Human Evolution</td>
<td>Data, methods and theory in the study of the origin and evolution of humans are surveyed. Topics will include genetic theory, primate evolution, human fossils and modern human adaption. Prereq: ANTH 101 or permission of instructor</td>
</tr>
<tr>
<td>ANTH 250</td>
<td>F 3C 0.5 Primate Behaviour</td>
<td>An introduction to the behaviour of non-human primates and its relevance to human development. Topics will include social organization, role behaviour, and communications patterns, as well as the history of primate studies.</td>
</tr>
<tr>
<td>ANTH 255</td>
<td>W 3C 0.5 Audio-Visual Images and Ethnography</td>
<td>The ability of audio-visual media to convey valid and accurate information on other ways of life is evaluated. Emphasis will be on recent attempts to record other cultures on motion picture film and video tapes. Pioneering efforts at &quot;scientific&quot; illustration, as on voyages of exploration, as well as early still photography and sound recording, are also examined.</td>
</tr>
<tr>
<td>ANTH 260</td>
<td>F 3C 0.5 Design of Anthropological Inquiry</td>
<td>This course systematically examines research design and methodology in anthropology. Prereq: ANTH 202</td>
</tr>
<tr>
<td>ANTH 261</td>
<td>F 3C 0.5 Culture and Sexuality</td>
<td>A seminar to investigate the role of the sexes in human evolution and the ways in which gender categories and the concepts of sex roles and sexual behaviour are considered in anthropological literature.</td>
</tr>
<tr>
<td>ANTH 271</td>
<td>Archaeological Field Methods</td>
<td>Guided reading in a selected portion of the anthropological literature. Prereq: Anthropology Major or Honours student and permission of instructor</td>
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<tr>
<td>ANTH 280</td>
<td>F 3C 0.5 Special Topics in Anthropology</td>
<td>Directed independent research. Prereq: Permission of instructor</td>
</tr>
<tr>
<td>ANTH 285</td>
<td>F 3C 0.5 Human Development in a Cross-Cultural Perspective</td>
<td>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.</td>
</tr>
<tr>
<td>ANTH 290</td>
<td>W 3C 0.5 Social and Cultural Change</td>
<td>An analysis of contemporary thought on culture contact and cultural evolution. The concepts to be explored might include integration, assimilation, conflict, nativistic reactions, and general and specific evolution. Prereq: One credit in socio-cultural anthropology</td>
</tr>
<tr>
<td>ANTH 295</td>
<td>W 3C 0.5 Reading in Anthropology</td>
<td>Guided reading in a selected portion of the anthropological literature. Prereq: Anthropology Major or Honours student and permission of instructor</td>
</tr>
<tr>
<td>ANTH 299</td>
<td>W, S 0.5/0.5 Honours Essay</td>
<td>Directed reading and research in a selected area of anthropology inquiry. A letter grade for ANTH 499A will be submitted only after the completion of ANTH 499B.</td>
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</tbody>
</table>

**NATIVE STUDIES**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Title</th>
<th>Prerequisites</th>
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<tbody>
<tr>
<td>NAT ST 370</td>
<td>0.5</td>
<td>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 CINN ST 370</td>
</tr>
</tbody>
</table>

**COURSES NOT OFFERED 1995-98**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Title</th>
<th>Prerequisites</th>
</tr>
</thead>
<tbody>
<tr>
<td>ANTH 103</td>
<td>The Nature of Language</td>
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<tr>
<td>ANTH 203</td>
<td>North American Prehistory</td>
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<td>ANTH 210</td>
<td>Anthropology Through Science Fiction</td>
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<tr>
<td>ANTH 223</td>
<td>Archaeology and Cultural Adaptation: Gatherers and Hunters</td>
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<tr>
<td>ANTH 224</td>
<td>Archaeology and Growth of Cultural Complexity</td>
<td></td>
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<tr>
<td>ANTH 241</td>
<td>The Contemporary Canadian Indian Scene</td>
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<tr>
<td>ANTH 270</td>
<td>Archaeological Method and Technique</td>
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<tr>
<td>ANTH 271</td>
<td>Archaeological Field Methods</td>
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<tr>
<td>ANTH 310</td>
<td>The Anthropological Imagination</td>
<td></td>
</tr>
<tr>
<td>ANTH 320</td>
<td>Studies in Hunter-Gatherer Archaeology</td>
<td></td>
</tr>
</tbody>
</table>
Course Descriptions

Applied Mathematics

ANTH 321 Studies in Archaeology of Complex Cultures
ANTH 333 Applied Anthropology
ANTH 351 Comparative Policies on Native Minorities
ANTH 352 History of Anthropological Thought
ANTH 365 Fossil Hominids
ANTH 377 Early Cultures in the New World
ANTH 400 Special Topics in Anthropological Theory
ANTH 460 Human Adaptation and Evolution
ANTH 461 Selected Topics in Primate Behaviour

AM 250 F,W 3C 0.5 Elementary Differential Equations and Applications
Properties of solutions of first- and second-order scalar differential equations; solution techniques. Physical dimensions; scaling; dimensional homogeneity; dimensionless ratios; the Buckingham Pi Theorem. Systems of first-order differential equations in R^n; 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 251 F,W 3C 0.5
Real Analysis
Toplogy of R^n, continuity, norms, metrics, completeness. Fourier series and applications, for example, to ordinary differential equations, the heat problem, optimal approximation, the isoperimetric inequality.
Prereq: MATH 337
Coreq: MATH 349
No student is allowed to take all three of AM 250, 251, and 261 for credit.

AM 250 F.W 3C 0.5
Newtonian Mechanics
Prereq: MATH 237
Coreq: MATH 235
No student is allowed to take all three of AM 250, 251, and 261 for credit.

AM 231 F,W,S 3C,1T 0.5 Calculus 4
Vector integral calculus, including line integrals, Green’s theorem, the Divergence theorem, and Stokes’ theorem, with applications to physical problems. Sequences and series of functions and their applications, including the role of uniform convergence.
Prereq: MATH 237
Antireq: MATH 212, 217, 227P

AM 250 F,W 3C 0.5
Modelling with Ordinary Differential Equations
Overview of the modelling process. Examples of physical systems leading to ordinary differential equations. Applications to Newton’s laws of motion, mechanical vibrations, and population dynamics. The emphasis is on the physical derivation and interpretation of the model equations.
Prereq: MATH 108
Antireq: MATH 218, 228
Not available for credit to students in Applied Mathematics programs.
No student is allowed to take all three of AM 250, 251, and 261 for credit.

AM 332 W 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
Coreq: MATH 352
Course Descriptions

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 (E3) and the Serret-Frenet formula; 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 365

AM 349 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 1
First order partial differential equations and characteristic curves. 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’Alembert’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
Coreq: AM 353 and AM/PMA 332 (or PMA 352)

AM 373 W 3C 0.5
Quantum Mechanics 1
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 261, 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, L^p-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 R^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.
Prereq: AM 333/PMATH 365 or consent of instructor
Cross-listed as PMATH 465

AM 441 F 3C 0.5
Numerical Solution of Differential and Integral Equations
Prereq: CS 370 or (374, or 337 and consent of instructor, or CS 372 and consent of instructor)
Cross-listed as CS 475

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 Venants' principle.
Prereq: AM 361, or 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 perception 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 and areas, bar forces in trusses, simple frame analysis, friction, moment of inertia.
Prereq: ARCH 112

ARCH 171 F 3C 0.5
Theories and Technologies of Building
Introduction to applications of technology in the design and construction of buildings. Organized as a series of case studies concentrating on the last three centuries, it addresses, among other themes, the emergence of new structural methods and materials, the evolution of environmental control, the rationalization of building assembly, and the invention of the modern urban infrastructure.
Prereq: Consent of instructor

ARCH 172 W 3C 0.5
Building Construction 1
An introduction to the fundamentals of building construction, in terms of materials, technical aspects of the making and design of buildings, basic building science and environmental concerns. Emphasis will be placed on soils, foundations, masonry construction and wood frame construction.

Prereq: Consent of instructor
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 192 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: $325-$350

ARCH 193 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 192

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, documenting 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 men's attitudes from humanism, nationalism, and Reformation through the Enlightenment until the French Revolution and Hume's dethronement of Reason.

Prereq: ARCH 246 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 deflecting shapes, flexural and shear stresses, deflection calculations; combined stresses, beams of different materials, compression members, Euler's formula.

Prereq: ARCH 163

ARCH 266 F 3C 0.5

Building Construction 2

The study of more advanced aspects of building construction dealing with the design and technological aspects of building structure: reinforced concrete, precast concrete, and steel framing; building envelope: cladding principles, window walls, roofing and glazing; and interior finish selection and interface with 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 292 F 2C,14std 1.5
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,14std 1.5
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 3C,3std 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 1850-1940
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 348 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 362 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 torsion, 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 363 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 fire protection criteria and systems, with reference to building codes and standards.
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 303 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 384/385 F,W R 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 392 W 3C,18std 2.0
Design Studio
Development of design skills and theoretical knowledge through their application in projects involving various building types in urban situations. Emphasis is placed upon issues of materiality and technology in architectural design.
Prereq: ARCH 293

ARCH 393 F 3C,18std 2.0
Design Studio
The application of architectural principles to urban design. The study and analysis of elements of existing communities, and of the theories and processes in the creation of new urban areas. Design at an urban scale.
Prereq: ARCH 392

COURSES FOR BACHELOR OF ARCHITECTURE

ARCH 444 S 3C 0.5
Roots of Japanese Architecture
This course will study three phases of the pre-Meiji (8000 BC - 1868 AD) period under the headings of i) Apparent Disorder, ii) Geometric Order, and iii) Sophisticated Order as they relate to the evolution of Japanese architecture.
Prereq: Consent of Instructor

ARCH 445 F,W 2C,2D 0.5
The Practice of Criticism In Creative Design
The application of critical thought will be exercised regularly through oral and written assignments on a wide range of designed human experience; secondarily, there will be reading assignments to facilitate the practice of criticism through a broadening knowledge of critical theory and its relationship to culture.
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. It introduces the influences upon the structure of public and private space 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 decisions; reference and source material; assembly and reproduction; structural, mechanical and electrical consultants.
Prereq: BArch Students or consent of instructor

ARCH 453 S 2G,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 partnership. 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 F 3C,1S 0.0
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.
Prereq: BES (pre-professional architecture) degree with minimum C-average in design courses
Field trip cost: $800

ARCH 493 W,S 3C,1S 0.0
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. Enrollment is normally limited to a maximum of fifteen in any one studio.
Prereq: 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 'CR' for the course on the student's academic record. The thesis proposal will be developed independently by the student between the 48 and 5A terms and will be reviewed and assessed by the 5A studio instructor.
Prereq: ARCH 493

ARCH 574/575 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
Arts

Courses not offered in the current academic year are listed at the end of this section.

Introductory 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

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.

Prereq: 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 1995-96

ARCH 348 Italian Renaissance
Architecture

Biology

Undergraduate Officers
D. Barton, B2-243, ext. 2559
M. Globus, B2-256B, ext. 2506
B. Greenberg, B2-154A
M. Griffith, B2-157B, ext. 6441
W.R. Hawthorn, B1-280, ext. 2117
N. Scott, ESC-357D, ext. 6435

Courses not offered in the current academic year are listed at the end of this section.

Introductory Note
The Department of Biology reserves the right to limit enrolment in Biology courses to those individuals whose programs require those courses.

Biology Courses: While the Biology Department wishes to teach all students who request its courses, the Department's resources are limited. Priority of access to crowded courses will be given to students whose academic program requires those particular courses be taken. Students who preregister late, or who neglect to preregister for a Biology course, may find there is no longer room for them.

It is the student's responsibility to meet the prerequisite requirement(s) or to obtain written permission of the instructor.

BIOL 111 F 2C 0.5

Introductory Biology 1
An introduction to the development of a framework of general biological concepts and connections. Emphasis will be placed on a cellular approach and will include cellular structure and processes, cell reproduction and inheritance, the human genome and recombinant DNA technology, and related aspects of immunology.

Open to students other than those intending to major in Biology or to enter the School of Optometry.
BIOL 111 cannot be counted for credit toward a joint degree in Biology and the Faculty of Environmental Studies.

May not be taken after successful completion of any 200-level Biology course.
**Course Descriptions**

**Biology**

**BIOL 112 W 2C 0.5**  
Introductory Biology 2  
An introduction to the basic principles of the structure and function of plants and animals within an ecological and evolutionary framework. The biology of multicellular organisms will be emphasized.  
Open to students other than those intending to major in Biology or to enter the School of Optometry.  
BIOL 112 cannot be counted for credit toward a joint degree in Biology and the Faculty of Environmental Studies.  
May not be taken after successful completion of any 200-level Biology course.

**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 1994-95.

**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.

**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 relationships of plants and animals to their environment. The nature of ecosystems, ecological energetics, biogeochemical cycling, community ecology, introduction to population biology.  
BIOL 298 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 351/352  
Offered during the Spring term in even-numbered years.

**BIOL 298 F fidlab 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 290 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**  
**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.
Course Descriptions

Biology

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 their regulation of tissue growth. Light and electron microscopy techniques.
   Prereq: BIOL 211 or 230 or 273
   Antireq BIOL 202

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, systematics 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 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 biochemical mechanisms.
   Prereq: BIOL 230 or permission of instructor

BIOL 426 W 2C,3L 0.5
Applied Phycology
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 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 (i) how molecular biology is used to locate and isolate disease-causing genes and (ii) the molecular basis of human cancer.
   Prereq: BIOL 239, 437 and 440

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/S 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 240241 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
Physical and biological properties of immunological agents that protect against disease, the procedures for their identification and their practical applications.
   Prereq: BIOL 240241, 273

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 240241 and 437 or permission of instructor
**Course Descriptions**

**Biology**

**BIOL 443 F 2C,3L 0.5**

**Fermentation Biotechnology**

Biology of industrial microorganisms: 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 240/241

**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 240/241

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 240/241 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 240/241 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 240/241 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 240/241 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 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; biodegradation 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**

**Behavioral 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

**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

Students are advised that this course involves a substantial computer component designed to foster mastery of a modern, statistical-analysis program (Systat/Sygraph).

**BIOL 470 F,S 2C,3L 0.5**

**Comparative Animal Physiology 1**

A comparative study of the ways in which animals regulate the volume and concentration of body fluids, excrete, digest and absorb nutrients.

Prereq: BIOL 210 and 211.

Prerequisites are not required by students who are enrolled in the Honours Science Program 2 (Pro Health-Professions option).
Course Descriptions

Biology

Ontario Universities at other times of the year also qualify.

BIOL 250 or equivalent
Field trip fee: $300-$700

BIOL 492 F,W,S flrlab 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 sires. 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.

BIOL 493 F,W,S flrlab 0.5
Myology
Fungal taxonomy and ecology; medical mycology; plant pathology; industrial applications; food and food processing; toxins and hallucinogens; biological control; fungi as coprophilies, predators and symbionts with plants and animals.

Prereq: BIOL 221
Antireq: BIOL 432
This course will normally be an intensive field course held in Algonquin Park, Ontario each September.

BIOL 498A/B F,W,S flrlab 0.25/0.25
Field Course 2
A general interest field course usually of one week duration. Requirement is met by attending the first week only of a two-week trip arranged or approved by the Department (e.g. BIOL 490 or 491). Courses sponsored by Ontario Universities at other times of the year may 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.

BIOL 428 Plant Growth Regulation: Biochemical and Molecular Perspectives
Instructors

Canadian Studies

Program Director
W.R. Needham, 885-1460

Introductory 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,1G 0.5
Canadian Cultural Narratives: Facts, Fictions and Truths
Do 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 365 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 365D F,W,S 0.5/0.5/0.5
Reading Course
A student-initiated reading course on the approval of the Program Director.
Available on-campus and by special arrangements through Distance Education.

CDN ST 365I W 3S 0.5
Native Women of Canada In Historical Perspective
Theoretical questions such as the determinants of women's status in aboriginal societies; native women's roles as cultural intermediaries in the fur trade, their responses to 'missionalization', and involvement in the larger Euro-Canadian economy; changes in legal position in relation to amendments to the Indian Act; political activism.

CDN ST 370 F 3S 0.5
Issues in Contemporary Canadian Native Communities
Selected aspects of the contemporary native experience, defined by the local native community, and placed in historical perspective. Course lecturers will be representative of the wider native community.
Cross-listed as NAT ST 370

CDN ST 400A/B F,W 0.5/0.5
Research Essay
An extensive senior research essay, supervised by a committee composed of faculty members from two or more of the participating departments, which deals with a specific aspect of Canada utilizing material and methods from several different disciplines.
A grade for CDN ST 400A is submitted only after the completion of CDN ST 400B.

COURSE NOT OFFERED 1995-96
CDN ST 310 Les francophones hors Quilbhee

Chemical Engineering

Undergraduate Officer
I.F. MacDonald, E1-2509, ext. 2413

Introductory Note
Prerequisite: 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 100 F 3C,1T,5L for first 6 weeks 0.75
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.

CH E 101 W,S 3C,1T,2L 0.5
Chemical Engineering Concepts 2
An extension of the topics covered in CH E 100. Energy balances. Laboratory experiments illustrate the physical principles discussed.
Prereq: CH E 100

CH E 102 F 3C,2T 0.5
Chemistry for Engineers
Chemical principles with applications in engineering. Stoichiometric calculations, properties of gases, properties of liquids and solutions, gas phase chemical equilibrium, ionic equilibrium in aqueous solution, oxidation-reduction reactions, chemical kinetics.

CH E 201/202 F,W,S,F 1C: 0 Seminar
General Seminar

CH E 021 F,W 3C,1T 0.5
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.
Prereq: CH E 101, MATH 115 Coreq: CH E 023

CH E 022 F,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 ENV E 222

CH E 023 F,W 3C,1T,3L 1.0 Physical Chemistry 1
Prereq: CH E 101,102 1Alternate weeks


Course Descriptions
Canadian Studies
Chemical Engineering
Course Descriptions

Chemical Engineering

CH E 025 S,F 3C,2L 0.5
Transport Processes 2 (Fluid Mechanics)
Prereq: CH E 101
Cross-listed as ENV E 213

CH E 026 S,F 3C,1T,3L 0.5
Physical Chemistry 2
Thermodynamics: ideal dilute solutions; equilibria in condensed phases and in non-ideal systems; fugacities and activities. Surface phenomena: surface tension; capillarity; adsorption; electrical double layers; colloids. Transport properties: thermal conductivity, viscosity and diffusion coefficients. Chemical kinetics: rate laws; mechanisms; catalysis; reaction rates; heterogeneous reactions; photochemistry. Polymers: types; thermodynamics of solutions.
Prereq: CH E 023
Alternate weeks

CH E 030 W,S 3C,1T 0.5
Transport Processes 3 (Heat Transfer)
Prereq: CH E 025, MATH 216

CH E 031 W,S 3C,1T,3L 0.5
Process Flowsheeting
Process simulation and mathematical modelling of chemical engineering flowsheets involving process units. Design variables; process simulation architectures; flowsheet decomposition theories. Use of modern computer-aided process design packages such as CHEMSHARE, ASPEN and SPEEDUP.
Prereq: MATH 118, GEN E 121.
CH E 025, 026

CH E 032 W,S 3C,3L 0.5
Introductory Biotechnology
Biological systems for the production of commercial goods and services: foods, drugs, chemicals, fuels, equipment, diagnostics, waste treatment. Properties of microbial, plant and animal cells, and of enzymes used in bioprocess applications. Classification and characterization of biological agents and materials; quantification of metabolism, biokinetics, bioenergetics. Elementary aspects of molecular biology, genetic engineering, biochemistry, microbiology.
Prereq: CHEM 026 or consent of instructor
Alternate weeks

CH E 033 W,S 3C,1T 0.5
Chemical Engineering Thermodynamics
Review of fundamentals, including 2nd law and concepts of equilibrium, phase and reaction equilibria, fugacity, exergy. Thermodynamics applied to practical situations. Examples chosen from: fluid flow; power generation; refrigeration; air conditioning and water cooling; liquefaction of gases; equilibria in complex chemical reactions and separation processes; surface phenomena; electrochemical reactions; biological processes.
Prereq: CH E 026

CH E 034 W,S 3C,1T,3L 0.6
Inorganic Process Principles 1
Inorganic chemical processes of industrial importance: sulphuric acid; nitric acid; ammonia; chlorine; phosphate; 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 presentation of thermodynamic data; aqueous solution thermodynamics. Inorganic materials; structure and properties of metals and alloys; ceramics; composites; semi-conductors. Selected topics in biology, polymers, metallurgy.
Prereq: CH E 026, MATH 118
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; evaporation; simultaneous heat and mass transfer in gas-liquid contacting and solids drying.
Prereq: CH E 021, 030, MATH 216

CH E 036 F,W 3C 0.5
Chemical Reaction Engineering
Prereq: CH E 026, MATH 216, GEN E 121
Cross-listed as ENV E 333

CH E 037 F,W 3C,3L 0.5
Inorganic Process Principles 2
Prereq: CH E 034
Alternate weeks

CH E 040 F,W 3C,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.
Prereq: CH E 030
CH E 041 S.F. 3C,17,2L 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 engineering subject chosen by the student in consultation with the supervising professor. A written preliminary report is required.
Students enrolled in this course must take CH E 049 in 4B.
Prereq: CH E students only
Cross-listed as ENV E 480
CH E 044 S.F. 3C 0.5
Economics for Chemical Engineering
Cross-listed as ENV E 422
CH E 045 S.F. 2C,3T 0.5
Process Equipment Sizing and Selection
Introduction to practical engineering methods, including standard computer packages, for specifying or selecting types of equipment commonly used in various process industries. Topics include: piping systems; control valves; pumps; compressors; fans and blowers; heat exchangers; tower contactors for one- and two-phase flow; mechanically agitated contactors, mixers, reactors; pressure vessels; materials of construction; special topics, as appropriate.
Prereq: CH E 035, 036
CH E 047 W 12L 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 483
CH E 048 W 9L 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 3C 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 3C 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 3C 0.5
Advanced Process Dynamics and Control
Prereq: CH E 041
CH E 524 W 1C,3L 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 6C 1.0
Polymerization and Polymer Properties
Prereq: CH E 101, 102, MATH 118
CH E 552 W 3C 0.5
Extractive Metallurgy 1
(Hydrometallurgy)
Introduction to extractive metallurgy: ores, minerals, metals, metalloids, geology. Ore and mineral dressing. Thermodynamic, kinetic, and engineering design considerations. The extraction-refining-winning of industrially important metals: zinc, uranium, copper, nickel, gold, silver.
Biorecovery.
Prereq: CH E 033, 035, 036, 038
CH E 554 W 3C 0.5
Extractive Metallurgy 2
(Pyrometallurgy)
In-depth discussion of several processes of importance in Canada: blast-furnace smelting (iron, lead, zinc); steelmaking and other specialized refining processes. Pyrometallurgical treatment of sulphide ores. Fused salt electrolysis. The emphasis is on the interplay between the underlying thermodynamics, kinetics and transport processes, and on the associated process engineering considerations.
Prereq: CH E 033
CH E 562 W 3C 0.5
Fermentation Engineering
Application of process engineering principles to the design and operation of fermentation reactors which are widely used in the pharmaceutical, food, brewing and waste treatment industries. Aspects of mass transfer, heat transfer, mixing and rheology with biochemical and biological constraints.
Prereq: CH E 032, 035 or consent of instructor
CH E 564 W 3C 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 3C 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
Chemistry

Course Descriptions

Chemistry

CH E 574 W 3C 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 electro-reduction. Legal, economic and social implications.
Prereq: CH E 035, 038

CHEM 026 F,W 3C,3L 0.5
Organic Chemistry 1
Structure and bonding in organic compounds. Stereochemistry, Chemistry of alkanes, haloalkanes, alcohols, alkenes, alynes, Reaction mechanisms.
Prereq: CH E 102
Antireq: CHEM 264, 266
For students in Year Two Engineering

CHEM 036 F,S 3C 0.5
Organic Chemistry 2
Aromaticity and aromatic substitution reactions. Chemistry of carbonyl compounds. Application of spectroscopic techniques in organic chemistry.
Prereq: CHEM 026
Antireq: CHEM 265, 267
For students in Year Two Engineering

CHEM 116 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 116 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 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 1201
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 and Biochemistry programs.
Prereq: Same as for CHEM 120
Coreq: Same as for CHEM 120
Antireq: CHEM 120

CHEM 123 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 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 specta to elucidate energy states of atoms and molecules and to determine molecular structure. Aspects of ultraviolet, visible, infrared, Raman, microwave and nuclear magnetic resonance spectrosopies.
Prereq: CHEM 120 or 121
1 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
Pre(req: CHEM 120 or 121
Antireq: CHEM 212

CHEM 219 W 0.5
Chemistry of Non-Transition Elements
Group trends in main group chemistry. Emphasis will be placed on correlation of structure with physical properties in various groups of compounds.
Pre(req: CHEM 212 or 218
By Distance Education only

CHEM 223 F,W 3C,1T 0.5
Analytical Chemistry
Modern quantitative analytical chemistry including classical and more recent methods. Emphasis on planning and decision-making in the analytical process.
Pre(req: CHEM 123 or 125, 123L, 129
Coreq: (for Science students)
CHEM 223L
Antireq: CHEM 220, 221, 228
For Honours students only
Available to Honours non-major students in Winter term only.

CHEM 223L F,W 3L 0.25
Analytical Chemistry Laboratory 1
Selected experiments for students taking CHEM 223.
Pre(req: CHEM 123L
Coreq: CHEM 223
For Honours students only. Priority will be given to students with programs requiring this course.

CHEM 224L F,W,S 1T,8L 0.5
Analytical Chemistry Laboratory 2
Extensive lab experience for students who have taken CHEM 223.
Pre(req: CHEM 223, 223L
Antireq: CHEM 221L
For Honours students only. Priority will be given to students with programs requiring this course.

CHEM 228 S 2C,3L 0.5
Analytical Chemistry for Life Sciences
Selected topics of importance to Biology students, with related experiments.
Pre(req: CHEM 123 or 125
Antireq: CHEM 220, 221, 223
For students in Honours Biology only

CHEM 233 F,S 3C 0.5
Fundamentals of Biochemistry
Chemistry of amino acids, carbohydrates, lipids and nucleic acids, with special emphasis on representative proteins and enzymes, including hemoglobin, cytochrome c and chymotrypsin.
Pre(req: CHEM 261 or permission of instructor
Antireq: CHEM 237
For students in the Honours Biochemistry or the Honours Biology and Chemistry program only

CHEM 237 F,W 3C 0.5
Introductory Biochemistry
An introduction to the chemistry of amino acids, carbohydrates, lipids and nucleic acids. Structure and properties of proteins and enzymes.
Pre(req: CHEM 264 or 266
Antireq: CHEM 233

CHEM 237L F,W 3L 0.25
Introductory Biochemistry Laboratory
Selected experiments for students taking CHEM 237

CHEM 254 F,W 3C 0.5
Chemical Thermodynamics 1
An introduction to the thermodynamics of ideal systems and the first, second and third laws of thermodynamics; the application of thermodynamic principles to the study of solutions, phase equilibria, chemical equilibria, and the properties of electrolytes.
Pre(req: CHEM 123 or 125H, MATH 127/128 or equivalent
Antireq: CHEM 356, PHYS 358
For Honours students only

CHEM 254L F,W 3L 0.25
Physical Chemistry Laboratory 1
Selected experiments for students in the 2A term.
For Honours students only

CHEM 256 W,S 3C 0.5
Introductory Quantum Mechanics
Historical background; the differential equation approach to quantum mechanics; treatments of "solvable" problems such as the particle-in-a-box, harmonic oscillator, rigid rotator and the hydrogen atom; introduction to approximation methods for more complicated systems.
Pre(req: CHEM 123 or 125, 129
Coreq: MATH 217 or equivalent
Antireq: PHYS 294, 334, AM 373
For Honours students only

CHEM 263 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.
Pre(req: OAC Chemistry or equivalent
CHEM 120 strongly recommended
Offered by Distance education only.
Not for students intending to major in Chemistry or Biochemistry.

CHEM 264 F,W 3C 0.5
Organic Chemistry 1
Structure and bonding in organic compounds. Stereochemistry. Chemistry of halides, alcohols, alkenes, alkyne, reaction mechanisms.
Pre(req: CHEM 123 or 125
Antireq: CHEM 026, 266
For Honours students only

CHEM 265 F,W,S 3L 0.25
Organic Chemistry Laboratory 1
Selected experiments for students taking CHEM 265.
For Honours students only

CHEM 266 F,W 3C 0.5
Basic Organic Chemistry 1
Discussion of the structure, nomenclature and reactions of important classes of organic compounds. Stereochemistry and its role in reaction mechanisms. A detailed look at carboxylic acids and their derivatives.
Pre(req: CHEM 120/123 or equivalent
Antireq: CHEM 026, 264
CHEM 266L F,W 3L 0.25
Organic Chemistry Laboratory
Selected experiments for students taking CHEM 266.
Lab alternate weeks

CHEM 267 W 2C 0.5
Basic Organic Chemistry 2
A continuation of the concepts of CHEM 266, including material on amines, aromaticity, carbohydrates and lipids. Introduction to nuclear magnetic resonance and infrared spectroscopy.
Pre(req: CHEM 260 or equivalent
Antireq: CHEM 036, 265
Course Descriptions

Chemistry

CHEM 267L W 3L 0.25
Organic Chemistry Laboratory
Selected experiments for students taking CHEM 267.

CHEM 303 W 2C,1L 0.5
Ionic Equilibria
Algebraic, geometric and computational methods of analysing the interactions in systems of equilibria. Applications to aqueous solutions, physiological fluids, and mineral systems may be studied. Labs will require selected calculations by various manual and machine methods on typical systems.

CHEM 306 F 2C,1T 0.5
Atmospheric Chemistry and Physics
The chemistry and physics of the terrestrial atmosphere with emphasis on the operation of major anthropogenic influences such as ozone depletion, the greenhouse effect and tropospheric systems such as photochemical smog. Other planetary atmospheres will be discussed in the context of their implications for the evolution of the earth's atmosphere.

CHEM 312 F 2C,1T 0.5
Transition Metal Chemistry
The transition elements and their compounds. Stereochimistry of complex ions; ligand field and molecular orbital theories of metal-ligand bonding; electronic spectra and magnetic-chemistry of complexes; reaction mechanisms (if time permits).

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, semiconductivity, superconductivity and ionic conductivity; special topics including one of: fast ion conductors, piezoelectric and ferroelectric oxides; magnetic oxides.

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.

CHEM 316 F 0.5
Analytical Instrumentation
Detailed study of selected instruments and instrumental methods. Introduction to chemometrics and to computer interfacing.

CHEM 319 W 2C 0.5
Inorganic Chemistry Laboratory
Experiments appropriate to the inorganic chemistry program.

CHEM 323 W 2C 0.5
Analytical Instrumentation
Detailed study of selected instruments and instrumental methods. Introduction to chemometrics and to computer interfacing.

CHEM 325,359

CHEM 333, F.S 2C 0.5
Metabolism 1
Metabolism of carbohydrates, lipids and amino acids.

CHEM 334L F,W 3L 0.25
Advanced Biochemistry Laboratory
Selected experiments for students taking CHEM 333 and CHEM 357.

CHEM 335 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 kinetics, inhibition and regulation. Some spectroscopy important to the life sciences.

CHEM 336 W 2C 0.5
Structural and Synthetic Organic Chemistry
Stereochimistry in organic reactions; synthesis of selected organic compounds examined in detail with emphasis on cyclo-addition reactions and condensation reactions.

CHEM 338 W 2C,1T 0.5
Statistical Thermodynamics

CHEM 341 W 2C 0.5
Advanced Biochemistry Laboratory
Selected experiments for students in the 3B term.

CHEM 343, 359

CHEM 344, F,W 3L 0.25
Advanced Biochemistry Laboratory
Selected experiments for students taking CHEM 333 and CHEM 357.

CHEM 350 W 2C 0.5
Mechanistic Organic Chemistry
Simple molecular orbital theory with applications to pericyclic reactions. Carbonium ions, carbanions, carbenes 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.

CHEM 354 W 2C 0.5
Kinetics and Dynamics
A course in chemical kinetics, which includes recent developments in reaction dynamics. Topics covered: rates and mechanisms of chemical reactions (rate laws, treatment of kinetic data, reaction mechanisms, complex and fast reactions); theory of reaction rates (collission theory, activated complex theory); selected recent topics, such as laser chemistry, atmospheric chemistry, heterogeneous catalysts.

CHEM 355 W 2C 0.5
Chemical Kinetics
A course in chemical kinetics, which includes recent developments in reaction dynamics. Topics covered: rates and mechanisms of chemical reactions (rate laws, treatment of kinetic data, reaction mechanisms, complex and fast reactions); theory of reaction rates (collission theory, activated complex theory); selected recent topics, such as laser chemistry, atmospheric chemistry, heterogeneous catalysts.

CHEM 356 W 2C 0.5
Mechanistic Organic Chemistry
Simple molecular orbital theory with applications to pericyclic reactions. Carbonium ions, carbanions, carbenes 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.

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 kinetics, inhibition and regulation. Some spectroscopy important to the life sciences.

CHEM 365 W 2C 0.5
Statistical Thermodynamics

CHEM 368 W 3L 0.25
Organic Chemistry Laboratory
Selected experiments for students taking CHEM 366.
Course Descriptions
Chemistry

CHEM 368 W,S 2C 0.5
Synthetic Organic Chemistry
Prereq: CHEM 265
Antireq: CHEM 366
For Honours students only

CHEM 368L F,W,S 6L 0.5
Senior Organic Chemistry Laboratory
Selected microscale 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

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 1BL 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
Prereq: At least third year standing or consent of 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

CHEM 413A-Z F,W 2C 0.5 each
Special Topics in Inorganic Chemistry
For a current list of offerings see the Undergraduate Officer.
Prereq: 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 quantification of chemical compounds.
For Honours students only

CHEM 425A-Z F,W 2C 0.5 each
Special Topics in Analytical Chemistry
For a current list of offerings see the Undergraduate Officer.
Prereq: Third-year standing or consent of instructor

CHEM 431 W 2C 0.5
Metabolism 1
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
Special topics in biochemistry with applications. Areas covered in recent years include biochemistry of methane-producing bacteria, mechanism of action of antibiotics, antiviral agents and vitamins.
For a current list of offerings see the Undergraduate Officer.
Prereq: CHEM 333

CHEM 435 F 2C 0.5
Bioorganic Mechanisms
Modern techniques of biosynthetic studies. Enzyme reaction mechanisms.
Prereq: CHEM 233 or 237 and one of 368, 366

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 256

CHEM 452A-Z F,W 2C 0.5 each
Special Topics in Physical Chemistry
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
Next offered Winter, 1997

CHEM 464 F 2C 0.5
Spectroscopy in Organic Chemistry
Elucidation and identification of organic structures by contemporary spectroscopic techniques.
Prereq: CHEM 265

CHEM 465A-Z F,W 2C 0.5 each
Special Topics in Organic Chemistry
Topics will be selected from photochemistry, organometallics, synthesis, heterocyclics, natural products, molecular rearrangements. For a current list of offerings see the Undergraduate Officer.
Prereq/Coreq: CHEM 368
Civil Engineering

Undergraduate Officer
J. Sykes, E2-2332, ext. 3776

Undergraduate Co-ordinator
R. Cockfield, E2-2324, ext. 3976

CIV E 125 W,S 2C,4L/T 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, elas-
ticity, fluids) and descriptive geometry
(points, lines, planes, intersections, devel-
opments). Exercises include laboratory
experiments to illustrate relation of physics
principles to engineering and a team pro-
ject/experiment involving planning, con-
ducting and reporting results in written
and oral presentations, introduction to group
dynamics.

CIV E 127 W,S,3C,2T 0.5
Statics
Basic concepts of mechanics and vectors.
Statics of particles and rigid bodies. Concepts
of force systems, resultants, equilibrium,
moments and couples. Centroids and centre of gravity. Moment of
inertia, Friction, Method of virtual work.
Planar and three-dimensional problems
including trusses, arches and frames.

CIV E 204 F,W 3C,1T 0.5
Mechanics of Solids 1
Stress-strain-temperature relationships.
Axial tension, Thin-walled pressure ves-

CIV E 205 F,S 3C,1T 0.5
Mechanics of Solids 2
Flexure, Strain Energy, Yielding and
Buckling, Impact, Virtual Work, Influence
Lines.

CIV E 221 F,W 3C,1T 0.5
Advanced Calculus
A review of Year One Calculus. Hyperbolic
Functions, Partial derivatives. Multiple
integration with applications. Vector analy-
sis, theorems of Green and Gauss, line
integrals. Elements of Fourier series.

CIV E 222 F,S 3C,1T 0.5
Differential Equations
An introduction to linear and partial differ-
etial equations. Standard methods of
solution, applications to physical and
engineering problems, linear equations
with constant coefficients, systems of dif-
ferential equations, solution by series,
numerical methods, partial differential
equations, Applications from Dynamics and
Vibrating Systems.

CIV E 224 F,W 3C,1T 0.5
Probability and Statistics
Role of Probability in engineering and
decision-making under uncertainty. Data
analysis. Basic probability concepts.
Probability distributions. Functions of ran-
dom variables. Estimation theory.
Empirical determination of distribution
models. Regression analysis.

CIV E 253 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 265 F,W 3C,1T,3L 0.5
Structure and Properties of Materials
A basic course in structure, behaviour and
application of engineering materials.
Bonding forces. Crystalline and amor-
phous structures. Structural defects.
Phase transformations and equilibria.
Structures and responses of metals,
ceramics and polymers. Corrosion.
Modes of deformation and failure.
Four lab sessions

CIV E 280 S,F 4C,2T,2L 0.75
Fluid Mechanics and Thermal Sciences
An introduction to fluid mechanics and
thermal sciences. Fluid properties. Fluid
statics. Thermodynamic principles.
Bernoulli equation. The momentum equa-
tion and applications. Laminar and turbu-
rent flow. Dimensionless numbers. Closed
circuit flow. Pipe network analysis.
Steady flow in pipes. Heat transfer.
Four lab sessions

CIV E 291 F,S 1 wk T,1T lab 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 Geological Engineering
students only.
CIV E 202 F,W 3C,1T 0.5
Engineering Economics
Prereq: MATH 117
Antireq: M SCI 261

CIV E 298 F,W 2S 0.0
CIV E 299 S,F 2S 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 353 W,S 3C,1T,2L 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: CH E 102. CIV E 280

CIV E 381 F,W 3C,1T,1L 0.5
Hydraulics
Four lab sessions.
Prereq: CIV E 280 or equivalent

CIV E 396 W,S 2S 0.0
CIV E 399 F,W 2S 0.0
Seminar
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.

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 of planar and space frameworks, 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
Course Descriptions
Civil Engineering

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 315, 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  
Reinforced concrete members and structures. Torsion. Slender columns, walls, continuous beams, floor systems. Prestressed concrete  
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 2C,2T 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 principles, 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 445 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 Bioengineering  
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, 285

CIV E 472 F,S 3C,1T,1L 0.5  
Wastewater Treatment  
Prereq: CIV E 375

CIV E 473 W 2C,2T 0.5  
Contaminant Transport  
Prereq: CIV E 375

CIV E 483 W 2C,2T 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 486  
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 Geological Engineering students

CIV E 493 W 2C,2T 0.5  
Engineering in the Canadian North  
Prereq: CIV E 486

CIV E 496 W 2C,2T 0.5  
Construction Engineering  
Prereq: CIV E 498 S,F 2S 0.0  
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)

Introductory 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 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.

CLAS 202 F,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.

CLAS 251 S 3C 0.5
Greek History
A survey of ancient Greece, emphasizing its political, military, social and economic aspects.

This course is acceptable for credit by the History Department.

CLAS 252 F 3C 0.5
Roman History
A military, political, social and economic survey of Rome from earliest times to the Empire's fall.

This course is acceptable for credit by the History Department.

Classical Studies accepts HIST 238 for Classical Studies credit, but a student may not take both HIST 238 and CLAS 252.

CLAS 255 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 302 W,S 3C 0.5
Roman 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 351 F 3C 0.5
Greek Art and Architecture
A survey of the art and architecture of the ancient Greek world from Etruscan to Imperial Times. Not open to first-year students.

Cross-listed as FINE 311

CLAS 352 W 3C 0.5
History of Ancient Philosophy 1
From the beginnings to Plato.

Cross-listed as PHIL 380
Offered by the Philosophy Department

CLAS 353 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 255 W 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 265 W 3C 0.5
Ancient Tragedy in Translation
This course focuses upon the dramatic literature of the classical age in Athens. It features the Oresteia of Aeschylus, the "Oedipus" plays of Sophocles, and the Medea, Hippolytus and Eumenides of Euripides. Roman tragedy is also studied for comparative purposes through the plays of Seneca. No knowledge of Greek or Latin is needed.

Cross-listed as DRAMA 251

CLAS 292 F 3C 0.5
Women in Classical Antiquity
A study 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 301 F 3C 0.5
Ancient Myth and Religion 1
A study of Greek and Roman myth, including the birth of the gods, creation, the Olympians, Prometheus and the fall, the flood, the ages of man, and the Greek mystery religions. Not open to first-year students.

CLAS 302 W,S 3C 0.5
Ancient Myth and Religion 2
A study of Greek and Roman legend, 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 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 353 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, Plautus 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 265 or instructor's permission

Cross-listed as DRAMA 385 (formerly DRAMA 350)
Course Descriptions

Classical Studies

CLAS 366 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, Petronius, 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 F 3C 0.5
The Fall of the Roman Empire
This course deals with the transition from 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 W 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 402 3C 0.5
The Aegean in the Bronze Age
A senior course concentrating on the Cycladic, Minoan and Mycenaean civilizations of the Bronze Age.
Prereq: CLAS 201, 251, 351 or instructor's permission

CLAS 485 F,S 2C 0.5
Greco-Roman Civilization and History 1
Senior seminar; intensive study of various problems.
Prereq: Previous work in ancient history or instructor's permission
This course is acceptable for credit by the History Department (but not as a senior seminar).

CLAS 486 2S 0.5
Greco-Roman Civilization and History 2
Senior seminar; intensive study of various problems.
Prereq: Previous work in ancient history or instructor's permission
This course is acceptable for credit by the History Department (but not as a senior seminar).

490A/B F,W 0.5/0.5
Senior Honours Thesis
All senior honours students should consult with the Undergraduate Advisor about writing a thesis or doing Directed Study. For further details see Classical Studies programs (Chapter 8).
A letter grade for CRN 490A/B will be submitted only after the completion of CLAS 490B.

CLAS 492-496
Senior Seminars
By arrangement with the Department, an individual student or a small group of students will follow a course of study under the supervision of a faculty member.

GREK

Introductory Notes
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 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

GRK 201 F 3C 0.5
Intermediate Greek
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)

GRK 202 W 3C 0.5
Selections from Greek Authors
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)

GRK 351 3C 0.5
Advanced Composition and Grammar
Intensive study of Greek language and style through composition and translation.
Prereq: Senior standing in Greek

GRK 363 F 3C 0.5
Introduction to Greek Tragedy
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

GRK 370 3C 0.5
Greek Historians
One or more of Herodotus, Thucydides, Xenophon may be read.
Prereq: Senior standing in Greek

GRK 375 3C 0.6
Homer
Extended reading of Homer.
Prereq: Senior standing in Greek
(Formerly GRK 452)

GRK 472 3C 0.5
Advanced Reading in Greek Poetry
Selections from one or more authors may be read, e.g., Aeschylus, the Lyric poets.
Prereq: Senior standing in Greek

GRK 473 3C 0.5
Greek Comedy
Selected plays of Aristophanes and Menander.
Prereq: Senior standing in Greek
(Formerly GRK 462)
GRK 474 W 3C 0.5
Advanced Reading in Greek Prose
Demosthenes, Lysias and other authors may be read.
Prereq: Senior standing in Greek

GRK 475 3C 0.5
Reading in Greek Philosophy
One or more authors may be read, e.g., the Pre-Socratics, Plato, Aristotle.
Prereq: Senior standing in Greek

GRK 400 400
Senior Seminars
By arrangement with the Department, an individual student or a small group of students will follow a course of study under the supervision of a faculty member.
Prereq: Senior standing in Greek

LAT

Introductory Notes
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 Latin is normally defined as successful completion of LAT 203 and 204; 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.

LAT 100A F 4C 0.5
Introductory Latin 1
A course designed for students beginning the study of Latin or who have not yet reached the level expected in LAT 203/204. Although the teaching approach emphasizes exposure to simple texts as soon as possible, students desiring basic competence in reading should go on to do LAT 100B.

LAT 100B W 4C 0.5
Introductory Latin 2
Continuation of LAT 100A. The aim is to attain basic reading competence in prose.
Prereq: LAT 100A

LAT 203 F 3C 0.5
A Survey of Latin Literature 1
A general survey of Latin prose and poetry from its origins to the beginning of the Roman Empire. The literary achievement of Rome will be examined mainly through selections in Latin with occasional readings in translation.
Prereq: OAC or Grade 13 Latin, LAT 100B or instructor’s permission

LAT 204 W 3C 0.5
A Survey of Latin Literature 2
A general survey of Latin prose and poetry from the beginning to the fall of the Roman Empire; a continuation of LAT 203.
Prereq: LAT 203 or instructor’s permission

LAT 351 3C 0.5
Latin Composition and Grammar
Composition, translation and grammar with intensive analysis of selected passages.
Prereq: Senior standing in Latin

LAT 363 3C 0.5
Roman Comedy
The study in Latin of at least one play by Plautus or Terence, with supplementary readings in translation.
Prereq: Senior standing in Latin

LAT 364 3C 0.5
Roman Oratory and Rhetoric
Selected orators and rhetoricians may be read, e.g., Cicero, Seneca, Quintilian, the Panegyricists.
Prereq: Senior standing in Latin

LAT 365 3C 0.5
Roman Lyric Poetry
Selections from Catullus and Horace.
Prereq: Senior standing in Latin

LAT 371 W 3C 0.5
Early Roman Historians
Headings from one or more of the early historians, e.g., Sallust, Livy.
Prereq: Senior standing in Latin

LAT 375 3C 0.5
Vergil
Selections from the Aeneid, Georgics, Eclogues may be read.
Prereq: Senior standing in Latin

LAT 381 F 3C 0.5
Medieval Latin
Survey of Medieval Latin poetry and prose.
Prereq: Senior standing in Latin

LAT 391 3C 0.5
Advanced Latin Reading
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

LAT 421 3C 0.5
Latin Epigraphy
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

LAT 431 3C 0.5
Roman Philosophy
Readings from one or more of the principal Roman philosophical writers, e.g., Lucretius, Cicero, Seneca.
Prereq: Senior standing in Latin

LAT 452 3C 0.5
Roman Letter-writing
Survey of Roman letter-writing through the Medieval period, e.g., Cicero, Pliny, Seneca, Symmachus, Heloise and Abelard.
Prereq: Senior standing in Latin
(Formerly LAT 261)

LAT 463 3C 0.5
Later Roman Historians
Selections from one or more of the historians, e.g., Tacitus, Ammianus Marcellinus.
Prereq: Senior standing in Latin
(Formerly LAT 372)

LAT 471 3C 0.5
Roman Elegy
Selections from Catullus, Ovid, Propertius and Tibullus.
Prereq: Senior standing in Latin

LAT 481 3C 0.5
Roman Satire
Selections from the satirists, e.g., Horace, Petronius, Juvenal, Martial, Persius.
Prereq: Senior standing in Latin

LAT 490/499
Senior Seminars
By arrangement with the Department, an individual student or a small group of students will follow a course of study under the supervision of a faculty member.
Prereq: Senior standing in Latin
Combinatorics and Optimization

Undergraduate Officer
A.S. Lewis, MC 6054, ext 6963
e-mail: aslewis@orion.uwaterloo.ca

Introductory Note
More detailed course descriptions and course outlines are available in the C&O Undergraduate Handbook.

C&O 203 S 3C 1T 0.5
Discrete Mathematics (for Engineers)
Prereq: ECE 223, ECE 250
Prereq: C&O 220
Cross-listed as ECE 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.
Prereq: 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
Prereq: MATH 108, 125 or equivalent
Prereq: C&O 350, 355
C&O 227 cannot be counted for credit toward a BMath Honours degree.

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.
Prereq: 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.
Prereq: PMATH 336
Offered at St. Jerome’s College in the Winter term

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.
Prereq: C&O 230

C&O 350 F,W,S 3C 0.5
Linear Programming
Prereq: MATH 225 or 235
C&O 350 may be substituted for C&O 356 in any degree program, or for prerequisite purposes.

C&O 351 W,S 3C 0.5
Network Flow Theory
Prereq: 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.
Prereq: MATH 235, 237
Antireq: C&O 350, ACTSC 335
C&O 355 may be substituted for C&O 350 in any degree program, or for prerequisite purposes.

C&O 367 F,W 3C 0.5
Nonlinear Optimization
Prereq: MATH 235, 237

C&O 370 F,W 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
Prereq: ACTSC 335

C&O 380 W,S 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 F,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
Course Descriptions
Combinatorics and Optimization

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 441 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 447 F 3C 0.5
Network Design
Prereq: C&O 350 or 355. C&O 351 is recommended.

C&O 448 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 459 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

C&O 462 F 3C 0.5
Convex Optimization and Analysis
Prereq: C&O 355 or 367. and AM/PMATH 331 or consent of instructor

C&O 466 W 3C 0.5
Continuous Optimization
Prereq: C&O 355, or 350 and 367

C&O 469 F 3C 0.5
History of Mathematics
An in-depth examination of the origins of mathematics, beginning with examples of Babylonian mathematics. Topics may include Pythagorean triples, solution of equations, estimation of p, duplication of the cube, trisection of an angle, the Fibonacci sequence, the origins of calculus.
Prereq: MATH 135, 136, 138 and third-year standing

C&O 499 F, W, S 2R 0.5
Reading In Combinatorics and Optimization
Prereq: Consent of department
Computer Science

Computer Science

Undergraduate Advisors
A. Pidduck, DC 3106, ext 4662
B.W. Becker, DC 3105, ext 4661

Introductory 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-specialist courses. As such, they will not normally be open to Computer Science Major students, but they will be available to all other students in the University, subject to resource limitations. CS 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 Fortran. These concepts of computer programming are covered in CS 130. Students who have substantial programming experience will be permitted 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 accommodate the students who preregister during published University preregistration 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 substitutions may be required to satisfy degree requirements.

4. Regular students will not normally be permitted to enrol in Computer Science 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 students 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 preregistration 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 performance will be permitted to enrol in 600-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 standing" 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 exam in question, with a minimum deduction of 5% from the final course grade. All such incidents will also be reported to the Associate Dean (Undergraduate Studies) of the student's faculty.

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 3B term.

CS 100 F,W,S 2C,2L 0.5
Introduction to Computer Usage
An introduction to universally applicable computer services. Hands-on experience with common software and hardware, supported by examples of applications and social implications chosen from many disciplines. Topics include: electronic mail, word processing, spreadsheets, record management, and hardware and software concepts. CS 100 cannot be counted for credit toward a BMath Honours degree.

CS 102 F,W,S 3C,3L 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 130 F, W, S 2C, 212L 0.5  
Concepts of Computer Programming  
Fundamental concepts of computer programming, including data types, structured programming, algorithm design, and numerical methods. Sample programs and exercises will be drawn from various areas of mathematics. Labs will emphasize programming.  
Prerequisite: Full-time degree registration in the Faculty of Mathematics  
Antirequisite: CS 102, 112  
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.  
Prerequisite: Full-time degree registration in the Faculty of Mathematics, and CS 130 or an equivalent level of knowledge and experience.  
Antirequisite: 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.  
Prerequisite: One of CS 102, 112, or equivalent  
Antirequisite: 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.  
Prerequisite: One of CS 134, 212  
Antirequisite: 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 processing programs.  
Prerequisite: CS 246  
Antirequisite: 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.  
Prerequisite: CS 134  
Antirequisite: CS 280

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: 2B standing and one of CS 134, 212  
Antirequisite: CS 480, MSCI 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: One of CS 230, 246 and third-year standing  
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, MATH 136, 138. One of CS 230, 246 is recommended.  
MATH 235 and 237 are recommended  
Antirequisite: CS 370, 372, 374  
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 334
Course Descriptions
Computer Science

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.
Prereq: CS 241 and registration in a Computer Science Major program
Antireq: 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.
Prereq: CS 241 and registration in a Computer Science Major program
Antireq: ECE 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.
Prereq: CS 342 and registration in a Computer Science Major program

CS 360 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.
Prereq: CS 241, C&O 230

CS 370 F,W,S 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.
Prereq: MATH 235, 237 and one of CS 230, 246
Antireq: CS 337, 372, 374
Replaces CS 372, 374 effective Fall 1995

CS 372 F,W 3C 0.5
Introduction to Scientific Computation: Numerical Linear Algebra
Pitfalls in computation. Direct solution of linear algebraic systems. Iterative solution of linear algebraic systems. Least-squares computations. Iterative solution of f(x) = 0. Minimization of functions of several variables.
Prereq: CS 134, MATH 235, 237
Antireq: CS 337, 370
Last offering: Winter 1995

CS 374 W,S 3C 0.5
Introduction to Scientific Computation: Numerical Approximation
Prereq: CS 134, MATH 235, 237
Antireq: CS 337, 370
Last offering: Winter 1995

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.
Prereq: CS 330 or permission of instructor and third-year standing
Antireq: CS 446
Replaces CS 430 cannot be counted for credit in a Computer Science Major program.

CS 432 F,W,S 3C 0.5
Business Systems Analysis
Prereq: CS 330 and third-year standing
Antireq: CS 482
Replaces CS 432 cannot be counted for credit in a Computer Science Major program.

CS 436 W 3C 0.5
Distributed Computer Systems
An introduction to networks and computer systems. Reliable communication, layered models, distributed file systems, cryptography, concurrency issues.
Prereq: One of CS 230, 246 and one of CS 330, 334, 338
Antireq: CS 336, 454

CS 442 F,S 3C 0.5
Principles of Programming Languages
An exposure to important concepts and issues in contemporary programming languages. Data types, abstraction, and polymorphism. Program structure. Lambda calculus and functional programming, logic programming, object-oriented programming. Semantics of programming languages. Critical comparison of language features and programming methodologies using examples drawn from a variety of programming languages including Lisp, Prolog, ML, Ada, Smalltalk, Icon, APL, and Luccid. Programming assignments involve the use of some of these languages.
Prereq: CS 340 and registration in a Computer Science Major program

CS 444 W 3C 0.5
Compiler Construction
Prereq: CS 340, 360 and registration in a Computer Science Major program
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<th>Course Code</th>
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<tr>
<td>CS 446</td>
<td>F,S</td>
<td>Software System Design and Implementation</td>
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<td>CS 454</td>
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<td>CS 457</td>
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<td>CS 458</td>
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<td>Design of Microprocessor-Based Systems</td>
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<td>CS 462</td>
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<td>CS 464</td>
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<td>CS 476</td>
<td>F</td>
<td>Numerical Solution of Differential and Integral Equations</td>
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**Software System Design and Implementation**
An investigation into the role and function of software engineering practice in the design and implementation of computer based systems. Topics include: structural design; procedural design; testing and reliability; management topics; programming languages and coding; portability techniques; maintenance; performance measurement and analysis.

**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.

**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 queueing or non-queueing systems.

**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 teams design and implement microprocessor-based systems.

**Formal Languages and Parsing**

**Computational Complexity Theory**
The classification of problems according to the computational resources required for their solution, with emphasis on properties of feasible computations rather than on specific algorithms. Topics include: time and space complexity, tractable and intractable problems, computation using randomness, parallel computation.

**Numerical Linear Algebra**

**Numerical Solution of Differential and Integral Equations**

**Algorithm Design and Analysis**
Design of good algorithms and analysis of the resources they consume. Lower bounds on the resource requirements of algorithms to compute certain functions. Problems from the following areas are discussed in this light: sorting and order statistics, data structures, arithmetic computations, the NP-complete problems.

**Software System Design and Implementation**
An investigation into the role and function of software engineering practice in the design and implementation of computer based systems. Topics include: structural design; procedural design; testing and reliability; management topics; programming languages and coding; portability techniques; maintenance; performance measurement and analysis.

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**Formal Languages and Parsing**
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, MSCl 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

CS 486 F,W,S 3C 0.5
Introduction to Artificial Intelligence
Prereq: CS 340 and registration in a Computer Science Major program

CS 487 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 488 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 492 W 2C,1D 0.5
The Social Implications of Computers
This course is designed to consider the problems caused for organizations and society by the advent of computer technology so that constructive solutions to these problems may be discussed.
Prereq: CS 340 and registration in a Computer Science Major program

CS 494 F,W 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

CS 498 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 499 0.5
Readings in Computer Science
This course cannot be used to satisfy any 400-level course requirement in a Computer Science Major program.

Dance

Undergraduate Officer
R. Priddle, ECH 1105, ext 6013

Courses not offered in the current academic year are listed at the end of this section.

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, videos, slides and live performance as well as lectures, discussions and workshop sessions.
No dance background necessary.

DANCE 111 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.

DANCE 234 W 3C 0.5
Women and Theatre Dance
An examination of the place of women in Western theatre dance from the 17th century to the present. With the help of film, video and readings we will discuss the accomplishments of selected female dancers and choreographers. We will also study the work of recent writers and researchers who have tried to understand the role of women in the dance traditions of Europe, India and North America.

DANCE 300 W 3std 0.5
Special Studies in Dance 2
Participation in a dance production, and the study of related problems in choreography, rehearsal, production and performance.
Prereq: DANCE 200
Coreq: Intermediate Ballet and Modern Dance or permission of instructor

DANCE 336 F 3C 0.5
Dance Criticism
This course offers students a chance to enhance their abilities to write and talk about the dance experience. Examples of dance criticism from the past two centuries are used in tandem with films, videos, slides, live performance and guest lecturers to sharpen perceptions.

Croatian

For courses in Croatian see Germanic and Slavic Languages and Literatures.
DANCE 353 F 2C, 2nd 0.5
Modern Dance Composition
This course explores major forms and theories of modern dance choreography through studio practice and seminars.
Prereq: Intermediate Modern Dance or permission of instructor.

DANCE 409 F,W 0.5
Senior Essay
An extensive critical review of the literature on an approved topic which will be broader in scope than those associated with specific research proposals (see DANCE 410). Students must register by topic area listed below.
Prereq: Fourth-year Honours Dance. For specific prereq electives by topic area, see below.

DANCE 410 F,W 0.5
Research Proposal
An independent paper in the form of a research proposal on an approved topic. The research may be experimental, descriptive, historical or philosophical in nature. The format will be determined in conjunction with the research advisor. Students must register by topic area listed below.
Prereq: Fourth-year Honours Dance and a suitable preparation in research methods. For specific prereq electives by topic area, see below.

DANCE 411 F,W 0.5
Research Project
This is the completion of the research proposal in DANCE 410. The format is to be determined with the supervisor and may be in chapters or in journal style.
Prereq: DANCE 410.
Prereq electives by topic area (when offered): B: Skill Learning: DANCE 264, 366, 367, C: Socio-cultural Issues in Dance: DANCE 371, U: Dance Notation: DANCE 441 or 482 (Benesh), or DANCE 442 or 484 (Labanotation), E: Dance History: DANCE 333, 334 or 343, F: Developmental Studies with Children in Dance: DANCE 264, 367, 484. Recommend auditing PSYCH 211.

DANCE 412 F 3C, 0.5
Seminar in Dance
An examination of current and major issues in dance.
Prereq: Honours Dance students only.

DANCE 442 W 3C, 0.5
Advanced Studies in Labanotation
A theoretical and practical study of Labanotation to the advanced level, including detailed analysis needed for current dance and non-dance applications. Students will experience the process of preparing a full notation score.
Prereq: DANCE 342.

DANCE 474 F,W 0.5
Directed Study on Special Topics
For the student who wishes 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. This course may be repeated in subsequent terms.
Prereq: Permission of instructor.

DANCE 480 F,W 3C or 0.5
Workshop Series
The following courses are designed to give the student an opportunity to take theoretical knowledge to the applied setting. Offerings each year are determined by student interest. Topics available include:
DANCE 481 Ballet Choreography
Prereq: DANCE 351 and Elementary Ballet
Coreq: Intermediate Ballet.
DANCE 482 Dance Notation
Prereq: DANCE 341 or 342.
DANCE 483 Modern Dance Composition
Prereq: DANCE 353 and Intermediate Modern Dance
Coreq: Advanced Modern Dance.
DANCE 484 Developmental Consideration of Applied Movement with Children and Adolescents
Prereq: DANCE 264 and one of DANCE 366 or 367.
DANCE 486 Dance Criticism
Prereq: DANCE 336, 235, 333.
DANCE 488 Dance Production
Prereq: DRAMA 243 or 348.
The Workshop series is open only to third- and fourth-year Dance students. Two workshops in the 480 series may be taken toward the Honours degree. Workshops are offered pending sufficient enrolment.

Technique Courses
Entrance to Technique Courses is by audition only. Students are placed according to their year of enrolment, and their level of technique. Sections are as follows:
A Advanced
B Intermediate

For example, DANCE 401A is Year Four Advanced Ballet 1.
Auditions are held in September.
Consult the Dance Department for time and location.
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 1½ hour classes per week. Credit 0.25.
DANCE 401A,B Year Four Ballet 1 F
DANCE 402A,B Year Four Ballet 2 W
DANCE 403A,B Year Four Modern Dance 1 F
DANCE 404A,B Year Four Modern Dance 2 W

COURSES NOT OFFERED 1995-96
DANCE 200 Special Studies in Dance 1
DANCE 230 Roots of Western Theatre Dance
DANCE 241 History of 20th-Century Dance
DANCE 242 Labanotation 1
DANCE 254 Developmental Aspects of Movement (see KIN 264)
DANCE 266 Principles of Dance Technique
DANCE 332 Canadian Perspectives on Theatre Dance
DANCE 341 Benesh Notation 2
DANCE 342 Labanotation 2
DANCE 343 Ballet Choreography
DANCE 366 Developmental Foundations of Dance Technique
DANCE 367 Developmental Aspects of Movement Learning
DANCE 371 Issues in Dance and Society
DANCE 441 Advanced Studies in Benesh Notation
Course Descriptions
Fine and Performing Arts
Drama and Speech Communication

Fine and Performing Arts

The University offers courses in:

- Dance see page 16:38
- Drama see page 16:40
- Fine Arts see page 16:65
- Music see page 16:101

For program information please see Chapter 9, Faculty of Applied Health Sciences, and Chapter 9, 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 not offered in the current academic year are listed at the end of this section.

Introductory Note
Laboratory sessions and rehearsal periods may be added to any course at the discretion of the instructor.

DRAMA 101A F 3C 0.5
Introduction to the Theatre 1
Introductory study of the theatre as a major art form. Selected plays as produced in their historical contexts. Contributions of the actor, designer and technician to theatrical production.

DRAMA 101B W 3C 0.5
Introduction to the Theatre 2
An extension of the studies described in 101A.

DRAMA 102 F,W 4L 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: DRAMA 223 for Speech Communication majors
Prereq or Coreq: DRAMA 101A or B
Limited Enrollment. Permission required.

DRAMA 211 F 6L 0.5
Intermediate Acting 1
An extension of DRAMA 102. This course stresses development of the actor through scene study.
Prereq: DRAMA 101A or 101B, 102
Audition required

DRAMA 222 W 6L 0.5
Intermediate Acting 2
An extension of DRAMA 221.
Prereq: DRAMA 221
Audition required

DRAMA 223 F,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.
Anthrq: ACC 432
Open to students in all faculties but limited enrollment. Must attend first class.

DRAMA 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: DRAMA 223 (Can be coreq for first-year prospective majors only.)

DRAMA 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: DRAMA 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: DHAMA 243

DRAMA 251 F 3C 0.5
Survey of Dramatic Literature and Drama 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 Drama Theory 2
The Medieval 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 Drama 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 Drama 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 Drama Theory 5
The first part of the 20th century.
Cross-listed as ENGL 233C

DRAMA 315 3C 0.5
Survey of Dramatic Literature and Drama Theory 6
The second part of the 20th century.
Cross-listed as ENGL 233D

DRAMA 316 3C 0.5
Survey of Dramatic Literature and Drama 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
Course Descriptions
Drama and Speech Communication

DRAMA 317 3C 0.5
Survey of Dramatic Literature and Theory I
American drama from the 1920's 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, on in-class workshops; and performance, on student evaluation of speeches.
Recommended: DRAMA 223
Cross-listed as ENGL 309E

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 2L2C 0.5
Theatre Management and Technology I
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 2L2C 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
Directing 1
Exploration of the director's task in its practical, theoretical and historical aspects.
Prereq: At least three dramatic literature classes and permission

DRAMA 362 W std 0.5
Directing 2
Students will be expected to form their own production company, mount a short play, and submit a detailed promptbook.
Prereq: DRAMA 361 and at least four dramatic literature classes

DRAMA 371 3C 0.5
Theatre History I
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

DRAMA 381 3C 0.5
Russian Drama
Cross-listed as RUSS 341

DRAMA 382 3C 0.5
Russian Drama
Cross-listed as RUSS 342

DRAMA 383 3C 0.5
The Stage as Forum: German Drama in Translation
Cross-listed as GER 355

DRAMA 384 3C 0.5
The Stage as Forum: Russian Drama in Translation
Cross-listed as RUSS 356

DRAMA 385 3C 0.5
Ancient Comedy in Translation
Cross-listed as CLAS 365
**Course Descriptions**

**Drama and Speech Communication - Earth Sciences**

**DRAMA 390 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 406 A/B/C F std 0.5**

**Theatre Workshop 1**

Participation in stage production for advanced students.

Prereq: Permission of play director and DRAMA 101A and B

**DRAMA 407 A/B/C W std 0.5**

**Theatre Workshop 2**

Participation in stage production for advanced students.

Prereq: Permission of play director and DRAMA 101A and B

**DRAMA 409 F 3C 0.5**

**Theatre Criticism**

Study and practice of the criticism of theatre production and performance.

This course will not normally be taken until the student's final year.

**DRAMA 421 F 6L 0.5**

**Advanced Acting Workshop 1**

An intensive workshop designed to develop performance skills. Special attention given to individual acting problems.

Prereq: DRAMA 321, 322

Audition required

**DRAMA 422 W 5L 0.5**

**Advanced Acting Workshop 2**

An extension of DRAMA 421.

Prereq: DRAMA 421

Audition required

**DRAMA 425 3C 0.5**

**Audition Technique**

An intensive approach to monologue work, this course will prepare students for the audition process. Time will also be devoted to learning about the demands of the theatre profession, and the problems faced by the self-employed artist.

Prereq: DRAMA 321/322 or equivalent

Audition required

**DRAMA 443 F std 0.5**

**Theatre Technology and Management Apprenticeship 1**

An advanced course. Selected students are apprenticed in theatre technology or management functions in productions both on and off campus.

Prereq: DRAMA 342, 343, and permission of instructor

**DRAMA 444 W std 0.5**

**Theatre Technology and Management Apprenticeship 2**

An extension of studies described in DRAMA 443.

Prereq: DRAMA 443, and permission of instructor

**DRAMA 490 A-E F wkshp 0.5**

**Selected Seminars in Drama and Theatre Arts**

Seminars in special areas of drama and theatre.

Prereq: Permission of Department

**DRAMA 491 A-E W wkshp 0.5**

**Selected Seminars in Drama and Theatre Arts**

Seminars in special areas of drama and theatre.

Prereq: Permission of Department

**DRAMA 499A/B F,W,T 0.5**

**Senior Seminar**

Open only to drama honours students in their fourth year. It is designed to give the student an opportunity to complete a comprehensive presentation in her/his major area of concentration.

A letter grade for DRAMA 499A will be submitted only after the completion of DRAMA 499B.

**COURSES NOT OFFERED 1995-96**

Consult with Drama Undergraduate Officer to determine offerings for 1995-96.

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**Earth Sciences**

**Undergraduate Officers**

R.G. Roberts, BFG 2112, ext. 3379

S. Schiff, BFG 2213, ext. 2473

J.F. Barker, BFG 2212, ext. 2103

**Introductory Notes**

1. **EARTH 121/122 or GEO E 126** is normally regarded as a prerequisite for any major program in Earth Sciences.

2. **Second- third- and fourth-year courses may involve field trips in the fall.** Normally, all those enrolled in Honours Earth Sciences programs are required to take a two-week field camp at the end of the third year (EARTH 390). The cost will range from $120-$150 per student.

3. **Regular Earth Sciences students are encouraged to seek geological employment in the summers.**

**EARTH 121 F 3C 0.5**

**The Planet We Live On**

This course will be given in two parts:

1. **Planet Earth: Structure of the Earth including plate tectonics, earthquakes, and volcanoes.**

2. **A Home for People: Natural processes operating on the Earth, e.g. erosion, mass wasting, glaciation, permafrost, rivers, etc.**

Coreq: EARTH 121L

Antireq: GEO E 126, EARTH 126

**EARTH 122 W 3C 0.5**

**The Planet We Live Off**

This course will be given in three parts:

1. **A Planet for the Taking: Earth history, stratigraphic and paleontologic concepts: minerals and non-renewable earth resources and their exploitation.**

2. **The Planet Strikes Back: Natural hazards and global change.**

3. **Future Planet Earth: Primary considerations for survival: water, food and energy supplies, soil loss, waste disposal.**

Prereq: EARTH 121 or permission of instructor

Coreq: EARTH 122L

Antireq: GEO E 126, EARTH 126

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**Dutch**

For courses in Dutch see Germanic and Slavic Languages and Literatures.
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 F 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 of 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 213A/B or equivalents

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 121/122 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 fidlab
Methods in Geological Mapping
Weekly 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; Gibb's 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,3L 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
Biostatigraphy
Methods of using paleontological 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

EARTH 436 F 3C,2T 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 this 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
Quaternary Geology
Stratigraphy and history of the Quaternary Period 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
Introductory Quaternary Ecology
An introduction to Quaternary ecology. The morphology, biostatigraphy, distribution and paleoecological signification 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
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 tracing 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: CS 102, one of EARTH 359 or 458, or equivalent. MATH 125 is recommended.
EARTH 458 F3 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 de-watering. The role of groundwater in the hydrological 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 213A/B 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 I 221 or CIV E 317 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 213A and an introductory course in computer programming.
EARTH 461 F 2C,1T,3L 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 metalliferous 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 480 S fl/dlab 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 fl/dlab 0.0
Field Course
One or more geology field trips normally conducted at the beginning of the Fall term. Trips will conduct areas of 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. Enrolment 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.

east Asian Studies

Director
G. Cuthbert Brandt, Renison College, 884-4400

Introductory Notes
1. Students who are interested in the Chinese, Japanese and Korean language courses should be aware that the completion of at least three courses in a subject is recommended for a minimum working knowledge of the language. The East Asian Culture course may provide useful historical background for students intending to spend time in the Far East.
2. Students who wish to take the Japanese language courses in preparation for exchange/Co-op programs in Japan should make their needs known to the Renison College Registrar through their program advisors well in advance of the term in which they plan to study.
3. Students who have previous experience with, or who have studied the Chinese, Japanese or Korean languages at the elementary or secondary school level should not enrol in first year level courses of the same language. Such students should consult with the Renison College Registrar regarding the appropriate level to enter.
4. Students seeking enrolment in any Chinese language course must complete a ballot (available from Renison College Registrar) which will be reviewed by the East Asian Studies Enrolment Management Committee to confirm placement in the appropriate level of instruction. Once courses begin, no change can be made in the level of instruction without approval of the Committee.
5. Students are not permitted to enrol in more than one level of a specific language course in one term.
6. We reserve the right to refuse admission to, and/or credit for, any of the language courses listed to a student who, in our view, a level of competence unsuited to the course(s).
EASIA 201R F.W 3C 0.5
East Asian Culture
An introductory survey of the cultures of East Asia with particular reference to China, Japan and Korea.
Open to all students above first year
CHINA 101R F,W,S 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
writing skills. Practical oral and written
grammatical foundation for further study.

JAPAN 101R F,W,S 3C,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.

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.

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)/Renison
permission
Ballot must be completed at Renison College prior to enrolment.

JAPAN 102R F W,S 3C,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

CHINA 201R F 3C,1L 0.5
Second Year Chinese 1
This course and its follow-up (CHINA 202R) will include a survey of grammar,
complex sentences, logical stress and a
final review.
Prereq: CHINA 102R or CHINA 101R (R2)/Renison permission
Ballot must be completed at Renison College prior to enrolment.

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

CHINA 202R W 3C,1L 0.5
Second Year Chinese 2
The study of Chinese characters will
receive more emphasis. Grammar instruc-
tion will include four types of comparison,
different kinds of complements and com-
plex sentences – pauses, logical stress,
etc. Some study of Chinese culture is
included.
Prereq: CHINA 201R/ Renison
permission
Ballot must be completed at Renison College prior to enrolment.

KOREA 201R 3C,1L 0.5
Second Year Korean 1
Designed for students who have complet-
ed KOREA 102R or the equivalent. To
achieve a balanced Korean language pro-
ciciency in listening, speaking, reading and
writing, a variety of teaching materials and
methods is used. The text includes adapt-
ed versions of short stories, essays, and
poems.
Prereq: KOREA 102R or permission of
instructor

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 improv-
ing 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

CHINA 210R Chinese Literature in
Translation
This course will concentrate on advanced
conversation, polite forms, and idioms. It
will provide an opportunity to revise and
practise the Hiragana and Katakana writ-
ing forms. Upon completion, students
should be able to write 800 characters and
use a Japanese dictionary with ease.
Prereq: JAPAN 202R

KOREA 301R F 3C,1L 0.5
Third Year Korean 1
This course will concentrate on advanced con-
versation, polite forms, and idioms. It
will provide an opportunity to revise and
practise the Hiragana and Katakana writ-
ing forms. Upon completion, students
should be able to write 800 characters and
use a Japanese dictionary with ease.
Prereq: JAPAN 202R

EASIA 210R Chinese Literature in
Translation

Please contact Renison College for further
developments in East Asian Studies.

COURSE NOT OFFERED IN 1995-96
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.

Introductory 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 her/his 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 1994-95. Consult departmental listing at time of preregistration for deletions or additional course offerings.

ECON 101 F,W,S 3C 0.5
Introduction to Microeconomics
An introduction to the central economic problems of society, the functioning of a mixed enterprise system, the economic role of government, the composition of and pricing of national output, pricing of productive factors, and income distribution.

ECON 102 F,W,S 3C 0.5
Introduction to Macroeconomics
An introduction to the determination of national income, unemployment (and inflation), interest rates, the exchange rate, monetary and fiscal policy.

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
Microeconomics: 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, interdependencies 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 capitalist governance 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 an 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 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

See overlapping content note (Grading System, Item 7 on page 9-7).
ECON 311 F,W 3 C 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
See overlapping content note (Grading System, Item 7 on page 9:7).

ECON 321 W,S 3 C 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
See overlapping content note (Grading System, Item 7 on page 9:7).

ECON 331 F,W 3 C 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 (Hricardian, 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 3 C 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 3 C 0.5
Interregional Economics
An economic analysis of regional development: theories and policies, with special reference to Canada.
Prereq: ECON 201

ECON 335 W 3 C 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 3 C 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 3 C 0.5
Urban Economics
Application of economic analysis to urban areas. Topics include location decisions of households and 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 3 C 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 3 C 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 346 F 3 C 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 3 C 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 3 C 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 3 C 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 3 C 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 3 C 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 3 C 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
Antireq: ACO 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 3S 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
Microeconomic 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 analyses 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
Economic Analysis, Forecasting, and Public Policy
The course focuses on the problems of forecasting economic activity (as measured by the principal macroeconomic variables), and of designing and implementing policies to control those variables. Topics covered include a critical review of current forecasting models, problems associated with lags of the impact of policies.
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 optimization and optimal control theory; analysis of stability conditions; introduction to linear and nonlinear programming, 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 lag 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

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, Sraffa, Kaldor, Pasinetti, Rowthorn, Nell, 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 Horvai, Nove, Medvedev and others.
Prereq: Consent of instructor or Undergraduate Officer
ECON 471 3C 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 472 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 481 F 3C 0.5
Advanced Microeconomic Theory
The course includes a more advanced treatment of selective topics in microeconomic theory.
Prereq: ECON 311, 401

ECON 482 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 483-488 3S 0.5 each
Special Studies
Research and reading courses under the direction of individual instructors. Admission by consent of instructor. See ECON Undergraduate Office for course registration.

COURSES NOT OFFERED 1995-96
ECON 210A Political Economy 1: Microeconomics
ECON 210B Political Economy 2: Macroeconomics
ECON 463A Political Economy of Capitalist Development
ECON 463B The Political Economy of Socialism

E&CE 203 S 3C,1T 0.5
Discrete Mathematics
Propositional and predicate logic, sets, functions and sequences, mathematical reasoning, combinitorics, relations, graphs and trees. Models of computation.
Prereq: E&CE 223, 250

E&CE 205 F,W 3C,1T 0.5
Advanced Calculus for Electrical and Computer Engineers 1
Fourier Series; Ordinary differential equations; Laplace transforms; 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
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.

**Prerequisites:** E&GE 150, MATH 114, 117, 118, 211.
**E&CE 100**
1 Alternate weeks

E&CE 241 F,W 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.

**Prerequisites:** MATH 114, 117, 118, 211.
**E&CE 100**
1 Alternate weeks

E&CE 250 F,W 3C,1T,3L 0.5
**Algorithms and Data Structures**
Algorithms and Data Structures emphasize the following topics: data structures, abstract data types, recursive algorithms, algorithm analysis, sorting and searching, and problem-solving strategies.

**Prerequisites:** E&CE 150
1 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.

**Prerequisites:** E&CE 150, 250
1 Project

E&CE 261 F,S 3C,1T,3L 0.5
**Energy Systems and Components 1**

**Prerequisites:** E&CE 100, MATH 211
1 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,W 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.

**Prerequisites:** E&CE 150 or equivalent

E&CE 309 W,S 3C,1T 0.5
**Introduction to Thermodynamics and Heat Transfer**

**Prerequisites:** MATH 211, 212

E&CE 316 W,S 3C,1T,3L 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, queuing theory.

**Prerequisites:** MATH 211

E&CE 318 F,W 3C,1T,3L 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.

**Prerequisites:** MATH 211, E&CE 241, 316, 342
1 Alternate weeks

E&CE 324 W 3C,1T,3L 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.

**Prerequisites:** E&CE 222, 223, 250, 251
1 Alternate weeks

E&CE 342 W,S 3C,1T,3L 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.

**Prerequisites:** E&CE 100, 241, MATH 114, 117, 118, 211

E&CE 354 W 3C,1T,3L 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.

**Prerequisites:** E&CE 250, 251
1 Project

E&CE 362 F,W 3C,1T,3L 0.5
**Energy Systems and Components 2**

**Prerequisites:** E&CE 100, 241, 281, MATH 211
1 Alternate weeks
Course Descriptions
Electrical and Computer Engineering

E&CE 370 W,S 3C,1T,3L 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 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 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 0.5
Digital Signal Processing
Prereq: E&CE 318, 342
1 Project

E&CE 427 W,S 3C,1T,3L 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, microprogam 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.
Prereq: One of ECE 354, 450 or CS 354
Prereq/Coreq: 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 (SCR's, power switching transistors, PIN rectifier diodes).
Prereq: 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. Process, device and circuit CAD.
Prereq: 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.
Prereq: 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, TTL, ICL, STL, MOS, CMOS, BICMOS.
Prereq: 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.
Prereq: 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.
Prereq: E&CE 241, 342 or equivalent
ECE 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. modulo-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.
Prereq: ECE 342 or 380

ECE 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.
Prereq: ECE 222 or equivalent.
1 Project

ECE 455 F 3C,1T,3L 1 0.5
Software Engineering
Requirement analysis, specifications, software design, software development environments, testing, software project management, quality assurance and control.
Prereq: ECE 203, 250, 251, 354, Computer Engineering Program or Computer Engineering Option
1 Project

ECE 456 W 3C,1T,3L 1 0.5
Database Systems
Introduction, data models, file systems, database system architectures, query languages, integrity and security, database design.
Prereq: ECE 250 or 252 or 450
1 Project

ECE 457 S 3C,1T,3L 1 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.
Prereq: ECE 251
1 Project

ECE 463 S,F 2C,1T,3L 1 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
1 Open

ECE 464 W 2C,1T,3L 1 0.5
Insulation and High Voltage Engineering
Prereq: ECE 100, MATH 211
1 Alternate weeks

ECE 465 W 3C,1T 0.5
Power Systems
Introduction to system concepts; aspects of power system planning and generation. Energy sources; environmental and resource implications. Per-unit and coordinate systems. Representation of equipment such as generators, transformers and transmission lines in system analysis. Analysis of imbalanced 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: metallic wave guides - rectangular and cylindrical, Dielectric wave guides - slab and fiber; Antenna Technology.
Prereq: ECE 100, 370, MATH 212
Not available until Spring 1996
1 Alternate weeks

ECE 473 W 2C,1T,3L 1 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
1 Every third week

ECE 474 S,F 2C,1T,3L 1 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
1 Every third week

ECE 475 W 3C,1T,3L 1 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
1 Project

ECE 481 F,S 2C,1T,3L 1 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
1 Alternate weeks

ECE 482 W 2C,1T,3L 1 0.5
Multivariable Control Systems
Prereq: ECE 380, 446
1 Open lab
**Course Descriptions**

**Electrical and Computer Engineering**

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**English**

**Undergraduate Officer**

M.G. McArthur, HJH 269, ext. 6873

**Introductory 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 very 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, and 344.

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.

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**GROUP ONE**

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 141R The Use of English 2

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,S 0.5

**Introduction to Written English**

Instructed 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,S 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

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Course Descriptions

English

GROUP TWO

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: Novels and Poetry
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 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 0.5
Youth and Adolescence
Studies the portrayal of young protagonists 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 190 F 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 enrollment

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 enrollment

ENGL 201 F,W,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 F 3C 0.5
The Canadian Short Story
Exploration of the Canadian short story, from its beginnings -- in the bush, in the north, on the land, in the small towns -- through the struggles of an urbanizing society to the present. Students will be expected to work in some depth with individual authors.
Offered at Renison College

ENGL 208A F,W 0.5
Forms of Fantasy
This course will deal with the history and forms of fantasy written for adults. In considering the genre, related forms like the romance, the fairy tale, the fable, and the gothic horror story will be discussed. Authors such as Morris, C.S. Lewis, Tolkien, Williams, and White will be studied.

ENGL 208B F 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 208C F,W,S 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, O.S. Lewis, George MacDonald, Kenneth Grahame, and Thurber will be studied.

ENGL 208E F 0.5
Women Writers of the 20th Century
A study of such major 20th-century writers as Woolf, Hellman, 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 208H F.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 F 0.5

Writing Strategies

Students practice 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 100

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 language and styles 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 technical 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 communication 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 219 S 0.5

Contemporary Usage

An in-depth, applied study of the conventions governing contemporary English grammar, punctuation, syntax, diction, spelling, and sentence structure. In addition, the course will examine variations and changes in conventions; the question of the determiners of correct usage; and the impact of dictionaries, textbooks, journals, large publishing houses, and international 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 terminology. Three to five written assignments.

May be subject to priority enrolment

ENGL 251B W 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 journals, 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.

ENGL 305B W 0.5

Old English 2

An introduction to Old English poetry, noting 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 374)

ENGL 306A F,W,S 0.5

Introduction to Linguistics

Introduction to linguistics and the principles of linguistic analysis through an examination of English phonology, forms, syntax, and discourse.

(Formerly ENGL 375A)

May be subject to priority enrolment

ENGL 306B W 0.5

Modern English Grammar

Introduction to modern English grammar and structure - its meaningful forms and syntax. Several methods of analysis will be employed and evaluated, including the traditional, structural, transformational-generative, and functional.

Prereq: ENGL 306A

ENGL 306E F 0.5

Linguistics and Literature

A study of linguistics and its applications in analyzing the style and language of literature. Topics include the relationship between the structure of language and literature, speech and writing, speech acts and genres, discourse and text.

Prereq: ENGL 306A

ENGL 306F W,S 0.5

Introduction to Semiotics

A study of systems of signs, codes, and signification in language, culture, and literature.

Prereq: ENGL 306A
Course Descriptions

English

ENGL 300A 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: ENGL 309A with an emphasis on the importance of style in rhetorical theory and practice. Priority may be given to RPW students

ENGL 300B S 0.5
Rhetoric: Principles and Practice 2
A continuation of ENGL 300A with an emphasis on the importance of style in rhetorical theory and practice.
Prereq: A 200-level writing course or consent of instructor
May be subject to priority enrolment

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 contributions 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 W 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, on in-class workshops; and performance, on videotaping and student evaluation of speeches.
Cross-listed as DRAMA 323
May be subject to priority enrolment

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.S 0.5
Chaucer 2
A study of Geoffrey Chaucer's "Canterbury Tales."

ENGL 312 W 0.5
Literature of the Commonwealth
A survey of Australian poetry and prose with some consideration of the literatures, in English, from Africa and the West Indies.

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 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 Merrill 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 380 (formerly DRAMA 351)

ENGL 317 F 0.5
Canadian Children's Literature
A study of 19th- and 20th-century Canadian literature for children.

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,S 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 336 W 0.5
Creative Writing 2
Designed to assist advanced creative writers to develop their skills in various genres by means of workshop processes, supervised practice, and critical discussion of one or more major projects.
Prereq: ENGL 335 or consent of instructor

ENGL 343 F 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 enrolment

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 enrolment

ENGL 345/346/347 Studies in American Literature
(Usually only one or two courses from this series are offered each year.)

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.
Course Descriptions

English

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 362 F 0.5
Shakespeare 1
A study of the plays written before 1599-1600, excluding Julius Caesar.

ENGL 363 W 0.5
Shakespeare 2
A study of the plays written after 1599-1600, including Julius Caesar.

ENGL 365/3156
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.

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.

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.

ENGL 392A W 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.

ENGL 409 W 1.0
Writing for Special Purposes
Topics may include editing; magazine, newspaper and editorial writing; advertising and public relations writing; instructional 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.

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 manners 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 451D 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, 1885-1918
A study of works by such writers as Shaw, Conrad, and Yeats.

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, Naisbult, Ackroyd, Larkin, Heaney, Hill.

ENGL 470A F,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 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.

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
Course Descriptions
English
Environment and Resource Studies

**Environment and Resource Studies**

**Undergraduate Officer**
G. Michalenko, ES1 206, ext. 6577

Courses not offered in the current academic year are listed at the end of this section.

**ERS 100 F 2C, 0.5**  
Issue Analysis and Problem Solving for Environmental Studies 1  
Designed to complement the introductory overview of ENV S 195. Selected themes and case examples are analyzed within a framework of concepts and theories from the natural and social sciences. Students undertake practical exercises to develop analytical and problem-solving skills.  
**Prereq:** Environment and Resource Studies students only

**ERS 101 W 2C, 0.5**  
Issue Analysis and Problem Solving for Environmental Studies 2  
Continuation of ERS 100.  
**Prereq:** Environment and Resource Studies students only

**ERS 218 F 3C, 0.5**  
Introduction to Sustainable Environmental and Resource Systems  
Examination of patterns and trends in major environmental systems and natural resource use. Analysis of these resources in the context of sustainable development. Local, regional and global systems will be examined.  
**Prereq:** At least second-year standing

**ERS 231 W 3C, 0.5**  
Environmental Issues in a Global Perspective  
This course examines the various political, economic and social factors in development and environmental concerns in various Third World countries. Special focus is on health-care systems, agricultural and forestry practices and policies, water management and resource ownership.  
Students are encouraged to study one country in some depth, and to submit seminars and projects.  
**Prereq:** ENV S 195 or consent of instructor

**ERS 241 W 3C, 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/B/C 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  
The latter designation allows this course to be taken more than once for credit

**ERS 285 W 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, landfills, 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 330 F,W 3C 0.5
Environmental Journalism 1
Introduction to writing (and preparing graphics) for print media on environmental issues, through practical experience working on the environmental journal Alternatives: Perspectives on Society. Technology and Environment. Each participant covers an environmental news beat in a selected regional (e.g. Atlantic Canada) or sectoral (e.g. law, technology, waste) topic area.
Prereq: Permission of instructor
Field trip fee $20-$25

ERS 337 F 3C 0.5
Socioeconomic Impact Assessment
Major problems and issues in the management of environmental impacts stemming from development projects. Synthesis of ecological, economic and institutional aspects. Integrating environmental management with social and economic development policies and programs.
Prereq: EHS 241 or consent of instructor

ERS 338 W 3C 0.5
Biophysical Impact Assessment
Introduction to the background, theory and methodology of social impact assessment (SIA). SIA as a type of social science research and as a key element in achieving more informed and responsible decision-making in society. Experience in SIA design for environmentally-relevant cases.
Prereq: ERS 241 or consent of instructor

ERS 352 F 2C,1T 0.5
Current Issues in the Canadian North
Introduction to contemporary environmental, social, economic and political issues in Canada's North, principally Yukon, Northwest Territories and Northern Quebec and Labrador. Lectures will discuss homeland and frontier perspectives, economic development and environmental conservation, the northern economies, native land claims and political development.
Prereq: At least second-year standing
Antireq: CDNST 301

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, T.V., cinema, magazines, radio, travellers, 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 362Z F 2.5
Waterloo in USA – Michigan
Description in Environmental Studies program section (page 11:7).

ERS 363Z W 2.5
Waterloo in USA – Michigan
As 362Z.

ERS 364Z S 2.5
Waterloo in USA – Michigan
As 362Z.

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/B/C 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 390A F,S 2C,1T 0.5
Seminar-Workshop
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,workshp 0.5
Seminar-Workshop
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 418B F 3C 0.5
Seminar on Strategies for Sustainable Development
Using selected environmental systems and resource use activities the course will analyse selected policy, planning and implementation strategies for sustainable development. The analysis will include consideration of organizational and institutional arrangements. Various approaches reflecting local, regional and international experiences will be compared and contrasted.

ERS 430 F,W 3C 0.5
Environmental Journalism 2
Advanced work in environmental journalism including examination of ethical issues and practical problems. Special attention to complex stories, editing and design. Course focus depends on nature of individual projects selected by participants.
Prereq: ERS 375A or 330, permission of instructor

ERS 445 W 3C 0.5
Impact Assessment and Policy Analysis: Practicum
Students will draw on knowledge and experience gained in the prerequisite theme courses to critique and/or design impact analyses of a variety of "real world" activities, including policy initiatives, technological choices, environmentally-relevant proposals, economic strategies and others of special interest or significance.
Prereq: ERS 241, 337 and 338, or consent of instructor
ERS 490, 491, and 492 vary depending on the amount of work involved and the depth of the subject matter. Study approval.

ERS 490A F,W,S 2C 0.5
Senior Honours Assignment
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. Study beyond the 490 level requires faculty approval.

ERS 490B F,W,S 2C 0.5
Senior Honours Assignment
Continuation of ERS 490A
Prereq: ERS 490A

ERS 491A F,W,S 4C 1.0
Senior Honours Assignment
Continuation of ERS 491A.
Prereq: ERS 491A

ERS 492A F,W,S 6C 1.5
Senior Honours Assignment
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 Assignment
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

COURSE NOT OFFERED 1995-96
ERS 150 Environmental Issues: Methods and Techniques
ERS 280 Applied Field Studies
ERS 305 Ecosystem Perspectives and Analyses
ERS 318 Soft Resource Paths in Canada/Sustainable Resource Development
ERS 350 Community Action on Environmental Problems
ERS 351 Organizations and Environmental Management in the Canadian North
ERS 360 Nature: Art, Myth and Folklore
ERS 385 Technology/Lifestyles for a Conserver Society
ERS 391A Seminar Workshop
ERS 391B Seminar Workshop
ERS 480 Special Topics Seminar

Environmental Engineering

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.G. Lennox, E2 3314, ext. 6959

ENV E 100 F 3C, 1T, 6L for first 6 weeks 0.75

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 WATSTAR computer 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

ENV E 101 S 3C, 1T, 2L 0.5
Environmental Engineering Concepts 2
A continuation of Environmental Engineering Concepts 1 (ENV E 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

ENV E 126 S 2C, 4L/T 0.5
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 to 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.

ENV E 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.

ENV E 213 F,S 3C, 2L 0.5
Fluid Mechanics

Prereq: CH E 101
Cross-listed as CH E 025
For Environmental Engineering students, Chemical branch
Course Descriptions
Environmental Engineering

ENV E 220 F.W 3C 0.5
Environmental Chemistry and Ecotoxicology
Prereq: Second-year standing

ENV E 222 F.W 3C,1T 0.5
Applied Mathematics 1 (Statistics)
Introduction to statistical ideas, probability 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

ENV E 320 W.S 3C,1T 0.5
Environmental Resource Management
The impact of the use of natural resources on the ecosystem; management of natural resources; spatial patterns of resource use and ecological impact. The role of environmental engineering models, methods, and modes of analysis in resource management. Capabilities and limitations of current models. Innovation in environmental control. The legislation process as it relates to environmental matters; factors influencing environmental legislation and its evolution.

ENV E 321 F,W 3C 0.5
Applied Mathematics 2: Advanced Mathematics
Prereq: MATH 215, 210, 216
Cross-listed as CH E 037
For Environmental Engineering students, Chemical branch

ENV E 330 S 3C,2L
Lab Analysis and Field Sampling Techniques
An introduction to the fundamental concepts of instrumentation and measurement. Water analysis, physical parameters, membrane application, electro-chemical 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.

ENV E 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.

ENV E 332 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, CFC's, NOx, and SOx). Selected inorganic chemical processes of industrial importance, e.g. sulfuric acid, nitric acid, ammonia, phosphate, caustic, iron ore, uranium. Impact of process design and chemistry on the environment.

ENV E 333 F,W 3C 0.5
Chemical Reaction Engineering
Prereq: CH E 026, MATH 216, GEN E 121
Cross-listed as CH E 036
For Environmental Engineering students, Chemical branch

ENV E 403 W 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.

ENV E 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.

ENV E 420 W 3C,1T 0.5
Modelling of the Environment
Cross-listed as SY DE 536
Course Descriptions

Environmental Engineering

Environmental Engineering Project

Students in consultation with the sponsoring faculty. A written interim preliminary report is required.

ENV E 462 F S 3C 0.5
Economics for Environmental Engineering

Cross-listed as 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 practice in an Environmental Engineering capacity in their chosen area of expertise, using knowledge gained from their academic and employment experiences. The first part of the project will include problem identification, generation and selection of solutions and time management. 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 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 generation, storage, collection, transfer and transport, processing and disposal of solid wastes in landfill sites. Design of natural attenuation sites and system reliability features for landfill designs.

ENV E 480 F S 3L 0.25
Environmental Engineering Project

Individual research or design on any chemical engineering subject 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 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.

Preq: ENV E 480
Antireq: CH E 047, ENV E 483
Cross-listed as CH E 049
For Environmental Engineering students, Chemical branch

ENV E 483 W 12L 1.0
Environmental Engineering 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.

Preq: CH E 040, ENV E 491
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.

Introductory 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 Environmental 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 interested in this area are urged to consult the course offerings of the four individual units mentioned above. These four departments/schools offer a variety of related courses allowing in-depth studies 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 techniques 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.

Preq: Only second year students and above except for Planning

Lab fee of $10
Antireq: BOL 250

ENV S 201 F 3C,1SS 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 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 of $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 on page 9:7)

ENV S 320 W 2C,1T 0.5
**Environmental Economics: An Historical Perspective**
An introduction to the history of economic thought as it relates to the environment. Approaches taken by economists in different eras will be assessed as to their applicability in the development of environmental policies now and then.

*Prereq: ENV S 220 or consent of instructor

ENV S 334 F 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 365Z F 2.5
**Waterloo in UK – Leeds**
Description in Environmental Studies program section (page 11:7).

*Cross-listed as GEOG 365Z

ENV S 366Z W 2.5
**Waterloo in UK – Leeds**
As 365Z.

*Cross-listed as GEOG 366Z

ENV S 382Z F 2.5
**Waterloo in Australia – RMIT**
Description in Environmental Studies program section (page 11:7).

ENV S 383Z W 2.5
**Waterloo in Australia – RMIT**
Description in Environmental Studies program section (page 11:7).

ENV S 384Z S 2.5
**Waterloo in Australia – RMIT**
Description in Environmental Studies program section (page 11:7).

ENV S 392Z F 2.5
**Waterloo in Australia – Deakin**
Description in Environmental Studies program section (page 11:7).

ENV S 393Z W 2.5
**Waterloo in Australia – Deakin**
As 392Z.

ENV S 394Z S 2.5
**Waterloo in Australia – Deakin**
As 393Z.

ENV S 395Z F 2.5
**Waterloo in Australia – Griffith**
Description in Environmental Studies program section (page 11:7).

ENV S 396Z W 2.5
**Waterloo in Australia – Griffith**
As 395Z.

ENV S 397Z S 2.5
**Waterloo in Australia – Griffith**
As 396Z.

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 417 S 3S 0.5
**Field Studies in Land Use History and Landscape Change**
Theory, method, case studies and field work in land use history and landscape change and their applicability to resource and environmental planning and management.

*Prereq: Consent of instructor
Field trip fee varies depending on destination

ENV S 433 W 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 433

ENV S 434 F 3C 0.5
**Advanced Park Planning and Management**
A study of policies, procedures, and practices relative to the management of natural resources. Emphasis is placed on an ecological systems approach to management as it relates to parks at all levels of government.

*Prereq: REC/ENV S 334
Cross-listed as REC 434

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

**COURSE NOT OFFERED 1995-96**

ENV S 469 Field Aspects of Applied Ecology
Fine and Performing Arts

The University offers courses in:

- **Dance** see page 16:38
- **Drama** see page 16:40
- **Fine Arts** see page 16:65
- **Music** see page 16:101

For program information, please see Chapter 8, Faculty of Applied Health Sciences, and Chapter 9, Faculty of Arts

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Fine Arts

Undergraduate Officer
B. Taylor, ECH 1211, ext. 5358

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 111 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 302

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 314 3C 0.5
**Art of the 20th Century in Europe**
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 arts 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. 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.
Admission by permission only

FINE 490A F S, std, R 0.5
Senior General Seminar
As in Fine Arts 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.
Admission by permission only

FINE 491 S, std W 0.5
Senior Honours Presentation 2
A continuation of FINE 490. Required of all Honours students in Art History Specialization.
Admission by permission only

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 (1895-1940)
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 286

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 258W 0.5
Canadian Film
A study of Canadian film, from 1895 to the present, based on the screening and analysis of selected films.
This is a WLU course for Film Studies Majors/Minors only.

FINE 259W 0.5
German Film
A study of major works (English subtitles) of the German cinema, beginning with the “golden age” of the 1920's and emphasizing the New German Cinema created by directors such as Fassbinder, Wenders, Herzog, Straub, Schöndorff 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 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.
Prereq: 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 350 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. (Bresson, Carné, Ophüls, Renoir, Chabrol, Godard, Malle, Truffaut, Renoir, and others.) Film screenings.

FINE 351 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 352 2L,2D 0.5
The Cinema of Science Fiction
A chronological survey of one of the most intriguing of 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 other directors). Film screenings.

FINE 353 2L,2D 0.5
Contemporary Italian Film
A study of major achievements of the Italian cinema in its post-Neorealist period. Discussion of the works of major directors since the late 1950's. Antonioni, Bertolucci, Fellini, Olmi, Taviani, Rosi, Visconti and others. Film screenings.

FINE 356R/357R 0.5/0.5
Special Topic in Film
Special topics will be announced from year to year.
Course Descriptions
Fine Arts

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 analyzing 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 2L2D 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 2L2D 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, Esslin). Film screenings.

FINE 360Z 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 focussing on material unavailable in Canada. Meetings with scholars/students. (One 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,S,d,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,S,d,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,S,d,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.

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 techniques 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

FINE 225 W 6C,6std 0.5
Introduction to Drawing 2
A continuation of FINE 224 with a further exploration into various approaches to drawing. 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

FINE 226A
Introduction to Printmaking
Introduction to the basic processes in relief and intaglio printmaking. Relief printmaking will include linocut, woodcut, single and multiple colour printing. Intaglio printmaking will include etching, drypoint, and collograph.
Prereq: FINE 120/121

FINE 226B
Printmaking (Lithography)
An introduction to basic lithographic processes using aluminum plates, including multiple colour printing.
Prereq: FINE 120/121

FINE 226D 0.5
Special Topics in Printmaking
An introduction to a variety of experimental, non-traditional printmaking techniques.

FINE 228A 6 std. 0.5
Applied Graphics
An introduction to graphic design. Fundamental design concepts as they relate to typography and page design will be explored using several PC Windows graphics packages and "desktop publishing" techniques.
Prereq: FINE 120 or consent of instructor

FINE 228C 6 std. 0.5
Electronic Imaging 1
An introduction to electronic imaging. Students will learn to create, develop, manipulate and enhance two-dimensional coloured images using PC Windows graphics packages. Students will produce 35mm slides and coloured prints to document their work. Students are encouraged to have had previous experience with PC Windows graphics packages.
Prereq: FINE 120 or consent of instructor

FINE 320 F 6 std. 0.5
Advanced Painting 1
Drawing upon the experience gained in FINE 220/221 this course will emphasize the student's individual development as a beginning painter, through independent problems, along with class discussions and individual critiques.
Prereq: FINE 220/221

FINE 321 W 6 std. 0.5
Advanced Painting
A continuation of FINE 320 with a further emphasis on independent problems.
Prereq: FINE 320

FINE 322 F 6 std. 0.5
Advanced Sculpture 1
An exploration of sculptural problems in a variety of media as vehicles for serious creative expression.
Prereq: FINE 222/223

FINE 323 W 6 std. 0.5
Advanced Sculpture 2
A continuation of FINE 322 in which students will explore sculptural problems in a variety of media.
Prereq: FINE 322

FINE 324 F 6 std. 0.5
Advanced Drawing
An exploration of drawing problems in a variety of media. The emphasis is on students becoming familiar with contemporary approaches to drawing and developing their own individual expression.
Prereq: FINE 224 and 225

FINE 325 W 6 std. 0.5
Advanced Drawing 2
Continuation of FINE 324

FINE 326A
Advanced Printmaking
Advanced processes in printmaking depending on the previous experience of students in the class.
Prereq: FINE 226A and 226B or 226C

FINE 328H W 6 std. 0.5
Electronic Imaging 2
A continuation of FINE 228H with emphasis on the development of individual expression. Students will produce 35mm slides and coloured prints to document their work.
Prereq: FINE 228H or consent of instructor

FINE 392A-2 F R std. 0.5
Selected Subjects in Fine Arts
Independent studio course under the direction of an individual instructor graded by a committee of Fine Arts faculty members.
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 Department

FINE 394A-D 0.5
Fine Arts Abroad
Working in the field with landscape, cityscape, and monuments of art, students will employ a variety of media to develop techniques for visual reportage, documentation, note-taking, and journalkeeping. Individual aesthetic responses to a wide range of subject matter will be encouraged. Offered in the spring, usually in France, England or Mexico. Information about current offerings can be obtained from the Department.

FINE 472 F R std. 0.5
Senior Honours Seminar 1
Each student will work on individual and assigned projects critiqued by visiting artists and supervising faculty and graded by the full faculty.
Required of all Honours students in Studio Specialization
Admission by consent of Department

FINE 473 W R std. 0.5
Senior Honours Seminar 2
A continuation of FINE 472.
Required of all Honours students in Studio Specialization
Admission by consent of Department

FINE 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

FINE 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
FINE 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 FINE 472 concurrently.

FINE 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 FINE 473 concurrently.

COURSES NOT OFFERED 1995-96
FINE 218A The Religious Art of India
FINE 220A Watercolour Painting
FINE 226C Printmaking (Screen)
FINE 227 Objective Drawing
FINE 228F Calligraphy
FINE 316 Canadian Native Art
FINE 329 Illustration

French Studies/Études françaises

Undergraduate Officer
A. Ages, ML 335, ext. 2181

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

Introductory 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.
2. Students with some elementary or secondary school French not exceeding Ontario Grade 10 French or equivalent should enrol in French 151. Those with Ontario Grade 11 or Grade 12 French or equivalent should enrol in French 152.
3. Students with Ontario Grade 13 or Ontario Academic Course French should enrol in French 192A/B and/or French 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.
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 above, notes 1-5
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 above, notes 1-5
Also offered at St. Jerome’s College
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 1: 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
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, 260A 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, 192A/B, 195A, 196A, 201 or the consent of Department
Antireq: FR 260
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, 192A/B, 195A, 196A, 201 or consent of Department
Antireq: FR 260
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.
Prereq: 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.
Prereq: FR 250A 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.
Prereq: 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.
Prereq: FR 251, 252 or consent of Department

FR 400 F,W 4C 0.5
French Language 4A
Intensive development of advanced comparative stylistics, translation and composition skills. Taught in French.
Prereq: FR 351, 352 or consent of Department
Priority enrolment for French majors

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.
Prereq: 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.
Prereq: FR 351 and 352

LINGUISTICS COURSES

Language of Instruction
Courses are normally taught in French. However, in the case of students not enrolled in a French Major or Honours Program, permission may be given for written assignments and examinations to be done in English.

FR 203 3C,1L 0.5
Introduction to Phonetics
An introduction to the structure of the French sound system with a view to improving pronunciation. Careful attention will be paid to the individual student's difficulties. Taught in French.
Prereq: Two of FR 155, 192A/B, 195A, 196A or consent of Department

FR 303 3C,1L 0.5
Introduction to Linguistics
This course will introduce students to a basic theoretical reflection on language. Various important schools of modern linguistic thought ranging from Saussure to Chomsky, etc. will be discussed. Taught in French.
Prereq: FR 251 or 252 or consent of Department

FR 403 3C 0.5
Topics in Linguistics
An area in Linguistics of particular interest to the Instructor and the students will be chosen. Taught in French.
Prereq: FR 251 or 252 or consent of Department

FR 409 3C 0.5
Medieval French Language
Introduction to the early development of French.
Prereq: FR 251 or 252 or consent of Department

CIVILIZATION COURSES

Language of Instruction
Courses are normally taught in French. However, in the case of students not enrolled in a French Major or Honours Program, permission may be given for written assignments and examinations to be done in English.

FR 291 3C 0.5
French Civilization 1
This course traces the cultural development of France from its origin to the French Revolution. Emphasis is given to the study of music, art, architecture, literature, ideas and “daily life” in their historical context.
Preferably completed in year 1 or 2.

FR 292 3C 0.5
French Civilization 2
This course completes the study of the cultural development of France to 1900. After that, the course emphasizes a study of life in these two areas today. Considerable attention will be paid to art, politics, industry, etc.
Prereq: FR 291 is recommended

FR 298A 3C 0.5
French Studies 1
A survey of French civilization and literature prior to the 18th-century and an introduction to the discipline. Language skills will be developed through dictées, composition and written assignments. Taught in French.
Prereq: FF 300A or 300B or consent of Department

FR 393A/B 0.5/0.5
French Civilization, 1884-1914
Offered in the Nantes Program.
May be taken as HIST 338F/380F

FR 395A/B 0.5/0.5
French Thought
A survey of the principal thinkers and currents of ideas in France from the Renaissance to the Present. Offered in the Nantes Program.

FR 473 3C 0.5
Aspects of Quebec
A presentation of traditional and contemporary Quebec in the fields of the Arts, literature, music, politics and society. Taught in French.
Prereq: FR 200A/B or consent of Department
(Formerly FR 273)

LITERATURE COURSES

Language of Instruction
Courses are normally taught in French. However, in the case of students not enrolled in a French Major or Honours Program, permission may be given for written assignments and examinations to be done in English.

FR 195A 3C 0.5
French Studies 2
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
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 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 or 195A and 196A or consent of Department
Also offered at St. Jerome's College

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
Course Descriptions

French Studies
General Engineering

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 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

Antireq: FR 254

FR 354 3C 0.5
18th-Century French Literature
A detailed study of selected aspects of 18th-century French literature. Taught in French.
Prereq: FR 200A/B or consent of Department

FR 363 3C 0.5
20th-Century French Literature
A detailed study of selected aspects of 20th-century French literature. Taught in French.
Pre req: FR 200A/B or consent of Department
(Formerly FR 275)

FR 375 3C 0.5
Contemporary French-Canadian Novel
A study of selected texts by modern French-Canadian authors. Taught in French.
Pre req: FR 200A/B or consent of Department
(Formerly FR 275)

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 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 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 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 485 3C 0.5
French Women Writers
A study of selected works by women writers in France from the Middle Ages to the twentieth 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 497 U.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

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.
Pre req: FR 200A/B or consent of Department

GEN E 010 F,W,S 1.0
Co-operative Education Orientation
Given by the Department of Co-operative Education and Career Services for students in First Year Engineering. Its purpose is to introduce students to the various 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 student'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 registered. The specific cases are indicated in the following:

GEN E 020C - 099C
International Exchange Program Courses
- Chemical Engineering
- Civil and Geological Engineering
- Electrical and Computer Engineering
Course Descriptions
General 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 computers, 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 operational amplifiers; ac circuit components; basic ac circuits; power circuits.

For Year One Chemical, Civil, Geological and Mechanical Engineering students.

*Alternate Weeks

GEN E 163 F 1C,1T,1L 0.25
Introduction to Methods of Mechanical Engineering
An introduction to some of the basic methods and principles used by engineers, including fundamentals of technical communication, 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 methods and principles used by engineers, including fundamentals of technical communication, 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 methods and principles used by engineers, including fundamentals of technical communication, 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 perspective 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 301/002 W,S,F,W 4D 0.5
Special Directed Studies
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 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 professional aspects of the foreign residence period. The instructor for this course is the Option Co-ordinator.

Restricted to students 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 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.

Prereq: 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-Z W 1.5
Engineering Study Abroad Program
Students studying abroad for academic transfer credits under an Engineering Exchange Program during a Winter term register at Waterloo under GEN E 396A-Z. The suffix is a letter indicating the country (and where necessary the fee status) of the exchange in a particular case.

GEN E 401/402 F,S/W 4D 0.5
Special Directed Studies
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.

Prereq: Permission of the Associate Chair of the Department in which the student is registered

GEN E 411 S,F 3C 0.5
Engineering Law
General introduction of Law and Common Law legal systems; formation of contracts, effect of mistakes on contracts, interpretation of contracts, breach of contracts, legal remedies; scope and content of technical specifications; sale of goods; introduction of the law of agency; the tort of negligence, professional negligence; some aspects of restrictive trade practices; introduction to patent law. Ethical aspects of professional practice.

Restricted to fourth-year Chemical, Computer, Electrical and Systems Design Engineering Students
Course Descriptions
General Engineering
Geography

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 flows of energy, water and matter and their effects on the subsystems of the natural environment.

GEOG 120 F 2C,2L 0.5
The World Region
Selected areas of the world's climatic regions, emphasizing characteristic problems as well as their physical, cultural and economic interrelationships, resources use, population pressure, urban and rural land use, and human impact on the earth.

GEOG 160 F 2C,2L 0.5
Introduction to Cartography and Map Analysis
An introduction to the analysis, production and use of maps. Techniques of data collection, manipulation and symbolization in order to present them in graphical form will be examined. Emphasis will be placed on hard copy maps and how they can mislead as well as inform.

Lab fee $15-$25

GEOG 201 F,S 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.

Prereq: GEOG 102 or EARTH 121 or 126 or GEO E 126

GEOG 202A 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 204 F 3C 0.5
Geography of Post Soviet Union
Introduction to the geography of the Post Soviet Union, with a focus on selected problems in urbanization, industrialization, resource use and regional economic development.

GEOG 205 W 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 206 S 2C,2L 0.5
The World Regions and World Issues
This course will discuss specific world regions, e.g., Japan, Switzerland, E. Europe, U.S.S.R., within a global context. It will also discuss world issues, including some of the following topics: the underdeveloped world, energy, the spread of arms and terrorism, environmental degradation, world trade, the flow of capital, and integrating geographical elements within the world region.

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 F 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 W 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 225 F 3C 0.5
Urbanization in the Third World
An analysis of the factors behind the rapid urbanization of selected areas in Asia, Africa and Latin America, with an examination of related problems of urban planning and development control policies.
Prereq: Any Faculty of Environmental Studies course or Third World Development course
Cross-listed as PLAN 260
Lab fee $8

GEOG 227 S 2C,2L 0.5
Regional Problems of Europe
An introduction to the Geography of Europe which examines agricultural, industrial and urban problems. Lectures, discussions and visual presentations based on field experience of instructors.

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 160
Antireq: PLAN 255
Lab fee $10

GEOG 275 F 2C,2L 0.5
Introductory Air Photo Analysis and Remote Sensing
Basic characteristics of various remote sensing techniques and their application in the broad field of geographic and environmental studies. Emphasis on the analysis and interpretation of air photos in 3 dimensions.
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 F 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,S 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 runoff.
Prereq: GEOG 201 or one of 208 or 309
Lab fee $20

GEOG 304 F 4C/lab 0.5
Field and Lab Techniques in Geomorphology
An analysis of the range of techniques used by geomorphologists. This course will involve intensive field surveying, mapping and laboratory work.
Prereq: GEOG 300 or EARTH 342 or consent of instructor
Field-trip expenses: $15 per student

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 306 F 2C,1D 0.5
Physical Climatology
Principles of physical climatology with emphasis on regional and global change and variability. Topics include radiation and energy balances, general circulation patterns, synoptic development and micro-climatology.
Prereq: GEOG 102

GEOG 311 F 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 316 S 1C,2L 0.5
Multivariate Statistics
The theory and application of multivariate statistics, with particular emphasis upon the use of the computer.
Prereq: ENV S 278 or consent of instructor
Cross-listed as PLAN 351

GEOG 320 S 2C,2L 0.5
Regional Geography
The approach of the regional geographer is illustrated using one or more specific regions. Political, social and historical processes are studied as they affect perception of the regional environment. Example regions used are Austria, Alpine and Mediterranean World, Greece, Germany, Switzerland.
Prereq: A first-year human geography course

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 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 326 W 3C 0.5
Gender Roles and Development
Alternatives in the Third World
The course examines several conceptual
research methods and action approaches,
ranging from conventional development
theories to feminist perspectives; from
planning (macro and micro level) and pro-
gram developments for women to popular,
grass-root community movements in the
development processes at work.
Prereq: Second-year Third World
Development courses or consent of
instructor
Estimated additional cost to student: $8

GEOG 332 F 3C 0.5
Health, Environment and Development
in the Third World
Geographic concepts and issues in study-
ing health related environmental problems.
Topics include: morbidity and mortality pat-
terns, "population at risk", malnutrition,
potency, 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 3C 0.5
Recreation Geography
Implications of existing and potential recre-
ation 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 340 W 3C 0.5
Towns and Villages of Rural Canada
An examination of the evolving function of
Canadian towns and villages; Emphasis is
placed on the economic, demographic and
social structure of communities from the
pre-industrial to post-industrial period.
Prereq: GEOG 202A/B or consent of
instructor
Field Trip Fee: $10 - $15

GEOG 341 S 2S 0.5
Historical Geography of Canada
The changing geographies of settlement
and resource use from the beginnings of
human settlement to the early twentieth
century.
Prereq: A second-year human
graphy course or consent of instructor

GEOG 349 W 3C 0.5
The City as a System
Theories, models and research proce-
dures in the study of internal urban struc-
ture. Focuses on city-wide processes,
urban land use, spatial economics, inter-
action 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 353 W 3C 0.5
Marketing Geography
A discussion of retail location at both
inter and intra-urban scales emphasizing
theoretical and applied approaches.
Prereq: GEOG 202A

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: $20

GEOG 356 W 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 F 3C 0.5
Water Planning and Management:
Strategies and Experiences
Benchmark theory and principles of com-
prehensive water planning and integrated
river basin management. Selected
international to local scale case studies.
Prereq: Consent of instructor
Lab fee $15

GEOG 365 F 2.5
Waterloo In Switzerland – Lausanne
Description in Environmental Studies
program section. (page 11:7)

GEOG 372 F 2.5
Waterloo In Switzerland – Lausanne
Description in Environmental Studies
program section. (page 11:7)

GEOG 376 W 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 275
Lab fee $10-$15

GEOG 381 F 2C 0.5
The Nature of Geography
The roots and evolution of geographic
thought, conceptual approaches and path-
ways. Past traditions, current issues, and
future trends. The politics and sociology of
geography as an art, science, and
profession.
Prereq: Third- or fourth-year geography
students
Course Descriptions

Geography

GEOG 391 F,W,Fllab 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.
Pre req: 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.
Pre req: Third- or fourth-year students only

GEOG 405 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.
Pre req: GEOG 201 and/or 207
Field trip fee: $20

GEOG 407 W 2C,1L 0.5
Physical Hydrology
Advanced study of hydrological processes with an emphasis on snow and snowmelt, and the linkage of atmospheric, surface and subsurface fluxes of energy and matter.
Pre req: GEOG 303
Lab Fee $20

GEOG 409 W 2S 0.5
Energy Balance Climatology
A field and lecture course including the study of energy balances of various surfaces, the principles of turbulent energy exchange, and the biotic response to the energy environment. These concepts will be illustrated through the collection and examination of field data. A self-directed learning approach is emphasized in this course.
Pre req: GEOG 309

GEOG 411 W 2S 0.5
Geography of Industrial Restructuring
Emphasis on multinational corporations, institutions, technological change, and analysis of the restructuring of specific industries.
Pre req: GEOG 202A and 202B or consent of instructor

GEOG 412 F 2C,1S 0.5
Japan and the Pacific Rim
This course will examine conflicting theories which explain the rise of Japan to the status of a global power. Geographic, economic, political, cultural and physical attributes are used to develop a better understanding of Japan, its complex trading system and the growing Pacific economy.
Pre req: GEOG 202A or 206 or consent of instructor

GEOG 413 F 2S 0.5
Europe
Physical, cultural, economic and political geography of Europe. Topics such as the development of cities, problems of agriculture, changing industrial patterns, distribution of trade, regional disparities, environmental degradation, and planning on the city, regional and national levels, will be discussed.
Pre req: GEOG 120 or 227

GEOG 422 F 2S 0.5
Canada
Seminar on geographical regional synthesis as applied in Canada. Study of regions at different scales. A self-directed learning approach is emphasized in this course.
Pre req: GEOG 322

GEOG 425 F 3C 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.
Pre req: GEOG 205

GEOG 430A/B/C 5 Fl lab 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. Consult Undergraduate Advisor.
Pre req: Third- or fourth-year geography students or consent of instructor

GEOG 431 F 2S 0.5
City and Regional Systems
A continuation of GEOG 349 and 350 with an emphasis on student projects.
Pre req: GEOG 349 and 350 or consent of instructor

GEOG 455 W 3C 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.
Pre req: GEOG 355 or PLAN 356

GEOG 459 W 2L,1S 0.5
Global Energy Systems
The major global energy systems: oil, coal, gas, nuclear and renewables, will be examined. The distribution of energy resources and changing consumption patterns will be reviewed. Comparisons will be made between different fuels and the consumption patterns of different countries. Attention will also be paid to the environmental impact of different energy systems.
Pre req: GEOG 202A or consent of instructor

GEOG 471 W 2C,2L 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.
Pre req: GEOG 376

GEOG 474A-Z F,W,S 3C 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.
Pre req: Consent of instructor

GEOG 474A/B/C F,W,S 2S 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.
Pre req: Third- or fourth-year geography students and consent of instructor
The letter designation allows this course to be taken more than once for credit
Course Descriptions
Geological Engineering

GEOG 490A 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 1995-96
GEOG 207 Water Resources of Canada
GEOG 226 Rural Resources and Development in the Third World
GEOG 318 Spatial Analysis
GEOG 319 Economic and Social Techniques for Regional Planning
GEOG 331 Special Topics in Cultural Geography
GEOG 350 Regional Urban Systems
GEOG 351 Geography of Transportation
GEOG 359 Geography of Energy
GEOG 375 Air Photo Interpretation
GEOG 401 Glacial Geomorphology and Some Contemporary Applications
GEOG 404 Cartographic Production and Design
GEOG 408 Atmospheric Resource Management
GEOG 461 Land Dereliction, Rehabilitation and the Design of “New Landscapes”

Geological Engineering

Undergraduate Officer
M. Dusseau, PHY-208A, 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.

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, analytical, 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.

Germanic and Slavic Languages and Literatures

Undergraduate Officer
I. Szarycz, ML 217, ext. 3393

GERMAN

Introductory Note
Not all courses listed in this section are available. Please consult the 1994-95 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 12 German, OAC, or equivalent.

GER 102 F,W,S 3C,1L 0.5
First Year German
As GER 101

Prereq: GER 101

GEH 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 121)

GER 192 W 3C 0.5
Studies in German Literature with Language Practice
As GER 191
Prereq: GER 101, or permission of instructor
(Formerly GER 122)

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 258A F 3C 0.5
Young Germany and Biedermeier
Reading, interpretation and critical analysis of prescribed prose, drama and poetry. (Grillparzer, Mönke, Stifter, Gotthelf, etc.).
Prereq: GER 152A, 192 or equivalent
(Formerly GER 361)

GER 262A W 3C 0.5
Poetic Realism
Reading, interpretation and critical analysis of prescribed prose, drama and poetry (Storm, Keller, Ludwig, Hebbel, Rabe, Fontane, etc.).
Prereq: GER 152A, 192 or equivalent
(Formerly GER 362)

GER 271 F 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

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

GER 281 F 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 282 W 3C 0.5
Post-War Literature
As GER 281
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, 292 or equivalent

GER 292 W 3C 0.5
Survey of German Literature
As GER 291
Prereq: GER 152A, 192, 292 or equivalent

GER 300A-Z 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 FIN 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)
**GER 353/354 0.5/0.5**

**Intermediate Conversation and Composition on Topics in German Landeskunde**

Conversation and composition on topics in German Landeskunde 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 Stage 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, Buchner, Bruch 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 361A F 3C 0.5**

**The Age of Goethe (Classicism)**

Reading, interpretation, and critical analysis of representative works (Goethe, Schiller, Hölderlin, etc.).

Prereq: GER 152A, 192 or equivalent

(Formerly GER 261)

**GER 362A W 3C 0.5**

**The Age of Goethe (Romanticism)**

Reading, interpretation, and critical analysis of representative works (Novalis, Tieck, Brentano, etc.).

Prereq: GER 152A, 192 or equivalent

(Formerly GER 262)

**GER 371 F 3C 0.5**

**Modern German Literature**

Reading, interpretation, and critical analysis of prescribed texts relating to the "Moderne" and various literary movements around the turn of the century.

Prereq: GER 152A, 192 or equivalent

**GER 372 W 3C 0.5**

**Modern German Literature**

Reading, interpretation and critical analysis of prescribed texts from the early 20th century to the end of World War II (Kafka, Bruch, etc.).

Prereq: GER 152A, 192 or equivalent

**GER 381 F 3C 0.5**

**Racism 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 such writers as Lessing, Goethe, Schiller, Buchner, Brecht and Dürrenmatt.

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 392 W 3C 0.5**

**Masterpieces of German Literature in Translation**

As GER 391

**GER 395Z F 2.5**

**Waterloo in Germany Program**

Description in Arts program section.

**GER 396Z W 2.5**

**Waterloo in Germany Program**

As GER 395Z

**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, Sacha, Opit, 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, Lenz, Klinger, etc.).

Prereq: Second-year standing in German

**GER 461 F 3C 0.5**

**Introduction to the History of the German Language with Readings in Modern German Literature**

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.

**GER 471 F 3C 0.5**

**German Poetry**

A study of the major 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 major thoughts, themes, forms and schools in German poetry from German Romanticism to the present.

**GER 495-498 F, W, S R 0.5 each**

**Reading Courses in Approved Topics**

Prereq: Approval of the Department

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**DUTCH**

**DUTCH 101 F 3C 0.5**

**First Year Dutch**

The basic elements of Dutch grammar with emphasis on oral practice and pronunciation, along with appropriate texts from Dutch literature. 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
Course Descriptions

Germanic and Slavic

DUTCH 201 F 3C 0.5
Intermediate Dutch
This course will be conducted partly in
Dutch and offers advanced study in gram-
mar, composition, and conversation.
Special emphasis will be given to
comprehension and practice in the spoken
language.
Prereq: DUTCH 102 or equivalent

DUTCH 202 W 3C 0.5
Intermediate Dutch
As DUTCH 201
Prereq: DUTCH 201 or equivalent

RUSSIAN

Introductory Note
Not all courses listed in this section are
available. Please consult the 1994-95
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 facul-
ty at the elementary, intermediate, and
advanced levels. Duration of program is
normally four-six weeks, although longer
periods in Russia are possible.
Prereq: 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
2. second-year Russian: 293, 294, 295 or
3. third-year Russian: 393, 394, 395 or
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.

RUSS 101 F 3C.1L 0.5
First Year Russian
A study of Russian grammar and composi-
tion with emphasis on oral practice and
pronunciation.
Language lab
Open to all university students with little
or no knowledge of Russian
Prereq: RUSS 101 or equivalent

RUSS 102 W 3C.1L 0.5
First Year Russian
As RUSS 101
Prereq: RUSS 101 or equivalent

RUSS 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, pronunci-
ation and intonation are stressed.
Prereq: RUSS 102

RUSS 252 W 3C 0.5
Conversation, Composition, Grammar
and Phonetics
As RUSS 251
Prereq: RUSS 251 or equivalent

RUSS 261 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.
Prereq: RUSS 102 or equivalent

RUSS 262 W 3C 0.5
Introduction to Russian Literary
Movements
As RUSS 261
Prereq: RUSS 261 or equivalent

RUSS 271 F 3C 0.5
Russian Thought and Culture
A survey of cultural history from the begin-
ings to 1861. Lectures will focus on major
developments in literature, philosophy, art,
archnology, 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

RUSS 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 back-
ground of Russia's historical past.
Discussion will be devoted primarily to
works of Russian literature.
Taught in English
Open to all students

RUSS 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: RUSS 102 or equivalent

RUSS 312 W 3C 0.5
Theory of Translation
As RUSS 311
Prereq: RUSS 311

RUSS 341 F 3C 0.5
Russian Drama
A study of the origins and development of
Russian drama up to 1900. Reading and
critical analysis of major works in various
genres with emphasis on authors of the
nineteenth century.
Taught in English.
Extra work in Russian required of
Russian majors only
Cross-listed as DRAMA 381 (formerly
DRAMA 352)

RUSS 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)

RUSS 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.
Prereq: RUSS 252 or equivalent

RUSS 352 W 3C 0.5
Intermediate Conversation and
Composition
As RUSS 351
Prereq: RUSS 351 or equivalent

RUSS 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 dra-
mas of such playwrights as Gogol,
Chekhov, Tolstoy, Gorky, Mayakovsky, and
Pogodin.
Taught entirely in English
Fall term: See GER 355
Prereq: Second-year standing or above
Cross-listed as DRAMA 384 (formerly
DRAMA 356)

RUSS 361 F 3C 0.5
Russian Short Story
A study of the form and a detailed exami-
nation of Russian short stories by major
representative writers.
Taught in English
Extra work in Russian required of
Russian majors only
Course Descriptions

Germanic and Slavic

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 nineteenth 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 Lucimila," Borodin's "Prince Igor," Mussorgsky's "Boris Godunov," Dargomyzsky'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: Open to all students. Additional requirements apply to students majoring in Russian and Music Programs. Cross-listed as MUSC 365

RUSS 391 F 3C 0.5
Great Russian Novels
Reading and interpretation of 19th- and 20th-century novels from the works of Gogol, Turgenev, Dostoevsky, and Tolstoy. Lecture on social and intellectual background. Taught in English. Extra work in Russian required of Russian majors only

RUSS 462 W 3C 0.5
Twentieth-Century Russian Literature
Reading, interpretation, and critical analysis of selected fiction and drama (Andreev, Bunin, Gorky, Katerina Sholokhov, A.N. Tolstoy). Taught in English. Extra work in Russian required of Russian majors only

RUSS 441 3C 0.5
East Slavic Epic Tradition
A study of the origins and development of the Epic tradition in East Slavic Literature. Taught in English

RUSS 442 3C 0.5
Russian Epic Tradition
As RUSS 441
  Taught in English

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 461 F 3C 0.5
Twentieth-Century Russian Literature
Reading, interpretation, and critical analysis of selected fiction and drama (Arbusov, Bulgakov, Erenburg, Nabokov, Pasternak, Solzhenitsyn). Taught in English. Extra work in Russian required of Russian majors only

RUSS 462 W 3C 0.5
Russian Poetry
A study of themes and forms of representative authors of Classicism, Romanticism (Lomonosov, Derzhavin, Pushkin, Lermontov, Nekrasov, Fet, Tiutchev, etc.). Prereq: RUSS 102 or equivalent

RUSS 485 F 3C 0.5
History of Russian Literature
This course deals with the emergence of the Russian national literature, emphasizing the cultural and intellectual setting from the beginning to 1917. Literary movements and major representative works not studied in other courses will be discussed. Taught in English. Extra work in Russian required of Russian majors only

RUSS 486 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. Taught in English. Extra work in Russian required of Russian majors only

POLISH

POLISH 101 F 3C 0.5
First Year Polish
The fundamentals of Polish grammar are taught with emphasis on oral practice and pronunciation. An introduction to Polish culture is given as well. Taught in English. Open to all university students with little or no knowledge of Polish.

POLISH 201 W 3C 0.5
Intermediate Polish
This course will be conducted largely in Polish and provides intensive practice in grammar, composition and conversation. Prereq: POLISH 102 or equivalent

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.

UKRAN 102 W 3C,1L 0.5
Beginners' Ukrainian
As UKRAN 101
  Prereq: UKRAN 101 or equivalent
UKRAN 201 F 3C, 1L 0.5
Intermediate Ukrainian
This course will be conducted in Ukrainian and provides intensive practice in grammar, composition and conversation.
Prereq: UKRAN 102 or equivalent

UKRAN 202 W 3C, 1L 0.5
Intermediate Ukrainian
As UKRAN 201
Prereq: UKRAN 201 or equivalent

UKRAN 271 F 3C 0.5
Ukrainian Civilization (From the Beginnings to 1800)
This course presents the evolution of Ukrainian civilization from its prehistoric origins to the period of national revival in the late 18th century. Developments in literature, art, architecture, music and the folk arts are examined against the background of Ukrainian history.
Taught in English
Open to all students

UKRAN 272 W 3C 0.5
Ukrainian Civilization (From 1800 to the Present)
This course examines the artistic, intellectual, spiritual, and material progress of the Ukrainian people in the 19th- and 20th-centuries. Integral to this course are the cultural aspects of Ukrainian settlement in Canada. Lectures are complemented by audio-visual presentations and readings from Ukrainian and Ukrainian-Canadian literature.
Taught in English
Open to all students

UKRAN 301 F 3C 0.5
Introduction to Ukrainian Literature
Reading and critical interpretation of texts chosen from the works of Skovoroda, Kotliarevsky, Shevchenko, Franko, L. Ukrainka and others.
Taught in English

UKRAN 302 W 3C 0.5
A Critical Survey of Literary Movements in 20th-Century Ukrainian Literature
With special attention to the rise of the new angry generation of poets of the Sixties (V. Symonenko, L. Kostenko, V. Korotych, and others).
Taught in English

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

GHUAT 3/1 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
Antireq: Students who have completed any of the following courses require 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.

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
GERON 218 W 3C 0.5
Aging, Dying and Death
An examination of the psychological aspects of aging and the traditional and
traditional 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 develop-
ment and maintenance of the effective physical and mental health of its mem-
ers. 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 organi-
zational 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 popula-
tion aging. Topics discussed include: aging from a historical and comparative perspec-
tive; aging in subcultures; aging and the social structure; aging and social proces-
es; 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 pop-
ulation 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. Students wishing to enrol in this seminar
must have completed at least six of the courses towards the Diploma/Minor
(including a statistics course) and must consult the Undergraduate Officer before
preregistering.
Cross-listed as HLTH 400

GERON 401 A/B
Directed Studies in Special Topics
For the student who desires to pursue a particular topic in depth through indepen-
dent research and/or extensive reading.
A faculty member must approve a 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 quan-
titative evaluation of environmental factors relevant to human disease and aging.

Health Studies

Undergraduate Officer
R.S. McColl, BMH 2319, ext. 2720

HLTH 101 F 3C 0.5
Introduction to Health Studies 1
An exploration of current issues and controvers-
iess in the promotion of optimal health with emphasis on the biological fac-
tors contributing to health or disease. Strategies and procedures for the reduc-
tion of risk factors for disease are described. Topical areas include:
(1) human reproduction and sexuality,
(2) nutritional factors and heart disease, and
(3) genetic diseases and cancer.

HLTH 102 W 3C 0.5
Introduction to Health Studies 2
The same as HLTH 101, with emphasis on
behavioural factors as they interact with
biological processes. The topics will
include (1) the neurological bases and
(2) the psychological bases of health relat-
ed behaviour such as stress and addiction
and (3) community health.

HLTH 150 F 0.5
Introduction to Gerontology
This course represents a first introduction
to the study of aging and as such will pro-
vide a survey of the major biological, psy-
chological and social aspects of aging.
It will be of interest to those who want to
obtain some basic knowledge about grow-
ing old and being old, and it can also serve as
the first step towards a more specialized
study of these phenomena.
Cross-listed as GERON 100
Prereq: Students who have completed
any of the following courses GERON 255/
SCI 255, GERON 352/HLTH 352/KIN
352/SCI 352, GERON 217/PSYCH 217/
HLTH 217, GERON 218/PSYCH 218/
HLTH 218, GERON 400/HLTH 400,
require permission of instructor

HLTH 210 W 3C 0.5
Growth, Development and Aging
The physiology of human growth, develop-
ment and aging is examined, with special reference to the influence of diet,
environ-
ment, exercise and disease on the normal
processes.
Prereq: BIOL 230, 273
Cross-listed as GERON 210, KIN 210
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 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 200, 273, KIN 317 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 317 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.B 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 (lung, 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. Students wishing to enrol in this seminar must have completed at least six of the courses towards the Gerontology Diploma Minor (including a statistics course) and must consult the Undergraduate Officer before preregistering.
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

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 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

HIST 100 F 0.5
History of Modern Europe 1600-1945
A thematic introduction to the rise and decline of European States, 1600-1945.
Recommended for all first-year students considering History as a major.

HIST 102C 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.

HIST 102F F,W 0.5
Canadian History
Selected major themes from pioneer life to Canadian involvement in 20th-century wars.
Offered at St. Jerome's College
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 211 F 0.5
British History to 1603
A survey of the main stages in the transition of Britain from a remote province of the Roman Empire to a prominent state of post-Reformation Europe. Within the chronological framework, political and constitutional as well as ecclesiastical and social developments will be examined.
Offered at St. Jerome's College

HIST 212 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 1800 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 212A F 0.5
Canadian Women in Historical Perspective: Forming Identities, 1600-1910
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 the 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 215

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 late 19th 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 215

HIST 217 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 218 F 0.5
Catholic Church in Canada since Confederation
An examination of the Catholic Church in Canada since Confederation, with an emphasis on social and political influences.
Offered at St. Jerome's College

HIST 219 W 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 Conrad Grebel College Cross-listed as RS 230

HIST 220 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 221 F 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 222 F 0.5
Canadian History: The Colonial Period
This course examines the major themes in 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 223 F 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 224 F 0.5
The Expansion of England
The history of the British Empire down to the American War of Independence, telling the story of the Tudor seadogs, of the plantation of Ireland, the settlement of the North American mainland, the establishment of slave plantations in the Caribbean, and the earliest British enterprises in Africa, Asia and the Pacific.

HIST 225 F 0.5
The British Empire and Commonwealth
The history of British imperialism between the loss of the American colonies and the Falklands Islands War of 1982, tracing the rise of the settlement colonies to dominion status, the huge expansion of the dependent empire during the age of the New Imperialism, the imperial apogee after World War I, and the rapid change from Empire to New Commonwealth after World War II.

HIST 226 F 0.5
The United States to 1990
From the British provincial society of the 16th century to the emergence of modern America. Special emphasis on the American character, and on the moral dilemmas of republicanism and democracy, freedom and slavery, equality and competition.
Course Descriptions

History

HIST 258 W 0.5
America: 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.

HIST 200 F 0.5
Europe: 814-1303
The political, cultural, economic, and ecclesiastical development of Europe from Charlemagne to Philip IV of France.
Offered at St. Jerome’s College

HIST 262 W 0.5
Europe: 16th to 18th Century
An introduction to the social and cultural history of Europe (including England) from the 16th century to the French Revolution. The course will focus on topics such as the social structure, daily life, the role of women and the family.

HIST 263 W 0.5
Europe: 1789-1945
The growth of nationalism and nation states since the French revolution with attention to the Industrial Revolution, the World Wars, Fascism, Nazism and Stalinism.

HIST 264 S 0.5
Europe Since 1945
Europe since the end of World War II. Focus will be on the Cold War, political and social movements.

HIST 300 W 0.5
The Idea of History
The course is an introduction to the Philosophy of History and to historiography from the 19th century to the present. It deals with the great theoretical issues influencing historical analysis and with the classics of historical literature.
Highly recommended for Year Three History majors.

HIST 304 F 0.5
Medieval Church History
An exploration of the development of the Church from 604 to 1448. Topics will include leadership struggles in church and state, crusades, heresy and inquisition, the western schism and the conciliar period.
Offered at St. Jerome's College
Cross-listed as RS 325

HIST 305 F 0.5
Tudor and Stuart England
A history of England from 1465 to 1714 discussing topics including the Tudor and Stuart monarchs, the Reformation, the Civil War and Cromwellian era, and the rise of parliamentary institutions.

HIST 315 F 0.5
American Cultural History 1: Words and Things
An intermediate-level exploration of concepts in cultural studies: mentalities, representations, cultural production and reproduction. Early settler societies and the emergence of the Republic and of a national culture will be examined. Specific themes will include ideas and practices of virtue, craftsmanship, obligation, time, family, work, from the age of Edwards and Franklin to that of Tocqueville and Emerson.

HIST 320 F 0.5
The History of Modern Quebec
This course will treat the history of Quebec from 1667 to the present. Nationalism, separatism, language and cultural problems, economic and social issues are all examined in their historical context.

HIST 321 W 0.5
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.

HIST 325 F 0.5
History of Native Peoples in Canada to 1870
This course examines aspects of Aboriginal social organization, economic activities and spirituality, as well as the impact of European contact upon Native societies. Issues such as the fur trade, missonization, and the development of government policy regarding Native Peoples will also be treated through lectures and discussions.

HIST 326 W 0.5
Native People in Canada: An Historical and Contemporary Perspective Since 1870
This course focuses upon both the impact of colonialism and the First Nations' efforts to resist the erosion of their autonomy since 1870. Issues such as the nature of the Indian Act, treaties and land claims will be studied. Contemporary concerns such as the growth of Native political organizations, the impact of the child welfare system and the struggle for self-government will be addressed.

HIST 329 W 0.5
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.
Offered at St. Jerome’s College

HIST 346 F 0.5
Mennonite History: Special Topics
This course considers the Mennonite experience within specific geographic and historical settings (for example, those of the former Soviet Union/Russia or Canada).
Offered at Conrad Grebel College

HIST 349 W 0.5
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.
Offered at Conrad Grebel College
Cross-listed as RS 322

HIST 350 W 0.5
British West Indian History
A survey history of the British Caribbean, widely defined. Topics emphasized include early colonization, plantations, slave society, abolition and emancipation, the growth of nationalism, independence, and the roots of contemporary problems.

HIST 355 F 0.5
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.

HIST 356 W 0.5
20th-Century Russia
The course will focus on selected themes in Russia's development in the 20th century including the Soviet period.

HIST 385 W 0.5
Canada: From Macdonald to Laurier
An analytical and historical examination of the development of the Canadian nation from Confederation to the First World War.

HIST 390 F 0.5
Shaping the Canadian City, 1880-1990
Introduction to retrospective policy analysis as applied to contemporary urban topics. Focuses on the history of environmental issues such as pollution and water management and social problems in health, education, welfare and culture.
HIST 397 F,W,S 0.5
Directed Studies in Special Topics
Study in a limited field under tutorial guidance. A high standard of written work will be expected.

HIST 398 F,W,S 0.5
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.

300-Level seminars are normally 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 seminars with the same professor.

HIST 401A F,W,S 1.0
HIST 401B S 1.0
European
"Offered at St. Jerome's College

HIST 403A F,S 1.0
HIST 403B W,S 1.0
Canadian
"Also offered at St. Jerome's College

HIST 405A F 1.0
HIST 405B W 1.0
British

HIST 407A F 1.0
HIST 407B W 1.0
Imperial/Minorities

HIST 409A F,S 1.0
HIST 409B W,S 1.0
American

HIST 491 F,W,S 1.0
Independent Study in Special Subjects

COURSES NOT OFFERED 1995-96
HIST 102F Western Intellectual History
HIST 102N Introduction to African History
HIST 201 Canadian Urban History
HIST 202 Individual and the Family
HIST 206 History of Canadian Minorities
HIST 207 Canadian Labour History
HIST 212 British History since 1603
HIST 218 German History, 1740-1945
HIST 222 History of Modern Revolutions
HIST 230 Church and Revolution in Latin America
HIST 237 Ancient Civilization 1
HIST 238 Ancient Civilization 2
HIST 248 History of Canadian-American Relations to 1914
HIST 249 Canadian-American Relations since 1914
HIST 261 Europe: 14th to 16th Century
HIST 307 British History 1760-1867
HIST 308 Britain since 1867
HIST 316 American Cultural History 2
HIST 319 French-Canadian History
HIST 358 History of Modern Germany
HIST 379 Reformation History
HIST 387 Ontario History
HIST 389 Canada in World Affairs
HIST 396 American South
HIST 400A/B Reformation
HIST 402A/B Russian
HIST 410A/B Historiography

Course Descriptions
History - Italian

HIST 238 Ancient Civilization 1

HIST 238 Ancient Civilization 2

HIST 230 Church and Revolution in Latin America

HIST 237 Ancient Civilization 1

HIST 238 Ancient Civilization 2

HIST 248 History of Canadian-American Relations to 1914

HIST 249 Canadian-American Relations since 1914

HIST 261 Europe: 14th to 16th Century

HIST 307 British History 1760-1867

HIST 308 Britain since 1867

HIST 316 American Cultural History 2

HIST 319 French-Canadian History

HIST 358 History of Modern Germany

HIST 379 Reformation History

HIST 387 Ontario History

HIST 389 Canada in World Affairs

HIST 396 American South

HIST 400A/B Reformation

HIST 402A/B Russian

HIST 410A/B Historiography

Interdisciplinary Social Science

For courses in Interdisciplinary Social Science see Social Development Studies.

Italian

Undergraduate Officer
G. Niccoli, St. Jerome's College, 884-8110

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,1L 0.5
Intermediate Italian 1
Advanced study of grammar. Conversation sessions based on intermediate-level readings reflecting contemporary Italian life. Intensive practice in the spoken and written language.
Prereq: ITAL 101/102 or consent of instructor
Antireq: ITAL 191

ITAL 202 W 3C,1L 0.5
Intermediate Italian 2
A continuation of ITAL 201.
Prereq: ITAL 201 or consent of instructor
Antireq: ITAL 192

ITAL 251 F 3C 0.5
Italian Conversation and Composition 1
This course offers extensive practice in idiomatic spoken and written language. Conversation will be based on social, political and cultural aspects of Italian life.
Prereq: ITAL 201/202 or consent of instructor (replaces former prereq 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
Antireq: ITAL 193

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

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

ITAL 311 W 2S 0.5
Medieval Italian Literature
An introduction to the Italian literature of the Middle Ages, with special reference to selections from the major works by Dante, Petrarch and Boccaccio.
Prereq: ITAL 201/202 or consent of instructor (replaces former prereq ITAL 191/192)

ITAL 396 F R 0.5
Special Topics/Directed Readings
This course gives the student an opportunity to study authors and works of special interest which are not covered in other courses.
Prereq: Consent of instructor

ITAL 397 W R 0.5
Special Topics/Directed Readings
Winter term of ITAL 396.

COURSES NOT OFFERED 1995-96
ITAL 312 Renaissance Italian Literature
ITAL 391 The Modern Italian Novel
ITAL 392 Modern Italian Poetry

Japanese

For courses in Japanese see East Asian Studies.

Kinesiology

Undergraduate Officer
I.D. Williams, BMH 3024, ext. 2825

KIN 102 F 3C,11 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.
Prereq: KIN 200, BIOL 230 and 273
Cross-listed GERONZIO, HLTHZL

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.
Prereq: KIN 102 and 103

KIN 200 F 3C,2L 0.5
Human Anatomy: Limbs and Trunk
Functionally-oriented regional anatomy of the limbs and trunk using predisesected 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 predisesected 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

KIN 222 F 3C,2L 0.5
Statistical Techniques Applied to Kinesiology
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

KIN 242 F 3C,2L 0.5
Introduction to Movement Disorders
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, cardio-vascular and respiratory disease.
Prereq: KIN 102 and 103

KIN 250 W 3C 0.5
Sociology of Physical Activity
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

KIN 255 W 3C,2L 0.5
Introduction to Psychomotor Behaviour
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
KIN 264 F 2C,1T
Developmental Aspects of Movement
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

KIN 300 W,S 3C,3L 0.5
Physiology of Physical Activity
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

KIN 317 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

KIN 321 W,S 3C,2L 0.5
Biomechanics of Human Movement
Anatomical, neural and mechanical considerations in the qualitative and quantitative analysis of human movement are examined. Concepts related to the bio-statistics and kinodynamics of linked segment models of human motion are introduced.
Prereq: PHYS 111, KIN 200 and 222

KIN 330 W,S 3C 0.5
Research Design
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

KIN 335 F 3C,2L 0.5
Evaluation of Human Motor Performance
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

KIN 340 F 3C,2L 0.5
Injuries in Work and Sport
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

KIN 341 W 3C,2L 0.5
Selected Topics in Sport and Work Injuries
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

KIN 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 317 or Year Three or Four standing or permission of instructor
Cross-listed as HLTH 346

KIN 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 HLTH 348

KIN 349 F,S 3C 0.5
Principles of Behaviour Modification
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 349

KIN 352 3C 0.5
Sociology of Aging
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

KIN 354 W,S 2C,1T 0.5
Social Psychology and Physical Activity
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

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 neuro-endocrine mechanisms involved.
Prereq: KIN 300 and 317
Those with pathologies will be emphasized.

This course will provide a detailed understanding of kinematics, electrical and neural control perspectives. The problems of the elderly and the assessment of those with pathologies will be emphasized.

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 cardiopulmonary 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 201 or consent of instructor

KIN 420 W 3C 0.5
Occupational Biomechanics
Biomechanical methods are applied to the study of the effect of the human operator of selected work place tasks, personal equipment, and work space layout. Examples include the use of EMG and/or computerized models to analyse load and stress during loading, the design of helmets, shoes and office chairs.

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 body segment movement 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
Advanced Biomechanics of Human Movement
An introduction to specific psychological topics as they relate to the social psychological behaviour of the individual in motor performance situations. Topics usually examined are personality, anxiety, motivation, attribution.

Prereq: KIN 354
KIN 456 F 3C 0.5
Cognitive Dysfunction and Motor Skill
An examination of issues related to understanding the cerebral organization of motor skill. Discussion of how certain movement disorders are a reflection of disturbances at different stages in the sequence of information processing.
  Prereq: One of PSYCH 206, 207, or KIN 356

KIN 457 W 3C,2L 0.5
Cognitive, Perceptual and Motor Assessment
This course is designed to provide the student with an introduction to the principles underlying the assessment of cognitive, perceptual and motor functions. Measurement issues associated with test development and use, factors involved in the administration and interpretation of test results, and methods of report writing will be examined. Under the supervision of a Registered Psychologist, the student will learn to administer a number of test instruments used in the assessment of cognitive, perceptual and motor functions. Assessments will be done on normal, healthy volunteers recruited from the university community.
  Prereq: KIN 356, 456 and consent of instructor

KIN 470 F,W,S 3C 0.5
Seminar in Kinesiology
An examination of current major issues and trends in Kinesiology. Students select areas of major interest from a series of faculty introduced topics.
  Prereq: Fourth year Honours KIN students

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.
  Prereq: Consent of department

KIN 472A/B Biomechanics
KIN 472C/D Work Physiology
KIN 472E/F Psycho-Motor Behaviour
KIN 479H 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 experience working with people from special populations and the consent of course co-ordinator.

Korean

For courses in Korean see East Asian Studies.

Latin

For courses in Latin see Classical Studies.

Latin American Studies

For the course in Latin American Studies see Spanish and Latin American Studies.

Management Sciences

Undergraduate Officer
F. Safayeni, CPH 4303, ext. 2226

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.
  Antireq: PSYCH 333 or 338

M SCI 251 F,W 3C 0.5
Probability and Statistics 1

For courses in Management Sciences see Economics 1

Managerial and Engineering Economics 1
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.

For courses in Management Sciences see Engineering Economics 1
Course Descriptions
Management Sciences
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 431 F,W,S 3C 0.5
Operations Research 1

M SCI 432 F,W,S 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/maintenance, equipment replacement, maintenance, design of service facilities, etc.

Prereq: M SCI 251 or equivalent and M SCI 331

M SCI 452 3C,1T 0.5
Decision Making Under Uncertainty
Review of probability, distribution theory, and classical statistical inference methods. Linear statistical models, analysis of variance, regression. Bayesian analysis, contingent decision making, value of information, utility and risk.

Prereq: M SCI 251 or equivalent
Antireq: SY DE 334

M SCI 461 F,S 3C,1T 0.5
Managerial and Engineering Economics 2
The course is concerned with cost minimizing choices of inputs to production. Topics to be considered are: production functions and cost functions; the relation between "size" and unit cost; labour inputs, labour as a quasi-fixed input; productivity measurement; learning-by-doing; capital inputs, investment rules, capacity decisions under scale economies.

Prereq: M SCI 261 or equivalent

Mathematics

See also Actuarial Science, Applied Mathematics, Combinatorics and Optimization, Computer Science, Mathematics Electives, Pure Mathematics, Statistics.

MATH 103 F 3C,1T 0.5
Introductory Algebra For Arts and Social Science
An introduction to applications of algebra to 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: rate 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 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: rate 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 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, 126, 138, 148
Not open to Honours Mathematics students.

MATH 109  F  3C,2T  0.5
Mathematics For Accounting
Prereq: OAC Calculus, or MATH 104
Antireq: All Calculus courses labelled MATH 1x7, 1xR
Open only to Arts students in the School of Accountancy.

MATH 115  F  3C,2T  0.5
Linear Algebra for Engineering
Prereq: OAC Algebra or equivalent
Antireq: MATH 125, 136, 146
(Formerly MATH 114)
Not open to students registered in the Faculty of Mathematics.

MATH 117  F  3C,2L  0.5
Calculus 1 For Engineering
Prereq: OAC Calculus
Antireq: MATH 107, 127, 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 117 or equivalent
Antireq: MATH 108, 126, 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 118, 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, 117, 127, 147
Also offered at St. Jerome's College in the Fall term.

MATH 128  W,S  3C,2T  0.5
Calculus 2 For Honours Physics and Chemistry
Prereq: MATH 127, or equivalent
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,W 3C,1T 0.5
Advanced Calculus 1 For Electrical Engineers
Fourier series, Ordinary differential equations. Laplace transform. Applications to linear electrical systems.
Prereq: MATH 118
Antireq: MATH 218, 228
Cross-listed as E&CE 205
Not open to students in the Faculty of Mathematics.

MATH 212 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 SE DE 112
Antireq: AM 250, MATH 228
Cross-listed as SY DE 211
Formerly MATH 216
Not open to students in the Faculty of Mathematics.

MATH 227P F 3C,1T 0.5
Calculus 3 for Honours Physics
Prereq: MATH 126
Antireq: MATH 212, 217, 273, 247, AM 231
Not open to students registered in the Faculty of Mathematics.

MATH 228 F,W 3C 0.5
Differential Equations For Physics and Chemistry
First order equations, second order linear equations with constant coefficients, series solutions and special functions, the Laplace transform method. Applications in physics and chemistry are emphasized.
Prereq: One of MATH 128
Antireq: AM 250, MATH 218
Formerly MATH 215, 216
Not open to students in the Faculty of Mathematics.

MATH 235 F,W,S 3C 0.5
Linear Algebra 2 For Honours Mathematics
Determinants. Eigenvalues, diagonalization and the minimal polynomial. Inner products, orthonormal bases, orthogonal and unitary matrices, quadratic forms. Applications.
Prereq: MATH 136
Antireq: MATH 126, 245
Also offered at St. Jerome's College in the Fall term.

MATH 237 F,W,S 3C 0.5
Calculus 3 For Honours Mathematics
Prereq: MATH 138
Coreq: MATH 136
Antireq: MATH 212, 217, 227P, 247
Also offered at St. Jerome's College in the Fall term.

MATH 245 F,W 3C 0.5
Linear Algebra 2 (Advanced Level)
MATH 245 is an advanced-level version of MATH 235.
Prereq: MATH 146 or consent of instructor
Antireq: MATH 126, 235

MATH 247 F,W 3C 0.5
Calculus 3 (Advanced Level)
MATH 247 is an advanced-level version of MATH 237.
Prereq: MATH 146 or consent of instructor
Antireq: MATH 136 or 146

COURSES NOT OFFERED 1995-96
MATH 111A Algebra
MATH 227 Calculus 3
### 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.

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Term</th>
<th>Credits</th>
<th>Notes</th>
</tr>
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<tbody>
<tr>
<td>MTHEL 100</td>
<td>F,S</td>
<td>2C</td>
<td>0.5</td>
</tr>
<tr>
<td><strong>Commercial and Business Law for Mathematics Students</strong></td>
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<tr>
<td>The Judicial Process, Contract Law, Commercial and Business Law for Mathematics Students</td>
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<tr>
<td><strong>MTHEL 100</strong></td>
<td>F,S</td>
<td>2C</td>
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<tr>
<td>Uses and Abuses of Statistics</td>
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<tr>
<td>This course provides an appreciation of how to correctly use statistical arguments in a wide variety of applications. Topics include descriptive statistics, sample surveys, experimental design, index numbers, and regression models.</td>
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<td><strong>MTHEL 102</strong></td>
<td>W,S</td>
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<tr>
<td>Introduction to Mathematics Education</td>
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<tr>
<td>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.</td>
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<tr>
<td><strong>MTHEL 206A</strong></td>
<td>F,S</td>
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<tr>
<td>Introduction to Mathematics Education</td>
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<tr>
<td>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.</td>
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<td><strong>MTHEL 205A</strong></td>
<td>F</td>
<td>3C</td>
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<tr>
<td>General Life Insurance 1</td>
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<tr>
<td>Types of life insurance contracts and their uses, basis of risk measurements, modified valuation methods, non-forfeiture values, dividends, formulas, selection of risks, substandard risks, and principles of reinsurance.</td>
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<tr>
<td><strong>MTHEL 305B</strong></td>
<td>W,S</td>
<td>3C</td>
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<tr>
<td>General Life Insurance 2</td>
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<tr>
<td>Legal aspects of life insurance, settlement options, principles of group and industrial insurance, organization and structure of life insurance companies, financial statements, the mathematics underlying insurance taxation.</td>
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<tr>
<td><strong>MTHEL 305A</strong></td>
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### Mechanical Engineering

**Undergraduate Office**  
G. Davidson, E2 2330, ext. 3340

**Introductory Notes**

1. **Uses and Abuses of Statistics**  
   The relevance of statistics in decision-making, the importance of statistical analysis in engineering applications, and the role of statistics in the study of materials.

2. **Scientific Principles of Mechanical Engineering**  
   The application of scientific principles to the design and analysis of mechanical systems, including thermodynamics and fluid mechanics.

- **M E 202** | F,W | 3C | 1T | 0.5 |
- **Statistics for Engineers**  

- **M E 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.

- **M E 212** | F,W | 3C | 1T | 0.5 |
- **Dynamics**  

- **M E 215** | F,S | 3C | 3L | 0.5 |
- **Structure and Properties of Materials**  

- **M E 220** | F,S | 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.

- **M E 201** | F,W | 3C | 1T | 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. Vector calculus, divergence, curl, Laplacian, and Stokes' Green's, and Divergence theorems. Applications include: topological problems, rotation in fluids, volumetric scalar flux transport, work and energy, conservative force fields.

- **M E 219** | F,W | 3C | 1T | 0.5 |
- **Mechanics of Deformable Solids 2**  
  A general treatment of the behavior 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.
Course Descriptions
Mechanical Engineering

ME 250 F,S 3C,1T 0.5
Thermodynamics 1
The engineering science of energy, The
scope and limitations of thermodynamics.
Macroscopic approach to heat, work,
energy and the First Law. Properties and
state of simple substances. Control-mass
and control-volume energy analysis. The
Second Law of Thermodynamics, principle
of increase of entropy, limiting cycle
efficiencies, criteria for equilibrium.
Prereq: M E 201
Antireq: E&CE 309 and SY DE 381

ME 262 F,S 3C,1T,3L 0.5
Introduction to Microprocessors and
Digital Logic
Number systems, codes and coding, mini-
mization 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 col-
clection and control of pneumatic hydraulic
and machine systems. Laboratory work
includes the use of microcomputers.
Prereq: GEN E 123

ME 269 F,W 3C,2T,3L 1.0
Electromechanical Devices and Power
Processing
Review of ac circuits. Three-phase cir-
ruits. Transformers. Industrial power net-
works. Principles and operating character-
istics of dc and ac motors including speed
control. Power conditioning for supplying
mechanical drives. Interface of electrome-
chanical systems with control circuits and
transducers.
Prereq: GEN E 123
Alternate weeks

ME 300A/300B W,S,F,W 2C 0.0
Seminar
Technical specialties in Mechanical
Engineering, discussion of options, cur-
culum, seminars and technical topics in
the various options.

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 cov-
ered: Interpolation, curve fitting, solution of
non-linear equations, numerical integra-
tion, numerical solution of ordinary differ-
ential equations, matrix algebra and
solution of systems of linear equations,
and problems in the solution of partial
differential equations.
Prereq: M E 201, 203

ME 305 W,S 3C,1T 0.5
Partial Differential Equations
Partial Differential Equations of
Mathematical Physics: wave equation,
diffusion of heat and species, Laplace
and Poisson equation. Modelling physical
systems with distributed parameters.
Boundary and initial conditions.
Separation of variables, eigenvalues and
eigenfunctions. Sturm-Liouville theory,
orthogonality, similarity methods and
Fourier series. Bessel and Legendre
equations and functions, transform
methods and characteristics.
Prereq: M E 201, 203

ME 321 W,S 3C,11 0.5
Kinematics and Dynamics of Machines
Principles of the geometry of motion,
Uniform and non-uniform motion, linkage,
gears, cams. Synthesis and analysis of
mechanisms. Consideration of the static
and dynamic forces in machines. Vibration
analysis, response to shock, motion and
force transmissibility, vibration isolation.
Prereq: M E 201, 212

ME 322 F,W 3C,1T 0.5
Mechanical Design 1
Analysis and synthesis of machine ele-
ments. Factors affecting working stresses,
fatigue, creep and impact considerations.
Design of shafting, springs, screws,
clutches, brakes and gears.
Prereq: M E 220, 321

ME 330 W,S 3C,2L 0.5
Control of Properties of Materials
Phase equilibria, non-equilibrium
behaviour, heat treatment of metals, dif-
sion, strengthening processes. Alloying,
composite materials, cold and hot working.
Failure of engineering materials: creep,
fatigue, corrosion and other environmental
degradation processes. Prevention of
service failures.
Prereq: M E 215

ME 340 F,W 3C,1T,3L 0.5
Manufacturing Processes
The principles of manufacturing unit pro-
cesses including casting, forming, machin-
ing 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 219, 330
Cross-listed as SY DE 364

ME 350 W,S 3C,1T,1L 0.5
Fluid Mechanics 1
Physical properties of fluids and funda-
mental concepts in fluid mechanics.
Hydrostatics. Conservation laws for mass,
momentum and energy. Flow similarity
and dimensional analysists 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

ME 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

ME 354 W,S 3C,1T 0.5
Thermodynamics 2
Emphasis on applications of thermody-
namics to flow processes, real fluids, eval-
uation of state functions of real fluids.
Non-rocoting mixtures, reacting mixtures,
equilibrium considerations.
Prereq: M E 250

ME 360 F,W 3C,1T,2L 0.5
Introduction to Control Systems
Open loop and feedback control. Laws
governing mechanical, electrical, fluid and
thermal control components. Analogies.
Analysis of some engineering control sys-
tems using block diagram algebra, tran-
sient and steady-state operation. Different
modes of control. Review of Laplace
Transform methods. Controllability.
Principles of analog computer simulation.
Brief treatment of linear flow graphs and
bondgraphs.
Prereq: M E 203, 321

ME 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

ME 400A/400B 3C,F,W 2C 0.0
Seminar
Research frontiers in Mechanical
Engineering, specific discussion of
research done at Waterloo, seminars by
members of research groups.
Course Descriptions
Mechanical Engineering

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, precipitate, dispersion and grain size strengthening).

Static, dynamic and fatigue fracture of various engineering materials both metals and non-metals including composite materials. High temperature behaviour 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 behaviour 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

M E 456 F,S 3C 0.5
Heat Transfer 2
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 459 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 fusion 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 469 F,S 3C 0.5
Dynamics of the Atmospheric Boundary Layer
For those students interested in working in the field of engineering problems that involve the flow of air in the lower kilometre 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,G 3L 0.5
Mechanical Engineering Projects
Engineering assignments requiring the student to demonstrate initiative and assume responsibility. Student activity is guided and co-ordinated 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.

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, gongoral 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
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

Mechanics of Deformable Solids 3
Prereq: M E 220

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, and environmental deterioration.
Prereq: M E 330

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

Non-metallic Materials
Prereq: M E 330

Deformation Processes
Prereq: M E 340

Machine Tool Analysis
Prereq: M E 340, 360

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

Welding
Features and advantages of the various welding processes. Welding arc characteristics. Temperature distributions around welds. Metallurgy 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

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

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

Numerical Control of Machine Tools 1
Prereq: M E 262, 360

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

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 equation system, 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
Course Descriptions

Mechanical Engineering

Middle East Studies

M E 561 F,S 3C 0.5
Fluid Power Control Systems
Prereq: M E 351, 360

M E 563 W 3C 0.5
Turbomachines
Prereq: M E 362

M E 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

M E 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 250, 351

M E 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

M E 568 W 3C 0.5
Noise Analysis and Control
Prereq: M E 305, 360

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, particulate 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, 351

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

Middle East Studies courses and approved courses are listed in Chapter 15.

MES 107A S 2C,2T 0.5
Introduction to 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 Course 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 see page 16:38
- Drama see page 16:40
- Fine Arts see page 16:65
- Music see page 16:101

For program information, please see Chapter 8, Faculty of Applied Health Sciences, and Chapter 9, Faculty of Arts.

Music

Undergraduate Officer
D. Huron, Conrad Grobel College, Room 152, 885-0220, ext. 247

Courses not offered in the current academic year are listed at the end of this section.

Introductory 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 150 F,W,S 3C 0.5
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.

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.

MUSIC 117 F,W,S 2L 0.25
Music Ensemble
See MUSIC 116 for course description. (Formerly MUSIC 102)

MUSIC 140 F 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.

MUSIC 216 F,W,S 2L 0.25
Music Ensemble
See MUSIC 116 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.

MUSIC 226 F,W,S 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.

MUSIC 227 F,W,S std 0.5
Music Studio
See MUSIC 226 for course description. Prereq: MUSIC 226 and consent of Music Faculty

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.

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 253 F 3C 0.5
Medieval and Renaissance Music
The study of music that flourished under courtly and church patronage from the early Christian Church to 1600. Gregorian chant, liturgical drama, mass, motet, secular songs and instrumental music are studied.

Prereq: MUSIC 100 or consent of instructor

MUSIC 254 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 258 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 260 W 3C 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 260)

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 275 F 3C 0.5
Computer Applications In Music
A comprehensive survey of computer applications in the creation, production and study of music.
Prereq: MUSIC 100 or consent of instructor.
Previous programming experience is recommended but not essential.

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 326 F W S std 0.5
Music Studio
See MUSIC 226 for course description.
Prereq: MUSIC 227 and consent of Music Faculty
(Formerly MUSIC 366)

MUSIC 327 F W S std 0.5
Music Studio
See MUSIC 226 for course description.
Prereq: MUSIC 326 and consent of Music Faculty
(Formerly MUSIC 367)

MUSIC 334 F 3C 0.5
Women and Music
A study of the role of women in music from antiquity to the present, emphasizing both "classical" and "popular" music within social, cultural settings of Western and Third World countries.

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 1995
Music 355A offered Spring 1996

MUSIC 361 W 3C 0.5
The Art Song
A study of the music written for solo voice from the 17th century to the present.
Prereq: MUSIC 100 or consent of instructor.

MUSIC 363 F 3C 0.5
Christian Hymnody
The origins and development of the Christian hymn (including contemporary hymn styles) considered as theological, poetic, musical, cultural and spiritual expression, and the use of hymns in a variety of worship settings.

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 nineteenth-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 Waterlooguelph 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 371 W 3C 0.5
Music Theory 4 (20th Century)
The study of the compositional aspects of 20th-century music, including extended tonality, atonality, 12-tone writing, neo-classical idioms and contemporary compositional procedures. Lab sessions will cover non-tonal melodic reading and complex chord structures.
Prereq: MUSIC 370

MUSIC 375 W 3C 0.5
Electroacoustic Music and MIDI Applications
The study of electroacoustic music and MIDI applications in sequencing and programming with synthesizers and computers. Composition, analysis and history of electroacoustical music, as well as practical studio experience, are included.
Prereq: MUSIC 271 or consent of instructor.
Studio Fee

MUSIC 380 F W 0.5
Directed Study In Music
Prereq: Advanced standing in music and consent of instructor.

MUSIC 381 F W 0.5
Directed Study In Music
Prereq: Advanced standing in music and consent of instructor.
Course Descriptions
Music - Optometry

Optometry

Undergraduate Officers
L. Sorbara, OPT 248, ext. 3085
T.D. Williams, OPT 335, ext. 3081

Introductory 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, W 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

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.

OPTOM 111 W, 3C, L 0.5
Fundamentals of Visual Optics

OPTOM 114 W, 3C, 2L 0.5
Anatomy of the Eye 2
A continuation of OPTOM 104

OPTOM 115 W, 4C, 1T 0.5
General Pathology 2
A continuation of 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 216 F, 3C, 4L 0.5
Ophthalmic Optics 1

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 subserving eye movements, clinical applications.

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.

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 movements.

Native Studies

For the course in Native Studies see Anthropology.
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

Ophthalmic Optics 2
Prereq: OPTOM 106/216

Visual Perception 2: Monocular and Bilocular Visual Processes
Prereq: OPTOM 109, 241

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 tests, relative accommodation tests, retinoscopy, and monocular and binocular cross cylinder tests.
Prereq: OPTOM 241/242

Physiology of the Eye
The physiology of the smooth muscles of the eye, the extracocular 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

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

Pharmacology 1: Medications and the Eye
Coverage of the principles of pharmacology (pharmaceuticals, pharmacokinetics, and pharma-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.

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

Optical and Binocular Visual Processes
Prereq: OPTOM 216, 246

Ophthalmic Optics 3
Continuation of 346A. Laboratories provide experience in practical aspects of ophthalmic dispensing.
Prereq: OPTOM 216, 246

Contact Lenses 1
Prereq: OPTOM 246, 252, 254

Visual Percepton 3: Colour Vision
Prereq: OPTOM 109

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

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 verbal communications. An exploration of optometric communication issues related to letter and report writing, patient counselling, patient referral, fee presentation, and complaint management.
Course Descriptions
Optometry

OPTOM 364 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 367 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 368 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 analytic principles developed in OPTOM 342, this course will involve discussion of cases drawn by the coordinator(s) from Clinic. Faculty discussants will direct the students in assessing the basic and clinical science features of specific cases. Cases involving all aspects of optometric practice will be chosen in a balanced fashion.
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 620).
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)

OPTOM 448A/B/C S,F,W 3L 3.0 each
Optometry Clinics
Optometry students learn all aspects of clinical practice by providing direct patient care under faculty supervision and instruction. Areas of clinical activity include oculo-visual assessment, the diagnosis and management of ocular disease; contact lens care, diagnosis and treatment of ocular motor-sensory disorders, low vision rehabilitation, and ophthalmic dispensing. In addition to the main university clinic, student will gain experience in a variety of settings, including hospitals, community health clinics, specialty care clinics, nursing homes, schools, private practices, and institutions for people with special needs. Each student will complete a one term externship in oculo therapeutics and disease management and a primary care rotation in private practice. Students will be required to show successful performance in each of the components of clinical training to which they are assigned. Evaluation may involve oral examination, assessment of performance with patients, record review, and/or demonstration of techniques.
Prereq: All third year Optometry courses

OPTOM 461A-Z S,F,W 3L 0.5
Advanced Study Topics
Intensive study of a specialty optometry topic of mutual interest to a professor and a small group of students. Consult course co-ordinator annually for list of offerings.

OPTOM 471 S,F,W 3L 0.75
Clinical Techniques 4
This course will provide an opportunity for optometry students to discuss and evaluate clinical techniques; instrumentation, and ideologies not covered in the current curriculum. Students will be encouraged to use their basic knowledge of the vision sciences to provide a perceptive critique of the clinical subjects addressed.
Prereq: All third year optometry courses

OPTOM 499A F,W 3T 0.5
Comprehensive Ocular Embryology/Anatomy/Physiology
Basic and clinical principles in ocular embryology, anatomy and physiology. Consult published syllabus.
Course Descriptions

Peace and Conflict Studies
Personality and Religion (Studies in)

INTERDISCIPLINARY PACS COURSES

PACS 390A/B F,W,S P 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 301 and/or 302.

COURSES NOT OFFERED 1995-96

PACS 230 The Politics of Nonviolence
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. Golinick, 885-1460

Introductory 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.
Personnel Studies

Associate Professor, Program Director
S.W. Kardasz, HH 240, ext. 2584

PERST 200 F,S 2L 0.5
Basic Personnel Administration
Examines the major area of Personnel Administration including personnel, recruiting, salary administration, labour relations, benefits administration, employee relations, labour law, and organizational behaviour. Reviews the role of Personnel Administration in organizations and the manner in which Personnel executives contribute to the well being of a total enterprise.
Prereq: Enrolment in an Honours or four-year General Major Program

PERST 300 W 3S 0.5
Concepts and Issues in Personnel Administration
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: PERST 200 and intention to complete a Personnel Studies Minor

Philosophy

Undergraduate Officer
W.N. Abbott, HH 326, ext. 2600

Courses not offered in the current academic year are listed at the end of this section.

Introductory Notes
1. Students must consult the Department before preregistering in upper-year courses. Final details of 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 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.

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 200B 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 201 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 203 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 203 J W 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 204J 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 205J W 3C 0.5
Philosophy of Science
A philosophical study of the approaches to the material world used by contemporary physical science. The nature and the value of the experimental method in the writings of scientists past and present will be examined.

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 data gathering, "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 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 215 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 216 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 217J 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 218J 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 1
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 224 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, bioactivism and other approaches to environmental problems.

PHIL 226G 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 live and the right to die, behavior control (e.g., psychosurgery, behavior 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.

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.
Prereq: 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.
Prereq: PHIL 140 or consent of instructor

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.
Prereq: PHIL 145 or 140 recommended

PHIL 255 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 psychology, logic, 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 256

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 300 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 an eye toward formulating a clear workable concept of education, its aims and methods. Prereq: At least second-year standing or consent of instructor

PHIL 312 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. Cross-listed as GEN E 412

PHIL 318 J 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.
Prereq: 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.
Prereq: PHIL 221 recommended
PHIL 327A 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 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.

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.

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.

PHIL 350 3C 0.5
Epistemology 1
An examination of such problems as meaning criteria, primary data, and the importance of certainty to knowledge.

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.

PHIL 359 3C 0.5
Philosophy of the Formal Sciences
A study of philosophical problems concerning mathematics. Topics discussed include formalism, intuitionism, logicalism, the mathematical paradoxes, and other topics in foundations and metamathematics.

PHIL 362 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.

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.

PHIL 380 F 3C 0.5
History of Ancient Philosophy 1
From the beginnings to Plato.

PHIL 381 W 3C 0.5
History of Ancient Philosophy 2
From Aristotle to the close of classical antiquity.

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.

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.

PHIL 384 F 3C 0.5
History of Modern Philosophy 1
Earlier period beginning with Descartes.

PHIL 385 W 3C 0.5
History of Modern Philosophy 2
Later period including Hume and Kant.

PHIL 387 3C 0.5
19th Century Philosophy
The 19th century Philosophers covered may include Hegel, Mill, Schopenhauer, James and Kierkegaard.

PHIL 389 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.

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.

PHIL 418J 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
Studies in Ethics
Special topics in ethics, as announced by the Department.

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.
PHIL 451J W 3C 0.5
The Thomistic Tradition in Philosophy
An examination of the work of Thomas Aquinas, his philosophical relation to his times, and the revival of Thomism in the modern era.
Pre req: Two term courses in Philosophy and 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.
Pre req: Consent of instructor

PHIL 456 3C 0.5
Metaphysics 2: Cosmology
Metaphysical problems in the areas of space, time and motion.
Pre req: Consent of instructor

PHIL 463 3C 0.5
Philosophy of Language
Issues in the philosophy of language, such as synonymy, propositions, meaning, semantics, reference.
Pre req: 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.
Pre req: 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 ramifications of phenomenological methods through the working out of particular analyses. The basic writings of phenomenologists such as Husserl and Merleau-Ponty will be used.
Pre req: 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.
Pre req: Consent of instructor

PHIL 498A-N F,W,S R 0.5
Directed Reading in Special Areas
Pre req: Consent of instructor

PHIL 499A/B 0.5/0.5
Senior Seminar and Honours Essay
All senior honours students attend this seminar in which a selection of major philosophical problems is discussed. They will also prepare a senior essay and discuss it with the group.
A letter grade for PHIL 499A will be submitted only after the completion of PHIL 499B or 499J.

COURSES NOT OFFERED 1995-96
PHIL 333J Contemporary Philosophical Problems in Art

Physics

Undergraduate Officers
J.K. Brandon, PHY 241, ext. 3494
K.A. Woolner, PHY 243, ext. 2848

Courses not offered in the current academic year are listed at the end of this section.

Introductory 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 university 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 010 F,W,S 1C 0.0
Physics Seminar
This seminar brings together Honours Physics (Regular and Co-op) students in all years to hear invited speakers, view physics-related films, and learn about current research.
PHYS 103 F 3C.3L.2T 0.5
Mechanics in Human Movement
An introduction to the physical principles required for the analysis of the mechanics of human movement; includes particle kinematics and dynamics, statics, work and energy, conservation of energy and linear momentum, rotational kinematics and dynamics, and conservation of angular momentum.
Coreq: MATH 107
For Kinesiology students
Lab alternate weeks, optional tutorial

PHYS 105 W 3C.3L.2T 0.5
Electricity
Basic electricity, magnetism and electronics. An introduction to the physical principles required for an understanding of the electrical measurements and instrumentation used in Kinesiology
Prereq: PHYS 103
For Kinesiology students
Lab alternate weeks, optional tutorial

PHYS 111 F 3C.1T 0.5
Physics 1
An introduction to physics for students intending to concentrate their future 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 111L F 3L 0.25
Physics 1 Laboratory
For students taking PHYS 111.
Lab alternate weeks

PHYS 112 W,S 3C.1T 0.5
Physics 2
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 121
Coreq: (for Science students) PHYS 112L
Antireq: PHYS 122

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
Brief review of kinematics. Particle dynamics, work, energy, conservation of energy. Conservation of linear momentum, collisions, rotational kinematics and dynamics, conservation of angular momentum.
For students in Year One Engineering

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 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 121L
Coreq: (for Science students) PHYS 122L
Antireq: PHYS 112

PHYS 122L W,S 3L 0.25
Mechanics, Wave Motion and Heat 2 Laboratory
For students taking PHYS 122.
Lab alternate weeks

PHYS 123 W,S 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.

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; reflection and refraction. Physical optics; interference and diffraction. Quantum physics; quantization of radiation; hydrogen atom.
Prereq: PHYS 115

PHYS 222 F 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
Antireq: PHYS 252
Not for students in the Honours Physics Program

PHYS 223 W 0.5
Electricity and Magnetism 2
Magnetic 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.11 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: 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 Schrödinger equation. Significance of the wave function. Bound states in potential wells. Travelling waves and transmission through barriers in one dimension.
Course Descriptions

Physics

PHYS 246 W 3C, 1T 0.5
Physical Optics
Prereq: First year physics and calculus
Coreq: 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 dipoles, current, resistance, electromagnetic force, D.C. circuits, A.C. circuits, instrumentation.
Prereq: First year physics and calculus
Coreq: PHYS 252L
Antireq: PHYS 222

PHYS 252L F 3L 0.25
Electricity and Magnetism Laboratory
For students taking PHYS 252.
Lab alternate weeks

PHYS 253 W,S 3C 0.5
Electricity and Magnetism 2
Magnetic fields, Ampère’s law, induced electromotive forces, magnetic devices, magnetic properties of materials, inductance, introduction to Maxwell’s equations and electromagnetic waves.
Prereq: PHYS 252, MATH 216, 227P
Coreq: PHYS 253L
Antireq: PHYS 223

PHYS 253L W,S 3L 0.25
Electricity and Magnetism Laboratory
For students taking PHYS 253.
Lab alternate weeks

PHYS 256 F 3C 0.5
Geometrical and Physical Optics
Prereq: First year physics and calculus
Coreq: PHYS 256L

PHYS 256L F 3L 0.25
Optics Laboratory
For students taking PHYS 256.
Lab alternate weeks

PHYS 259 F,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 diffraction 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: 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 F,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 systems of particles: resisted motion, gravitation, central-force motion, non-inertial frames, oscillations, normal modes.
Prereq: First year physics and calculus,
MATH 216

PHYS 275 F 3C 0.5
Astrophysics 1—The Solar System
The Planets, Newtonian gravity and celestial 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 326 F 3C 0.5
Modern Physics
Special theory of relativity, quantization of electromagnetic radiation, wave properties of particles, the hydrogen atom.
Not for students in the Honours Physics program

PHYS 334 F,S 3C 0.5
Quantum Physics 2
Prereq: PHYS 254, MATH 227 or 227P

PHYS 352 F,S 3C 0.5
Analogue Electronics
Prereq: Introductory DC and AC circuit theory
Coreq: PHYS 350I

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, E&CE 223

PHYS 355 W 3C 0.5
Nuclear Physics
Prereq: PHYS 352 or 334

PHYS 358 F,S 3C 0.5
Thermodynamics
Prereq: PHYS 122, MATH 216, 227 or 227P
Course Descriptions

Physics

Planning, Urban and Regional

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 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 4 - 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
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 x 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 +15°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, hypothermia. Physics of the cardiovascular system: hydrostatics, hydrodynamics, electrocardiograms. Anatomy and physics of respiration, gas transport and gas exchange, applications to diving.

COURSES NOT OFFERED 1995-96
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

Planning, Urban and Regional

Undergraduate Officer
J. Thoberge, ES1 112 ext 2182

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
(Formerly PLAN 100A)

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
(Formerly PLAN 100B)

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
(Formerly PLAN 159)

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.

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.
(Formerly PLAN 156)

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 (159), second year Planning students only
Studio fee: $15
Estimated additional cost to student for supplies: $100
(Formerly PLAN 256A)
Course Descriptions
Planning, Urban and Regional

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 (256A), second year Planning students only
Studio fee: $15
Estimated additional cost to student for supplies: $100
(Formerly PLAN 256B)

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
(Formerly PLAN 259)

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
(Formerly PLAN 230)

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

PLAN 260 F 3C 0.5
Urbanization in the Third World
An analysis of the factors behind the rapid urbanization of selected areas in Asia, Africa and Latin America, with an examination of the related problems of planning and development control policies.
Cross-listed as GEOG 225
(Formerly PLAN 225)

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
(Formerly PLAN 270)

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
Prior to registering for this course, students must arrange with a faculty member to serve as advisor and complete a contract.
The latter designation allows this course to be taken more than once for credit.
(Formerly PLAN 275A-Z)

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
(Formerly PLAN 300B)

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. ApproxF 170.00 CDN.
Prereq: PLAN 210
Estimated additional material cost to student $40 Approximate field trip fee, $170.
(Formerly PLAN 301)

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
(Formerly PLAN 359)

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,S 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
(Formerly PLAN 367)

PLAN 341 F 3C 0.5
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 ecosystem management, 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
(Formerly PLAN 368)

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 social inquiry, the development of theories, the use of social research in policy-mak-
ing, and the ethical issues associated with social research provide the context for discussing the details of research methods.
Prereq: Planning students
(Formerly PLAN 307)

PLAN 351 S 1C,2L 0.5
Multivariate Statistics
The theory and application of multivariate statistics, with particular emphasis upon the use of the computer.
Prereq: ENVS 278 or consent of instructor
Cross-listed as GEOG 316
(Formerly PLAN 316)

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
Lab fee $25. Field trip fee $10.

PLAN 361 W 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
(Formerly PLAN 325)

PLAN 380 S 3C 1.0
Theory and Practice of Planning in the U.K.
Familiarization with the contribution of U.K. theory and practice to Canadian planning. Study of development of U.K. planning from mid-eighteenth century to present with reference to new town and urban redevelopment.
Prereq: Third year regular Planning students. Students register on a Letter of Permission, during the Winter term.
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
(Formerly PLAN 360)

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.
(Formerly PLAN 370)

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
(Formerly PLAN 480A)

PLAN 401 F,W 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
(Formerly PLAN 456A)
Course Descriptions
Planning, Urban and Regional

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
(Formerly PLAN 456B)

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
(Formerly PLAN 435)

PLAN 411 F 3C 0.5
Landscape Planning and Visualization
A project based studio course that addresses the problems of development within a scenic landscape. The issues associated with the definition, management and mapping of visual resources are covered. Computer-based methods are used to produce visual simulations depicting scenarios of potential change.

Prereq: PLAN 210(256A)
Lab fee $25
Estimated additional cost to student $30.

PLAN 412 W 3C 0.5
Elements of Landscape Architecture
A studio course that focuses on the elements and principles of landscape architectural design through practical application to site-specific projects. Important influences on the profession of landscape architecture as well as current issues and trends will also be covered.

Prereq: PLAN 210(256A)
Lab fee $15
Estimated additional cost to student $50.

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(256A), or consent of instructor.
Estimated additional cost to student: $60.

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.

Estimated additional cost to student: $20
(Formerly PLAN 414)

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
(Formerly PLAN 420)

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
Lab fee $25
Field trip fee $15.

PLAN 451 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
(Formerly PLAN 402)

PLAN 474 A-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
(Formerly PLAN 454)

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
(Formerly PLAN 470)

PLAN 485 A-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.
(Formerly PLAN 475A-Z)
PL40 F,W 0.5
Senior Honours Essay
Practical experience in carrying out the research proposal developed in PL490 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
(Formerly PL490A)

COURSES NOT OFFERED 1995-96
PL320(319) Economic and Social Techniques for Regional Planning
PL352(317) Nonparametric Statistics
PL353(318) Spatial Analysis
PL381(344) Recreation Planning
PL430 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.

Introductory 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 1
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 clearer understanding of conservatism, liberalism and socialism.

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 102 consists of a series of courses dealing with different aspects of politics. Students should select the course which most closely corresponds to their interest.

First-year winter term courses will be drawn from the following list:

PSCI 102D W 0.5
The Political Process in the Modern Democracies
A study of power and influence in the modern democracies, based on an examination of three contending models of the political process - the liberal-democratic or popular rule model, the pluralist model, and the elitist model.

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
See overlapping content note (Grading Systems, Item 7 on page 9-7)

PSCI 225 F 3C 0.5
The History of Political Theory 1
A survey of the principal ideas of Western political theorists from the earliest times to the 17th century.
Prereq: Second-year standing

PSCI 226 W 3C 0.5
The History of Political Theory 2
A survey of the principal ideas of Western political theorists since the 17th century.
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 268 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 untried criminal issues are analyzed 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

PSCI 315 0.5
**Research Design in Political Science**
Introduction to the logic and limitations of experimental and non-experimental research designs. Selected studies of politics are examined to demonstrate how plausible threats to validity are made less plausible with appropriate design and data analysis.
Prereq: PSCI 214 or consent of instructor

PSCI 321 F 3L 0.5
**Marxist Theory**
A basic introduction to the political and social thought of Karl Marx from the early writings to Das Capital.

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
**Modern Political Philosophy**
A selective examination of political philosophy in the modern period.
Prereq: 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.
Prereq: 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.
Prereq: 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.
Prereq: 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.
Prereq: 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.
Prereq: 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).
Prereq: Third-year standing and above

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.
Prereq: 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.
Prereq: 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.
Prereq: Third-year standing and above

PSCI 351 F 2C 0.5
**Federal and Consgoncational Political Systems**
Federal and Consogoncational Political Systems are examined with emphasis on processes of political integration, patterns of conflict resolution, and the impact of modernization on political development.
Prereq: Consent of instructor
PSCI 363 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.
Prereq: PSCI 260A and 260B or consent of instructor

PSCI 365A 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.
Prereq: Third-year standing or consent of instructor
(Formerly PSCI 362A)

PSCI 365B W 0.5
Politics in the Soviet Successor States 2
An examination of policymaking and implementation in the policy areas which pose the greatest challenges to the Soviet successor states.
Prereq: PSCI 365A 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 these two avenues of political participation will be compared. Discussion will focus on Canadian examples.
Prereq: 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, Iraq, Syria, 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 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 3S 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 3S 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 2S 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

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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

PSCI 461 F 0.5
Problems in Canadian Politics 1
Selected aspects of Canadian national politics.
Prereq: Fourth-year standing or consent of instructor

PSCI 462 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 479 W 0.5
Voting Behaviour
Prereq: PSCI 214 or consent of instructor

PSCI 480-498 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.
A letter grade for PSCI 499A will be submitted only after the completion of PSCI 499B.

COURSES NOT OFFERED 1995-96
PSCI 102D The Political Process in the Modern Democracies
PSCI 102E Political Rights and Obligations
PSCI 264 American Government and Politics
PSCI 268 British Government and Politics
PSCI 384 Foreign Policies of Select Middle East Studies
PSCI 422 Conflict of Political Ideas in Canada

PSCI 483 F 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 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 486 W 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 487 0.5
Senior Research Seminar: Violence in the Political Process
Politics can be brutal. This seminar deals with not, revolt, revolution and state directed mass murder.
Prereq: Third- or fourth-year standing

PSCI 481 0.5
Research Seminar on World Politics
An examination of research on the causes and consequences of interstate warfare.
Prereq: PSCI 380 or consent of instructor

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

Introductory Note
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.
Antireq: PSYCH 120R
Also offered at St. Jerome's College

PSYCH 200 3C 0.5
Measurement in Psychology
The logic of measurement in Psychology. Descriptive procedures for collecting and handling data. Making inferences from test scores. The use of correlation procedures in measuring intelligence, achievement, aptitudes, interests and personality.
Prereq: PSYCH 101
Antireq: Any course in statistics
This course is intended for General Psychology majors. Others wishing to enrol may do so provided that their math background does not exceed one OAC math course or one term course at the first-year level of university math. Students working on a Psychology minor whose math background exceeds that just described and who will not be taking a statistics course in their major, may enrol in this course after completing five term courses in Psychology.

PSYCH 203 3C 0.5
Learning and Motivation
This course is designed to introduce the student to theories in Learning and Motivation and to provide the student with an understanding of the experimental techniques in these areas.
Prereq: PSYCH 101
Priority enrolment for Psychology majors
Therapy with dying individuals is reviewed. The idea of age-related decline in function, as well as comparisons among altered states of consciousness including some forms of prayer.

Processes such as memory, perception, and Death in human life.

Aging, Dying

What processes change as adults age? Is the nature of thinking. Topics discussed will include mental representations, sensory and physical impairments and intellectual giftedness.

Aging and Basic Psychological Processes

An examination of the process and factors of human development.

Aging and Basic Psychological Processes

A consideration of the variables affecting learning in the classroom with special focus upon the conditions essential to efficient learning.

Educational Psychology

A consideration of the variables affecting learning in the classroom with special focus upon the conditions essential to efficient learning.

Psychology and Social Psychological Theories and Research

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.

Aging 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.

Course Descriptions

Psychology

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 enrollment 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 enrollment for Psychology majors
Also offered at St. Jerome's College

PSYCH 212 F 3C 0.5
Educational Psychology
A consideration of the 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 3C 0.5
Exceptional Children
Educational problems associated with mental retardation, emotional disturbances, sensory and physical impairments and intellectual giftedness.
Prereq: PSYCH 101

PSYCH 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 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 F 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 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 enrollment 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
The nature and origin of deviant behaviour.
Prereq: PSYCH 101
Priority enrollment 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 enrollment for Psychology majors

PSYCH 271 3C 0.5
Animal Behaviour
Survey of mechanisms, development, adaptive value and evaluation of behaviour in non-human animals. Covers ethology, sociobiology and experimental comparative psychology. Emphasis on principles of research with laboratory and wild animals as well as methods of observing behaviour.
Prereq: PSYCH 101 or permission of instructor
Priority enrollment for Psychology majors

PSYCH 291 F 3C,2L 0.5
Basic Research Methods
An introduction to the methods used in psychological research. Methods for observing behaviour and the procedures used to summarize these observations are emphasized.
Prereq: PSYCH 101 and second-year Honours standing in Psychology
See overlapping content note (Grading Systems, item 7, p. 9.7)

PSYCH 292 W 3C,1L 0.5
Basic Data Analysis
An introduction to the logic and methods of inferential statistics with emphasis on application in Psychology. Also included is a more detailed treatment of the methods and projects introduced in PSYCH 291.
Prereq: PSYCH 291 and second-year Honours standing in Psychology
See overlapping content note (Grading Systems, item 7 on p. 9.7)
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 350

This course counts as an Advanced Psychology Course (Natural Science) for Psychology majors

Priority enrolment for Psychology majors

PSYCH 312 F 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
Antireq: PSYCH 160

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 339 3C 0.5
Personnel Psychology
An examination of the following major topics in personnel psychology: employment planning, selection and recruitment, selection techniques, career development, performance appraisal, training programs, labour relations, compensation systems.
Prereq: PSYCH 101 and a statistics course (e.g., PSYCH 200 or 262).
This course counts as an Advanced Psychology Course (Social Science) for Psychology majors.
Priority enrolment for Psychology majors.

PSYCH 344 W 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 253.
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 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
An examination and evaluation of some of the outstanding theories of personality.
Prereq: PSYCH 101.
Priority enrolment for Psychology majors.
Cross-listed as PSYCH 322R.

PSYCH 361 (A-Z) 3C 0.5
Special Topics in Advanced Psychological 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 F 3C,1L 0.5
Advanced Data Analysis
An examination of the effective use and interpretation of statistics in complex research designs. Topics include an introduction to multivariate analysis, analysis of variance, and applied psychological research.
Prereq: PSYCH 292 and third year Honours standing in Psychology.
See overlapping content note (Grading Systems, item 7 on p. 9.7).

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 and Honours standing in Psychology.

PSYCH 393 F.W 2S,2L 0.5
Research in Developmental Psychology
Open only to students in a Psychology Honours Program.
Prereq: PSYCH 211 and 301 (PSYCH 391 acceptable as a corequisite).

PSYCH 394 F.W 2S,2L 0.5
Research in Perceptual and Cognitive Processes
Open only to students in a Psychology Honours Program.
Prereq: PSYCH 206 or 207 and 391 (PSYCH 391 acceptable as a corequisite).

PSYCH 395 F.W 2S,2L 0.5
Research in Social Psychology
Open only to students in a Psychology Honours Program.
Prereq: PSYCH 253 and 391 (PSYCH 391 acceptable as a corequisite).

PSYCH 396 F 2S,2L 0.5
Research in Biopsychology
Open only to students in a Psychology Honours Program.
Prereq: PSYCH 261 and 391 (PSYCH 391 acceptable as a corequisite).

PSYCH 397 F.W 2S,2L 0.5
Research in Personality and Psychopathology
Open only to students in a Psychology Honours Program.
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
Open only to students in a Psychology Honours Program.
Prereq: PSYCH 203 or 207 or 261 or 271 and 391 (PSYCH 391 acceptable as a corequisite).

PSYCH 399 F.W 2S,2L 0.5
Research Apprenticeship
For Honours Psychology students in the Thesis Program. 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 the student and 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.
Prereq: PSYCH 391 and at least one Research Course.
This course cannot be used to meet the Advanced PSYCH Course Requirement.

PSYCH 405 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.
This course cannot be used to meet the Advanced PSYCH Course Requirement.

PSYCH 464 0.5
Research Apprenticeship
For Honours Psychology students in the Thesis Program. 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 the student and 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.
Prereq: PSYCH 391 and at least one Research Course.
This course cannot be used to meet the Advanced PSYCH Course Requirement.

PSYCH 465 0.5
Research Apprenticeship
For Honours Psychology students in the Thesis Program. 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 the student and 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.
Prereq: PSYCH 391 and at least one Research Course.
This course cannot be used to meet the Advanced PSYCH Course Requirement.

PSYCH 466 0.5
Research Apprenticeship
For Honours Psychology students in the Thesis Program. 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 the student and 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.
Prereq: PSYCH 391 and at least one Research Course.
This course cannot be used to meet the Advanced PSYCH Course Requirement.

PSYCH 467 0.5
Research Apprenticeship
For Honours Psychology students in the Thesis Program. 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 the student and 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.
Prereq: PSYCH 391 and at least one Research Course.
This course cannot be used to meet the Advanced PSYCH Course Requirement.

PSYCH 468 0.5
Research Apprenticeship
For Honours Psychology students in the Thesis Program. 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 the student and 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.
Prereq: PSYCH 391 and at least one Research Course.
This course cannot be used to meet the Advanced PSYCH Course Requirement.

PSYCH 469 0.5
Research Apprenticeship
For Honours Psychology students in the Thesis Program. 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 the student and 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.
Prereq: PSYCH 391 and at least one Research Course.
This course cannot be used to meet the Advanced PSYCH Course Requirement.
Course Descriptions

Psychology

HONOURS SEMINARS

Consult departmental listings for topics and prerequisites for 1995-96. Open to third and fourth year Honours Psychology or Make-Up Psychology students, or by consent of instructor.

PSYCH 450 (A-Z) 2S 0.5 Honours Seminar in the History of Psychology

PSYCH 451 (A-Z) 2S 0.5 Honours Seminar in Learning

PSYCH 452 (A-Z) 2S 0.5 Honours Seminar in Perception

PSYCH 453 (A-Z) 2S 0.5 Honours Seminar in Developmental Psychology

PSYCH 454 (A-Z) 2S 0.5 Honours Seminar in Educational Psychology

PSYCH 455 (A-Z) 2S 0.5 Honours Seminar in Social Psychology

PSYCH 456 (A-Z) 2S 0.5 Honours Seminar in Personality

PSYCH 457 (A-Z) 2S 0.5 Honours Seminar in Clinical Psychology

PSYCH 458 (A-Z) 2S 0.5 Honours Seminar in Cognitive Processes

PSYCH 459 (A-Z) 2S 0.5 Honours Seminar in Motivation

PSYCH 461 (A-Z) 2S 0.5 Honours Seminar in Physiological Psychology

PSYCH 462 (A-Z) 2S 0.5 Honours Seminar in Industrial/Organizational Psychology

PSYCH 463 (A-Z) + 466 (A-Z) 2S 0.5 Honours Seminar in Special Topics

COURSES NOT OFFERED 1995-96

PSYCH 235 Psychological Perspectives on Gender and Sex

PSYCH 311 Behaviour and Development of Human Infants

PSYCH 316 Moral Development

PSYCH 340 Community Psychology

PSYCH 341 Psychology of Early Childhood Education

The following courses are administered by Renfson 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 121R 3C 0.5 Introductory Psychology

PSYCH 121R 3C 0.5 Introductory Psychology (Special Topics)

PSYCH 220R 3C 0.5 Social Psychology

PSYCH 221R 3C 0.5 Interpersonal Interaction

PSYCH 322R 3C 0.5 Personality Theory

PSYCH 323R 3C 0.5 Abnormal Psychology

PSYCH 367R-369R Special Topics in Psychology

PSYCH 398R/399R R 0.5 Independent Study

Open to senior Social Development Studies majors only.
Pure Mathematics

Undergraduate Officer
B. Forrest, MC 5174, Ext. 5560

Introductory Note
More detailed course descriptions and availability information may be obtained upon request from the Pure Mathematics Department.

GROUP 1 COURSES
The following courses are intended for students who are not enrolled in any Pure Mathematics Honours Program. No Group 1 course may be used to fulfill any of the Pure Mathematics requirements in any program leading to a degree with a Pure Mathematics designation.

PMATH 330 F,W,S 3C 0.5
Introduction to Mathematical Logic 1
A broad introduction to Mathematical Logic. The logic of sentences: truth-functions and axiomatic approaches (e.g., Natural Deduction and Gentzen sequences). A brief introduction to the logic of predicates and to the foundations of mathematics.

PMATH 331 F,W,S 3C 0.5
Real Analysis
Topology of R^n, continuity, norms, metrics, completeness, Fourier series, and applications, for example, to ordinary differential equations, the heat problem, optimal approximation, the isoperimetric inequality.

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.

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.

PMATH 335 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.

GROUP 2 COURSES
The following courses may be used to fulfill the various requirements of any of the Honours programs leading to a degree with a Pure Mathematics designation. Group 2 courses are open to students in any Honours program.

PMATH 336 F,S 3C 0.5
Introduction to Group Theory
Groups, subgroups, normal subgroups, quotient groups, morphisms. Products of groups. Permutation groups. Symmetry groups.

PMATH 337 W,S 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.

PMATH 340 W 3C 0.5
Rings and Fields
Rings: ideals, quotient rings, homomorphisms, factor rings, Lagrange's theorem, Cayley's theorem, Abelian groups, direct products, the structure of finitely generated Abelian groups, applications.

PMATH 341 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, Cauchy's theorem, Abelian groups, direct products, the structure of finitely generated Abelian groups, applications.

PMATH 342 W,S 3C 0.5
Geometry

PMATH 343 F,W 3C 0.5
Multivariable Calculus
Multiple integrals, line integrals, Green's theorem, Stokes' theorem, the divergence theorem. Curves and surfaces. Vector fields, the gradient, divergence, and curl. Divergence and curl theorems. Path independence of line integrals.

PMATH 344 F,S 3C 0.5
Complex Analysis
Analytic functions, Cauchy's theorem, Laurent series, integral evaluation, Möbius and other conformal maps.

PMATH 351 F.S 3C 0.5
Real Analysis
Metric spaces, compactness, completeness, continuity, convergence, integration, function spaces.

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.

PMATH 353 W 3C 0.5
Fourier Analysis
Fourier series: A descriptive introduction to L2 spaces, inner products and Hilbert spaces, Fourier series on the circle, convergence theorems, the Fourier transform. Other topics: The heat equation, the Dirichlet problem on the disk, approximation theory and orthogonal polynomials.

PMATH 354 S 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, Cauchy's theorem, Abelian groups, direct products, the structure of finitely generated Abelian groups, applications.

PMATH 355 W 3C 0.5
Geometry

PMATH 356 S 3C 0.5
Multivariable Calculus
Multivariable calculus: Partial derivatives, directional derivatives, the gradient, the implicit function theorem. Optimization problems. Double and triple integrals. Line and surface integrals. Green's theorem, Stokes' theorem, the divergence theorem.

PMATH 357 W 3C 0.5
Topology
Introduction to point-set topology, including metric spaces, topological spaces, continuous functions, compactness, connectedness, completeness, and separability.

PMATH 358 S 3C 0.5
Linear Algebra
Linear algebra: Vector spaces, linear transformations, matrices, determinants, eigenvalues and eigenvectors, diagonalization, quadratic forms, inner products and Hilbert spaces, orthogonal projections, and applications.

PMATH 359 W 3C 0.5
Introduction to Partial Differential Equations
Partial differential equations: Classification of second-order equations, separation of variables, Fourier series, and applications to the heat equation, Laplace's equation, and wave equation. Boundary value problems.

PMATH 360 S 3C 0.5
Introduction to Partial Differential Equations
Partial differential equations: Classification of second-order equations, separation of variables, Fourier series, and applications to the heat equation, Laplace's equation, and wave equation. Boundary value problems.

PMATH 361 W 3C 0.5
Introduction to Partial Differential Equations
Partial differential equations: Classification of second-order equations, separation of variables, Fourier series, and applications to the heat equation, Laplace's equation, and wave equation. Boundary value problems.

PMATH 362 S 3C 0.5
Introduction to Partial Differential Equations
Partial differential equations: Classification of second-order equations, separation of variables, Fourier series, and applications to the heat equation, Laplace's equation, and wave equation. Boundary value problems.
PMATH 365 F, S 3C 0.5
Elementary Differential Geometry and Tensor Analysis
Curves in Euclidean 3-space (E^3) and the Serret-Frenet formulæ, 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 AM 333

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 380A 3C 0.5
Introduction to Information Theory
Variable length coding. The Shannon entropy as a measure of uncertainty and expected information. Minimal average length coding; the Shannon entropy as lower bound. Source entropy, Channels. Transmission capacity. Applications to problem solving, information transmission, logics, science, linguistics and communications (TV, music, etc.). Determination of practical measures of information.
Prereq: Consent of instructor
Not offered every year

PMATH 380B 3C 0.5
Applications of Information Theory
Prereq: Consent of instructor
Not offered every year

PMATH 399
Readings in Pure Mathematics

PMATH 432 F 3C 0.5
Mathematical Logic
First order languages and theories.
Next offered Fall 1995, and each alternate Fall thereafter

PMATH 440 W 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: AM/PMATH 332 or PMATH 352
Next offered in Winter 1996, and each alternate Winter thereafter

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 334 or 344
Next offered in Fall 1996, and each alternate Fall thereafter

PMATH 444 3C 0.5
Non-Commutative Algebra
Prereq: PMATH 344
Next offered in Winter 1996

PMATH 446 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 1344
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, L^p-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 332
Next offered in Winter 1996, 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 463 3C 0.5
Differentiable Manifolds
Topics chosen from: Charts and atlases, Manifolds and Diffeomorphisms, Tangent Spaces, Submanifolds, Vector Bundles, Tensor and Exterior Algebras, Differential Forms, Oriented Manifolds and Geometry, Homogeneous Spaces and Lie Groups.
Prereq: PMATH 365 or consent of instructor
Not offered every year

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.
Prereq: AM 333/PMATH 365 or consent of instructor
Cross-listed as AM 433
Course Descriptions
Recreation and Leisure Studies

PMATH 487 3C 0.5
Topology
Topics from algebraic, combinatorial and geometric topology.
Prereq: PMATH 336, 367

PMATH 470 3C 0.5
Functional Equations
Cauchy's, Pexider's, and similar equations. Equations for polynomials and trigonometric functions. Reduction to different equations. Applications.
Prereq: Consent of instructor
Not offered every year

PMATH 499
Readings in Pure Mathematics

Recreation and Leisure Studies

Undergraduate Officer
A. Gilbert, BMH 2212, ext. 3015

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 206 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.
Prereq: PSYCH 101

REC 209 F 2C 2L 0.5
Computer Applications in Leisure Services
Theory and application in leisure service management and programming. Examination of computer impact on leisure service industry.
Prereq: REC 100, and second-year standing. CS 100 is recommended. Restricted to Applied Health Sciences students only

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.

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.
Prereq: REC 210

REC 220 W 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.
Prereq: 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 sectors bodies.

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.

REC 251 F 3C 0.5
Recreation and Disability
This course is designed to explore the etiology and issues relevant to the broad spectrum of people who are challenged or disabled. Study will focus on physical, intellectual and emotional or behavioural disabilities.
Prereq: REC 250

REC 255 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 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 considerations will be given to the technical problems involved in various stages of research methodology with emphasis on the logic underlying the research process.
Prereq: Second-year standing
Course Descriptions
Recreation and Leisure Studies

REC 280 W 3C 0.5
Travel and Tourism
The scope and nature of travel and
and its implications for the future.

REC 300 F 3C 0.5
Philosophy of Leisure
Examination of major philosophical
themes through the ages with reference to
contemporary viability and effect upon
social behaviour.
Prereq: Third-year standing or consent of
instructor
Offered in even-numbered years only

REC 301 W.S. 3C 0.5
Sociology of Leisure
Nature and extent of leisure phenomena in
contemporary society. Examination of
institutional and formal organizational
aspects, social role, social research
strategies employed in the study of leisure.
Prereq: SOC 101
Cross-listed as SOC 347

REC 304 W 3C 0.5
Culture and Recreation
A study of major issues of Canadian cul-
tural policy from a socio-historical, political
and sociological perspective. Students will
examine the role and organizational struc-
ture of the arts and major cultural agen-
cies, and discuss social, economic and
administrative aspects of professional,
amateur, commercial and public art
organizations and services.
Prereq: REC 206 or consent of
instructor

REC 310 W 3C 0.5
Commercial Recreation Business
Development
Students will develop an idea for a small
recreation business and will then deter-
mine 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 321-329 0.5
Selected Topics in Recreation and
Leisure Studies
See department scheduling board for
these experimental courses.

REC 331 F 2C, 1L 0.5
Outdoor Education
The present status of outdoor education in
modern society; government functions and
policies related to outdoor education ser-
dices; the planning and administration of
outdoor education activities are discussed.
Prereq: REC 230
Offered in odd-numbered years only

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 con-
sidered as well as the behavioural aspects
of amenity resources.
Prereq: REC 230 or GEOG 202A
Cross-listed as GEOG 333

REC 334 F 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 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 tech-
niques, tools, knowledge and skills
required to design, plan, develop and facil-
itate therapeutic recreation programs in a
variety of settings for individuals and
groups.
Prereq: REC 251 or consent of
instructor and third-year standing

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 behaviour and ser-
dices. Various issues such as poverty, eth-
nicity, 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 361 W 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, manage-
ment and leadership skills and techniques
necessary in the assumption of the direc-
tion 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 W 3C 0.5
Statistical Techniques Applied to
Leisure Studies
An introduction to descriptive and inferen-
tial 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 380 F 3C 0.5
Recreation and Tourism Analysis
The course introduces the student to a
variety of quantitative techniques used in
the analysis of recreation and tourism,
especially in the context of policy analysis,
planning, and marketing. Techniques rele-
ant to both (1) the perceptions and
behaviour of recreationists and tourists
and (2) the distribution of resources are
examined. Specific topics may vary from
term to term, but generally include opera-
tional definitions, measurement errors,
scale developments, simple decision-
making models, market segmentation,
geostatistics and other regional-descriptive
methods, and basic forecasting techniques.
Prereq: REC 371

REC 383 F 3C 0.5
Perspectives on International Tourism
The character, problems of and prospects
for tourism are examined through consid-
eration of tourism in a variety of countries
and regions, both developed and develop-
ing. Topics include the nature and signifi-
cance of tourism; economic, environmen-
tal 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 402 S 3C 0.5
Colloquium on Religion and Leisure
Theological notions as they relate to theo-
ries of leisure. Contemporary trends and
behaviour which affect organized religions
and their subsequent attitudes toward leisure.
Offered in odd-numbered years only
Course Descriptions
Recreation and Leisure Studies

REC 406 A/B 1.0
Comparative Recreational Systems
A study of multi-national recreation systems. Course meets on campus and in the field in other countries. Full term study over a period of 6-8 weeks. Laboratory fee varies with field observation. This course is taught on an irregular basis.

REC 408 F 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 analyses of men's and women's leisure experiences, attitudes, constraints, challenges and behaviours. The role of the family as a leisure location and as an important agent in the construction of leisure experiences and behaviours 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 409 3 C, 1 L 0.5
Computerized Database Applications in Leisure and Cultural Agency Management
Analysis of information handling tasks. Theory and design of database applications. Students are required to design and produce an operational application.
Prerequisite: REC 209 or equivalent and third- or fourth-year standing

REC 415 W 3C 0.5
Consumer Behaviour and Leisure Services
This seminar style course will examine consumer behaviour theory in a broad context and focus specifically on consumer behaviour 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.
Prerequisite: REC 270 and one of REC 215 or BUS 352W; REC 371 recommended. Offered in odd-numbered years only

REC 416 W 1C, 2L 0.5
Principles of Recreation Planning
An exploration of alternative approaches to the planning of recreation opportunities with an emphasis on community and municipal settings. The demand for and supply of recreation opportunities; standards, models and systems; recreation planning policies and agendas; and selected recreation planning issues.
Prerequisite: REC 230 and fourth-year standing
Offered in odd-numbered years only

REC 425 S 3C 0.5
Leisure, Community and Cultural Heritage
This course examines the role of cultural heritage in a community context. Varying forms of heritage preservation, its function and organization are covered.
Prerequisite: Third-year standing

REC 433 W 2C, 2L 0.5
People in Natural Areas
Designing and managing for people in natural areas. Behavioural research and its relevance to the design and operation of natural areas and facilities will be emphasized. Means of understanding and involving neighbouring and visiting public and indigenous people in the planning, design and management of natural areas will be studied.
Prerequisite: REC 334/ENV S 334
Cross-listed as ENV S 433
Offered in even-numbered years only

REC 434 F 3C 0.5
Advanced Park Planning and Management
A study of policies, procedures, and practices relative to the management of natural resources in parks. Emphasis is placed on an ecological systems approach to management as it relates to parks at all levels of government.
Prerequisite: REC 334/ENV S 334
Cross-listed as ENV S 434
Offered in even-numbered years only

REC 455 W 3C 0.5
Senior Seminar in Therapeutic Recreation
This course is designed to facilitate an in-depth exploration and analysis of philosophical issues and interdisciplinary theories to discuss how they relate to therapeutic recreation practice and research.
Prerequisite: REC 350, 356 and fourth-year standing

REC 471 A/B F, W, S 1.0
Honours Thesis
An independent research project on an approved topic supervised by a faculty member.
Prerequisite: REC 471A includes an approved design and completion of the first segment of the paper.
Prerequisite: REC 471B requires the completion of the project begun in REC 471A.
Prerequisite: REC 270, 371

REC 475 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. A faculty member must approve a student's project prior to registration. Students may take only one directed studies course for undergraduate degree.
Prerequisite: Faculty approval

REC 480 W 3C 0.5
Tourism Planning, Development and Marketing
Covers the role of tourism in economic and community development, and the roles of government and industry in formulating tourism policy. Students learn through case studies and practical assignments.
Prerequisite: REC 280 and fourth-year standing

COURSES NOT OFFERED IN 1995-96
REC 406 A/B Comparative Recreational Systems
REC 409 Computerized Database Applications in Leisure and Cultural Agency Management
### Course Descriptions

**Religious Studies**

**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.  
**Area 1**

**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 100B F,W 3C 0.5**
**Religions of the West**
Encounter with Judaism, Christianity and Islam: the characteristics and interaction of the three major religious traditions originating in the Middle East that have shaped the image of the Western World.  
**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 100D F,W 0.5**
**Introduction to Christian Ethics**
**Area 4**

**RS 100E W 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**

**RS 100H F,W 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 deity, women, ministry, and ecumenism.  
**Area 4**

**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, consumption and the end of history.  
**Area 4**

**RS 105A F 3C 0.5**
**Elementary Biblical Hebrew**
An introductory course designed to tend 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**

**RS 105B W 3C 0.5**
**Elementary Biblical Hebrew**
A continuation of the introduction to Biblical Hebrew.  
**Taught at WLU as RE 140-3C**

**RS 106A F 3C 0.5**
**New Testament Greek**
An introduction to Greek grammar with appropriate grammatical exercises and development of vocabulary.  
**Antireq: GRK 100A**  
**Area 3**

**RS 106B 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.  
**Antireq: RS 201**

**RS 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 MES 107A**  
This course meets the Group A(ii) requirement  
**Offered in Spring 1995**

**RS 200 F 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 spiritualities.  
**Area 5**

**RS 209 F,S 3C 0.5**
**Parsi: 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**
An analysis of the major theological developments in the Christian traditions from Christ to the present.

The development of Christianity in its Roman Catholic tradition. This course will be on the critical and global influences opment and contemporary challenges to the Roman Catholic, Eastern Orthodox and Protestant traditions from the time of the Jews, in terms of beliefs, practices, ideals and institutions from the beginning to the present time.

The development of Christianity in its Roman Catholic tradition. This course will be on the critical and global influences on the Christian tradition.

The Papacy is one of the most visible, enduring and yet controverted elements of the Christian tradition. This course will explore the origins, development and contemporary challenges to the papacy. A multi-disciplinary study of the Christian gospel as a means to liberation in Canadian society; its roles in the theory and practice of liberation theologies; and the role of contemplation and action in political and spiritual life.

An introduction to the religious tradition of the Jews, in terms of beliefs, practices, ideals and institutions from the beginning to the present time.

An introduction to the religious tradition of the Jews, in terms of beliefs, practices, ideals and institutions from the beginning to the present time.

An introduction to the Islamic faith and its relationship between personality and religious experience. tongues-krism. crime, poverty, racism, and gender relations. Attention will be given to various biblical, theological, and historical bases for these approaches.

Film and the Quest for Meaning 1

Film and the Quest for Meaning 2

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.

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.

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.

A study of the psychology of personality in its relationship between personality and religious thought, experience and behaviour.

An introduction to the religious tradition of the Jews, in terms of beliefs, practices, ideals and institutions from the beginning to the present time.

An introduction to the religious tradition of the Jews, in terms of beliefs, practices, ideals and institutions from the beginning to the present time.
Course Descriptions
Religious Studies

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 256

RS 307A A-D
Selected Topics in Biblical Studies
Consult Department for offerings 1995-96.

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 321 W 3C 0.5
The History and Culture of the Orthodox Church
The purpose of the course is to introduce the student to the religious tradition of Eastern Christianity. Topics will include the origins of the Christian Church, the Byzantine Empire, Orthodoxy behind the Iron Curtain, the liturgy, the icon, the celebration of life and the place of Orthodoxy in the world today.
Prereq: RS 100B or 230
Area 2

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
Area 2
Cross-listed as HIST 348

RS 325 F 3C 0.5
Medieval Church History
An exploration of the development of the Church from 604 to 1449. Topics will include leadership struggles in church and state, crusades, heresy and inquisition, the western schism and the conciliar period.
Cross-listed as HIST 304
Area 2

RS 329 F 3C 0.5
Mothers of the Church
This course will examine the writings of women Christians from Perpetua to Mary Jo Leddy, their historical and cultural setting and will attempt to gauge their contemporary significance for women.
Prereq: RS 292A or B, or consent of instructor
Area 2

RS 331 W 3C 0.5
Vatican II Assessments and Perspectives
An analysis of the context and rich documentary tradition of the second Vatican Council, the course will explore, in particular, the global dynamics of these teachings.
Prereq: RS 100H
(Formerly RS 331A)
Area 2

RS 336 F 3C 0.5
Contemporary Theology
A study of major themes and movements in contemporary theology, with reference to selected thinkers, such as Barth, Tillich, Buber, de Chardin and Rahner.
Prereq: RS 231 or consent of instructor
Area 2

RS 360 W 3C 0.5
Psychology of Religion in Historical Perspective
An analysis of the context and rich documentary tradition of the second Vatican Council, the course will explore, in particular, the global dynamics of these teachings.
Prereq: RS 100H
(Formerly RS 331A)
Area 2

RS 372 F 3C 0.5
Carl Jung's Theory of Religion
Jung's analysis of the development of personality through its 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 372
Area 5

RS 380 W 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
Course Descriptions
Religious Studies - Science

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.

Pre: RS 100H or 230 or 231 or consent of instructor
Area 4

RS 390A-D 0.5
Studies in Religion
See Department for offerings 1995-96.

RS 399A-D, F,W,S 0.5
Directed Reading in Special Subjects
Permission of Undergraduate Officer required

RS 400A-H
Special Topics in Religious Studies
Special topics will be offered in 1995-96. Consult Department.

RS 490A F,W 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.

Pre: Fourth-year standing and consent of Undergraduate Officer

RS 490B F,W 0.5
Honours Seminar
A continuation of the above.

Every student in the Honours RS Program is required to take RS 490A and 490B.

COURSES NOT OFFERED 1995-96

RS 205 The Hebrew Prophets
RS 208 The Parable of Jesus
RS 213 Hinduism
RS 229 The Cult of Mary
RS 256 Current Ethical Issues
RS 261 Women and the Great Religions
RS 263 Justice, Peace and Development
RS 268B Religious Perspectives in Contemporary Canadian Literature
RS 269 The Religious Art of India
RS 281 Theology of Worship, Sacrament and Spirituality
RS 293A Religious Experience of the Young
RS 294 Religion in the Canadian Context
RS 312 The Gospel of John
RS 316 Old Testament Themes
RS 310 The Sacred Book of Islam
RS 313 Tradition and Change in Modern India
RS 315 The Narrative Expression of Canadian Native Religions
RS 316 Canadian Native Religious Traditions
RS 318 Islam and Christianity
RS 327 Evangelical and Anabaptist Christianity
RS 328 Christian Feminist Thought
RS 334 Islamic Theology, Philosophy and Mysticism
RS 335 Modern Christian Thought
RS 351 Religious Perspectives on the Environmental Crisis
RS 353 The Bible and Peace
RS 356 Bioethics and Religious Values
RS 357 Religion and the Arts
RS 371 Religion and Social Justice
RS 373 Folk Religion: Custom, Belief and Ritual
RS 375 Religion and Psychotherapy
RS 384 Christian Hymnody
RS 450A Study Term Abroad

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Russian

For courses in Russian see Germanic and Slavic Languages and Literatures.

Science

Science labelled courses (other than Liberal Science Core Courses) are offered by the Departments of Biology, Chemistry, Earth Sciences and Physics, determined by course content.

Introductory Notes

1. The Faculty of Science offers the following courses 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.

2. Normally, no more than three SCI credits may be applied towards any Science degree program.

SCI 205 F,W 3C 0.5
Physics of High Fidelity Sound Reproduction
An application of elementary physical principles to the study of acoustics and high fidelity sound reproduction. This course will look at the physics behind the design of modern equipment and explain the meaning of its specifications. Several evening clinics will be held where interested students may measure the properties of their own or available systems in a laboratory setting.

Pre: At least one year of Secondary School Physics

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.

Pre: 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.)

Pre: At least one year of Secondary School Chemistry
Available by Distance Education only

SCI 237 F 3C 0.5
Descriptive Astronomy
A survey course in astronomy (primarily intended for students in Applied Health Sciences, Arts, Environmental Studies). The solar system, stars, 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 260 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 261 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 263 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 265 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 267 F 3C 0.5
Topics in History and Philosophy of Science
Selected areas or cases chosen may vary from year to year. Current theme: measurement.
Cross-listed as PHIL 258

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 radiotopes in industries, 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

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 I
An introduction to selected topics in human physiology: the nervous system; sensation; muscles; the heart and circulatory system; blood; the immune system; respiration.
Antireq: BIOL 273
Offered by Distance Education only

SCI 352 F,W,S 0.5
Human Physiology II
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: BIOL 273
Offered by Distance Education only

SCI 355 F 2C 0.5
Biological 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 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: BIOL 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: BIOL 451

SCI 462 F 3C 0.5
Biological 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.
Sexuality, Marriage and the Family
(Studies in)

Undergraduate Officer
J.K. Rempel, St. Jerome's College
884-8110

Courses not offered in the current academic year are listed at the end of this section.

SMF 204  F 3C 0.5
Introduction to Sexuality and Sex Education 1
A broad multidisciplinary overview of perspectives on human sexuality. The significant principles of sex education and some of its most relevant methods and programs will be discussed as well.
Prereq: PSYCH 236
(Formerly SMF 201A)

SMF 205  W 3C 0.5
Introduction to Sexuality and Sex Education 2
A multidisciplinary examination of selected topics in human sexuality. Principles of sex education and some of its most relevant methods and programs will be discussed as well.
Prereq: SMF 204 or PSYCH 236 or consent of instructor
(Formerly SMF 201B)

SMF 206  F,A 3C 0.5
Introduction to Marriage and the Family 1
A broad multidisciplinary overview of perspectives on marriage and the family. SMF 206 in the A term is held in conjunction with SMF 207 in the A term. Both courses must be taken together.
(Formerly SMF 202A)

SMF 207  W,A 3C 0.5
Introduction to Marriage and the Family 2
A multidisciplinary examination of selected topics exploring dynamics within marriage and the family.
Prereq: SMF 206 or consent of instructor
SMF 207 in the A term is held in conjunction with SMF 206 in the A term. Both courses must be taken together.
(Formerly SMF 202B)

SMF 304  F 3C 0.5
Advanced Study of Sexuality and Sex Education 1
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 305  W 3C 0.5
Advanced Study of Sexuality and Sex Education 2
An in-depth and multidisciplinary examination of some special and selected topics in the area of human sexuality and sex education.
Prereq: SMF 204 or PSYCH 236 or consent of instructor
(Formerly SMF 301B)

SMF 306  F 3C 0.5
Advanced Study of Marriage and the Family 1
A detailed analysis of various disciplinary perspectives on marriage and the family.
Prereq: SMF 206 or consent of instructor
(Formerly SMF 302A)

SMF 307  W 3C 0.5
Advanced Study of Marriage and the Family 2
An advanced multidisciplinary examination of some special and selected topics in the area of marriage and the family.
Prereq: SMF 206 or consent of instructor
(Formerly SMF 302B)

SMF 308  F 3C 0.5
Introduction to Marriage and Family Therapy 1
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
(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 406  F,W,S 3C 0.5
Independent Study: Special Topics in Marriage and the Family
An independent, in-depth study, based on empirical research and/or extensive reading, of a topic in the area of marriage and the family. 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 306 and 307 or consent of instructor
(Formerly SMF 403)

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

COURSES NOT OFFERED 1995-96

SMF 309  Introduction to Marriage and Family Therapy 2
Course Descriptions
Social Development Studies

ISS 250R 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.
Prerequisite: Second-year standing and at least two term courses in the social sciences or consent of instructor.

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.
Prerequisite: Second-year standing and at least two term courses in the social sciences or consent of instructor.

ISS 310R F 3C 0.5
Social Science and Social Policy
Examining sociological, psychological, cross-cultural, historical and political factors. Art and literature will also be used to reflect attitudes about social change. Examining sociological, psychological, cross-cultural, historical and political factors. Art and literature will also be used to reflect attitudes about social change.

ISS 315R F 3C 0.5
Social Ideologies, Social Policy and Political Practice
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.
Prerequisite: Social Development Studies majors.

ISS 320R F 3C 0.5
Critical Encounter with Human Nature
An examination of the significant psychological 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 325D 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.
Prerequisite: ISS 150R or consent of instructor.

ISS 330R F 3C 0.5
Family Law and Social Work
Consideration of the court system; investigation of divorce mediation, court mandated custody, access and juvenile predispositional assessment, child welfare, psychiatric advocacy, corrections, and highlighting of professional, ethical, confidentiality, civil and criminal liability issues for social workers.
Prerequisite: 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.
Prerequisite: At least two social science courses.
Cross-listed as SOCWK 350H.

ISS 399B F,W,S T 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.
Prerequisite: Permission of Associate Dean.

ISS 799A/B F,W,S T 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.
Prerequisite: Permission of Associate Dean.

PSYCHOLOGY

PSYCH 101 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.
Prerequisite: PSYCH 101.
Course Descriptions
Social Development Studies

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 behaviouristic models.  
Prereq: An introductory Psychology course  
Cross-listed as PSYCH 355

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, psychophysiological and behavioural disorders.  
Prereq: An introductory Psychology course  
Cross-listed as PSYCH 257  
(Formerly PSYCH 357)

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: An introductory Psychology course

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.

PSYCH 389R/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 Psychology. 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

SOCIAL WORK

SOCWK 001R 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.  
Social Work Diploma students only

SOCWK 120R 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.  
Prereq: SOCWK 120R or consent of instructor

SOCWK 220R F,W,S 3C 0.5
Social Casework 1
A presentation of some of the theoretical constructs necessary for the 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 221R F,W,S 3C 0.5
Social Group Work
Presentation of some of the theoretical constructs necessary for an understanding of social group work as well as an introduction to methodology and interventions.  
Prereq: SOCWK 120R or consent of instructor

SOCWK 222R F,S 3C 0.5
Community Organization 1
An examination of the casework 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 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 F 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 326R 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

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

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 have 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 356F 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
Antireq: SOCWK 350B

SOCWK 365R 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

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 J U 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 399R/399F F W G 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

SOCIOW 320 F 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 specifically in Canada, and in general, within North American society.
Prereq: SOC 101

SOC 223 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 SOC course and second year standing or consent of instructor

SOC 367R 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 360R 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 389R/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 1995-96
ISS 231R Social Ideas, Social Policy and Political Practice 2
ISS 240R Art and Society
ISS 350F Values in the Social Sciences
ISS 350I Individualism and the Family Life Cycle
PSYCH 220R Social Psychology
PSYCH 221R Interpersonal Interaction
PSYCH 369R Advanced Topics in Counselling Psychology
SOC 220R The Individual, Society and Religion
SOC 221R Master Trends in Modern Society
SOC 327R Minority Status in Canadian Society
SOCWK 121 R Contemporary Social Problems
SOCWK 230R A Christian Perspective on Social Work Practice
SOCWK 241R Psycho-Social Factors in Palliative Care

Social Work
For courses in Social Work see Social Development Studies.

Course Descriptions
Social Development Studies - Society, Technology and Values

Society, Technology and Values

Undergraduate Officer
S.C. Lemer, ES1-222, ext. 3060

STV 100 F,W,S 0.5
Society, Technology and Values: Introduction
This course examines the interaction of the technologies developed by a culture with the values and social organization of that culture. The course exposes students to various definitions of society, technology and values, and it presents alternative views about how the three interact. These views are then applied to a number of spheres of influence, including patterns of employment and the role of work; medicine and health; politics and economy; sustainable development and the environment.
Prereq: None

STV 201A-Z 0.5
Society, Technology and Values: Special Topics
Study of the interaction of society, technology and values in a particular topic area under tutorial guidance by visiting or adjunct faculty.
Prereq: STV 100 or 202 or instructor's consent

STV 202 F,W 0.5
Design and Society
The course uses design as a vehicle for examining technology and society interaction. The meaning of design will be discussed, including what contributes to good design and how to evaluate design from a societal and values perspective. Areas discussed include disability, inherently safe design, designing better engineers and other professionals, risk communications, third world issues, approaches to management and environmental issues. The overriding purpose of this course is to (a) develop an ability to see through the eyes of others and promote thinking about technology in terms of users as well as producers or creators, (b) develop critical thinking skills and (c) present design as an activity involving societal and value concerns rather than a purely technical matter.
Prereq: None

STV 204 F,W 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: None

STV 302 F 0.5
Society, Technology and Development
The concept and implementation of development is used to help students further their understanding of how technology, society and values interact and to promote critical awareness of how decisions are made. The course will introduce students to the benefit of and problems in doing truly interdisciplinary work. Development is treated as a global phenomenon but major emphasis is placed on change in less developed nations.
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 or 202 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: STV 100 or 202 or instructor's consent
Comparisons with U.S and Britain will be societies. Special attention is given to marriage and the family in urban-industrial society. A survey of sociological perspectives on marriage and the family, delinquency and ethnic relations in Canada. The course will introduce and examine some of the principles, patterns, factors, choices and consequences of the mutual interaction between technology, engineering and society. Intended for third- and fourth-year students.

**Sociology**

Undergraduate Officer
L. Dawson, PAS 2028, ext. 5340

**Introductory Note**
Not all the courses listed in this section are available in 1995-96. Please consult the 1995-96 Course Offerings List or the Department for current course information.

**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.

Antireq: 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**
Marriage and the Family
A survey of 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 include victims and politics, the victims movement, "Victim-presentation", 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
Offered at Conrad Grebel College

**SOC 209 2C 0.5**
Ancestry, History and Personal Identity
In this course each student analyzes 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 societies 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
Course Descriptions
Sociology

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 biases 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 ecology, "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 experiences; 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 236 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 concepts 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 and functions of communication in dyadic or small group settings. Emphasis is directed toward increasing student understanding of communication in face-to-face contexts.
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
Course Descriptions
Sociology

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 Disorders
An examination of sociological research and theory in the field of mental illness, 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 263 3C 0.5
Sects, Cults and New Religious Movements
An analysis of minority religions considered deviant by the dominant society such as the Amish, Mormons, and Jehovah's Witnesses, with special consideration of the recent new religious movements including Unification (Moonies), Scientology and Krishna consciousness.
Cross-listed as RS 221

SOC 264 2C 0.5
Sociology of Religion
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, and the development of new and alternative forms of religious activity.
Prereq: SOC 101 or consent of instructor

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 275
The Mennonites as a Sociological Community
An analysis of the Mennonites as a social movement, their transition to a sectarian community, transformation to a religious-ethnic society, and present pluralistic profile. Case studies of and field visits to area Mennonite included.
Prereq: An introductory social science course
Offered at Conrad Grebel College

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
See overlapping content note (Grading Systems, item 7) on page 9:7

SOC 286 2C 0.5
Environment and Behaviour
A study of the interaction between social organization and ecological factors such as pollution, energy and land resources.

SOC 305 2C 0.5
Introductory 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.
See overlapping content note (Grading Systems, item 7) on page 9:7
SOC 322 2C 0.5
Methods 2
Continuation of Methods 1. The course involves seminar meetings emphasizing the critical evaluation of research techniques.
Prereq: SOC 280 and 321 or consent of instructor

SOC 326 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; relationships 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 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 Sociology course
Cross-listed as GERON 352, HLTH 352, KIN 352
(Formerly 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 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 368 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 238 or consent of instructor

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. Juries, 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
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
Title: Theoretical Perspectives on Gender

Subtitle: An examination of sociological theories through procedures from the Theory Development of Sociological Systems and the role of the scientist, artist to social action, comparative value systems, and intellectual in society. Approaches to be considered and debated. Emphasis is on pertinent critical literature.

Prerequisite: SOC 101 and 206 or consent of instructor

Title: Contemporary Sociological Theory

Subtitle: Development of sociological theory in the 20th-century. Included is discussion of current theoretical work.

Prerequisite: SOC 305

Title: Canadian Social Thought

Subtitle: 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.

Prerequisite: SOC 305 or consent of instructor

Title: Contemporary Debates in Sociological Theory

Subtitle: 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.

Prerequisite: SOC 101 and 305

Title: Qualitative Methods: Field Research

Subtitle: 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.

Prerequisite: SOC 101

Title: Social Networks

Subtitle: 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, inter-organizational relations, elites, deviant groups, etc.

Prerequisite: SOC 101 or consent of instructor

Title: Quantitative Methods

Subtitle: Design and data analysis in contemporary sociological research, with an emphasis on the analysis of secondary data and computer applications.

Prerequisite: SOC 280 and 321

Title: Political Participation

Subtitle: An examination of the social psychological foundations of Canadian participation, broadly conceived, in the political system.

Prerequisite: Third- or fourth-year social science or consent of instructor

Title: Environmental Sociology

Subtitle: Inquiry into the relationship between the natural environment and society. Review of issues relating to technology, social change, politics of environmental reform, factors and issues that contribute to environmental - resource conflict and policy.

Prerequisite: SOC 286, plus third- or fourth-year standing or permission of instructor

Title: Sociology of Work and Occupations

Subtitle: This seminar examines major theoretical perspectives and issues in the sociology of work.

Prerequisite: One of SOC 241, 242, 243, 336, 342 or consent of instructor

Title: Directed Studies

Subtitle: Selected study and assignments under the direction of a faculty member.

Prerequisite: Fourth-year standing in Sociology

Title: Directed Studies in Quantitative Methods and Statistics

Prerequisite: One of SOC 241, 242, 243

Title: Directed Studies in Social Psychology

Title: Directed Studies in Social Inequality

Title: Directed Studies in the Family

Title: Directed Studies in the Marketplace

Title: Directed Studies in Industry, Work and Complex Organizations

Title: Directed Studies in Religion

Title: Directed Studies in Demography

Title: Directed Studies in Developing Nations

Title: Directed Studies in Gender Relations

Title: 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.
Prefer: 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. Gutierrez, ML 200, ext. 3668

Courses not offered in the current academic year are listed at the end of this section.

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 SP101/151-40)

SPAN 102 W 3C.1L 0.5
Introduction to Spanish 2
A continuation of SPAN 101.
Prefer: SPAN 101 or consent of
Department
(WLU SP101/152-40)

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.
Prefer: SPAN 102 or consent of
Department
(WLU SP121/171-30)

SPAN 201B W 3C.1L 0.5
Intermediate Spanish 2
A continuation of SPAN 201A
Prefer: SPAN 201A or consent of
Department
(WLU SP122/172-03)

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
Prefer: SPAN 201B
(WLU SP205/255-30)

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
Prefer: SPAN 205
(WLU SP206/256-03)

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 SP233/283-03)

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.
Prefer: SPAN 201B
(WLU SP208/258-30)

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. 1880) to the present day. Works of some renowned authors as Neruda, Borges and Garcia Márquez will form part of the material taught in this course. The approach will be similar to SPAN 227 with special emphasis on textual analysis.
Prefer: SPAN 227
(WLU SP209/259-03)

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 skillful translations.
Prefer: SPAN 201B or consent of
Department
(WLU SP211/261-30)

SPAN 251B W 3C 0.5
Composition and Conversation 2
A continuation of SPAN 251A.
Prefer: SPAN 251A
(WLU SP212/262-03)

SPAN 305 F
The Spanish Realist Novel
Study of the fundamental narrative techniques and ideology in some of the most representative realist novels of the 19th century.
Prefer: SPAN 206
Offered at WLU
(WLU 305/355)

SPAN 322 F 2C 0.5
The Generation of '88: Fiction
A study of selected works of Valle Inclán, Azorín, Baroja and Unamuno.
Prefer: SPAN 206
(WLU 322/372)

SPAN 327 W 0.5
The Spanish Golden Age: Don Quijote
A literary analysis of Don Quijote through diverse criticism of the masterpiece.
Prefer: SPAN 206
Offered at WLU
(WLU 327/477)

SPAN 334 F 2C 0.5
Modern Latin American Prose
An in-depth study of selected prose masterpieces from Sarmiento to the 1930's. The political, social, cultural and educational motifs will be analyzed in detail. The question of the novel as a vehicle for social conscientization will also be studied.
(WLU 308/356)
Course Descriptions
Spanish and Latin American Studies
Statistics

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 of study under the supervision of a faculty member.
(WLU SP317/467-20)

SPAN 351A F 2C 0.5
Advanced Composition and Conversation 1
This course is aimed at intense 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.
Prereq: SPAN 251B
(WLU SP212/262-03)

SPAN 351B W 2C 0.5
Advanced Composition and Conversation 2
A continuation of SPAN 351A.
Prereq: SPAN 351A
(WLU SP302/352-02)

SPAN 387 W 2C 0.5
Latin American Women Writers
A study of selected works by women writers from the Baroque to the 20th-century. This course will focus on the artistic and literary quality of the selected material and on the analysis of valuable works that are not yet part of the traditional anthologies. Some of the authors studied are Sor Juana Inés de la Cruz, Gertrudis Gómez de Avellaneda, Gabriela Mistral, María Luisa Bombal, Lydia Cabrera, Rosario Castellanos, Elena Garro, Luisa Valenzuela, Rosario Ferré, Elena Poniatowska and Isabel Allende.
Taught in English
(WLU 320-307/20)

SPAN 490 F 2C 0.5
Translation
This course is designed for students enrolled in third and fourth year of the General or Honours program in Spanish. Fluency in both Spanish and English is required. The objective of this course is to refine translation techniques in order to enable the student to reproduce an English text into accurate and idiomatic Spanish. Documents and texts selected for use include corporate and press materials, magazine articles, and some literary extracts.
Prereq: SPAN 351B or consent of the Department

SPAN 497 W 2C 0.5
The Novel in Latin America
A study of the 20th-century novel and its development from the 1930's to the present through representative authors. While special attention will be paid to the aesthetic achievements of the Latin American novel in the last half century, the individual works will be analyzed for their value as the expression of social and historical reality.
Prereq: SPAN 328 or consent of Department
(WLU 329/479-20)

LATIN AMERICAN STUDIES

LATAM 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

COURSES NOT OFFERED 1995-96

SPAN 111 Conversational Spanish
SPAN 203 Spanish Civilization 1
SPAN 204 Spanish Civilization 2
SPAN 217 Latin American Civilization 1
SPAN 266 The Latin American Short Story
SPAN 304 Romanticism in Spain
SPAN 311A Applied Spanish Stylistics 1
SPAN 311B Applied Spanish Stylistics 2
SPAN 324 Contemporary Spanish Theatre and Poetry
SPAN 325 Contemporary Spanish Novel
SPAN 326 The Spanish Golden Age Drama
SPAN 331 Contemporary Spanish Essay
SPAN 333 Modern Latin American Fiction
SPAN 338 Contemporary Latin American Theatre
SPAN 445 History of the Spanish Language
SPAN 446 Medieval Spanish Literature
SPAN 495 The Novel in Mexico

Statistics

Undergraduate Officer
J.C. Robinson, MC 6030, ext. 5538

Courses not offered in the current academic year are listed at the end of this section.

Introductory Note
More detailed course descriptions and course outlines are available in the Statistics Undergraduate Studies Handbook.

STAT 202 F 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 204 F 3C,1T 0.5
Statistics for the Physical Sciences 1
Descriptive statistics. Probability, random variables, discrete and continuous distributions. Estimation and hypothesis testing, 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 109
Open only to students from the School of Accountancy

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
Anti-req: STAT 230, 240
Course Descriptions
Statistics

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 231, 241

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
Antireq: STAT 220, 240
Also offered at St. Jerome’s College in the Fall term

STAT 231 F,W,S 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, 241
Also offered at St. Jerome’s College in the Winter term

STAT 240 F,W 3C 0.5
Probability
Prereq: STAT 221

STAT 241 W,S 3C 0.5
Statistics
STAT 241 is an advanced-level enriched version of STAT 230.
Prereq: MATH 137 or MATH 138
Antireq: STAT 220, 230

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 Accounting

STAT 321 W 3C, 1T 0.5
Applied Regression Analysis
Prereq: STAT 221
Not open to Honours Mathematics students
Antireq: STAT 331

STAT 322 F 3C 0.5
Application of Sampling Surveys
The planning of surveys; simple random sampling; stratified sampling; ratio and difference estimators; cluster and systematic sampling.
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 235, and STAT 231
Antireq: STAT 232

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 322

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 433 F 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 434 W 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
Course Descriptions
Systems Design Engineering

STAT 443 F, W 3 C 0.5
Forecasting
Prereq: STAT 331 or consent of instructor

STAT 450 W 3 C 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 UMV estimation, least squares. Neyman-Pearson theory of hypothesis testing.
Prereq: STAT 330

STAT 464 0.5
Topics in Probability Theory
Prereq: STAT 330 or consent of instructor
May not be offered 1995-96

STAT 466 0.5
Topics in Statistics 1
Prereq: STAT 330 and 331, or consent of instructor
May not be offered 1995-96

COURSES NOT OFFERED 1995-96

STAT 443 An Introduction to Econometrics
STAT 454 Sampling Theory and Practice
STAT 467 Topics in Statistics 2
STAT 468 Readings in Statistics 1
STAT 469 Readings in Statistics 2

SY DE 111 F 3 C, 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, series and convergence.

SY DE 112 S 3 C, 1T 0.5
Calculus 2

SY DE 114 S 3 C, 1T 0.5
Linear Algebra

SY DE 121 F 3 C, 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 3 C, 1T, 3 L (alt. weeks) 0.5
Introduction to Human Systems
Ergonomics - the man-machine environment, human sensory processes, information processing, motor function. Introduction to biomedical engineering. Introduction to cognitive ergonomics.

SY DE 161 F 3 C, 1T, 3 L 0.5
Introduction to Systems Design Engineering

SY DE 181 F 3 C, 1T 0.5
Physics 1 (Statics)
Course Descriptions
Systems Design Engineering

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, interrelation 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 281 W 3C,2T 0.5
Mechanics of Deformable Solids

SY DE 282 F 3C,1T 0.5
Fluid Mechanics

SY DE 283 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 inductance, 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
Course Descriptions
Systems Design Engineering

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; eigensystems; 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,1L,3L (alt. weeks) 0.5
Introduction to Control Systems

SY DE 354 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 modelling systems for other physical systems.

SY DE 356 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 361 W 3C,1T,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 362 W 1C,3L 0.5
Systems Design Workshop 2
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.

SY DE 371 W 3C,1T,2L 0.5
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.
Course Descriptions
Systems Design Engineering

SY DE 401/402 F,W 1C 0.0
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.

SY DE 422 W 3C,1T 0.5
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.
Prereq: SY DE 324 or equivalent

SY DE 423 F 3C,1T 0.5
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.
Prereq: SY DE 324 or equivalent

SY DE 432 W 3C,1T 0.5
Numerical Optimization
Theory and algorithms for non-linear constrained optimization problems: convex set, convex functions, convex programming, Kuhn-Tucker conditions, duality, quadratic programming, quasi-Newton methods, geometric programming, dynamic programming.

SY DE 434 W 3C,1T 0.5
Random Processes in the Environment
The objective of this course is two-fold: firstly to impress on the students that most processes in the environment occur as random processes and secondly to develop in the students the capability to analyze such processes. The course will review theory of random variables and introduce concepts of random processes and time series analysis. Physical phenomena in the environment and their random nature will be discussed with examples from the hydrologic cycle, air circulation and ocean circulation.
SY DE 442 W 3C 0.5
Occupational and Environmental Systems Safety

SY DE 444 W 3C,1T 0.5
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 currently 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 positron emission tomography.

SY DE 452 W 3C,1T 0.5
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.

SY DE 453 F 3C 0.5
Time Domain Models for Physical Systems
State equations for two-terminal component systems; time varying and non-linear components; analytical solutions for state models: numerical and analog methods of solution.

SY DE 454 W 3C,1T 0.5
Computer Simulation of Systems
System modelling, simulation techniques for continuous and discrete systems; special purpose computer languages for systems simulation; examples and applications in a variety of areas.

SY DE 461 F 1C,3L 0.5
Systems Design Workshop 2
The first half of a two term engineering design project continuing the systems design workshop sequence. An interim progress report is presented at the end of the first term.

SY DE 462 W 1C,3L 0.5
Systems Design Workshop 3
The concluding half of the fourth year Systems Design Workshop.

SY DE 511 F 3C,1T 0.5
Optimization Methods for Stochastic Systems
A continuation of SY DE 311, with emphasis on stochastic operations research models. Topics will include: introductory time series analysis and queuing theory, Markov decision processes, and stochastic programming. Models for optimization of large systems under uncertainty.

SY DE 513 F 3C,1T 0.5
Linear Graph Theory and Applications
Important concepts in graph theory, their properties, relationships among them and useful graph algorithms are given in the context of various applications. Applications include but are not restricted to graph theoretical solutions to electrical network equations, sparse matrix techniques, graph models for fault diagnosis, optimum distribution of traffic through networks and other network flow problems.

SY DE 521 F 3C 0.5
Computer Aided Design
Issues and directions in computer aided design and engineering (CAD/CAE); principles underlying the design of CAD systems. CAD systems architecture and data structures. Fundamentals of interactive computer graphics with application to engineering design and analysis software: graphical interfaces; geometrical transformations and projections; representation of lines, curves, surfaces and solids; graphical rendering techniques. Automated assembly and solution techniques for linear systems. The course usually involves a major project in which students develop a working CAD system.

SY DE 533 F 3C 0.5
Conflict Analysis
Techniques from game theory for assessing the social and political influences in engineering decision making. Topics include metagame analysis, games with mistaken information, sensitivity analysis, dynamic games, probabilistic considerations, bargaining and real-world applications of all the foregoing concepts.
SY DE 536 W 3C,1T 0.5
Environmental Systems Modelling
The course presents concepts of systems modelling and applies them to environmental subsystems such as energy, physical and bio-ecosystems, and to socio-economic systems. The course emphasizes the symbiotic aspects of socio-economic and environmental systems which form the basis for analysis and design of such complex projects.
*Cross-listed as ENV E 420*

SY DE 543 F 3C,1T 0.5
Engineering Psychology and Human Performance
The purpose of this course is to provide a comprehensive survey of human mental capabilities with applications to human-machine systems. Topics covered include: signal detection and absolute judgement, decision making, perception of verbal material, non-verbal perception, memory, attention and perception, mental workload, selection of action, reaction time and human error, continuous manual control, process control and automation, learning and skill acquisition.

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; model 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*

Ukrainian

*For courses in Ukrainian see Germanic and Slavic Languages and Literatures.*
University Faculty

Professor Ralph Chou celebrates with the Optometry Class of '94.
### 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>Science</td>
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<td>Germanic and Slavic Languages</td>
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<td>Polish</td>
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<td>Pure Mathematics</td>
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<td>Department of Drama and Speech Communication</td>
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<td>Statistics and Actuarial Science</td>
<td>Department of Statistics and Actuarial Science</td>
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<td>Systems Design Engineering</td>
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<td>Ukrainian</td>
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<td>Women's Studies</td>
<td>Department of Germanic and Slavic Languages and Literatures</td>
<td>Arts and Interdisciplinary Program</td>
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Accounting

Professor, Director
J.H. Waterhouse, BSc, MBA (Alberta), PhD (Washington, Seattle)

Associate Professor, Associate Director, Director, Professional Programs
H.M. Armitage, BSc (McGill), MBA (Alberta), PhD (Washington, Seattle), CMA

Professor, Graduate Officer, Peat Marwick Thorne Professor in Accounting
G. Richardson, BA (Toronto), MBA (York), PhD (Cornell), CA, FCA

Professor, Undergraduate Officer
D.T. Carter, BComm, MBA (Windsor), CA, FCA

Professor, The Ontario Chartered Accountant’s Chair in Accounting
W.R. Scott, BComm (Carleton), MBA, PhD (Chicago), CA, FCA

Professor, Ernst & Young Professor in Accounting
J.E. Boritz, BA, MBA (York), PhD (Minnesota), CA, CISA, FCA

Associate Professor, Coopers & Lybrand Professor in Auditing
W.M. Lemon, BA (Western Ontario), MBA (Toronto), PhD (Texas at Austin), CA, FCA, CPA

Assistant Professor, David C. Higginbotham-Price Waterhouse Fellow in Accounting
J.L. Kao, BComm (Alberta), PhD (UBC), CA

Professors
L.G. Eckel, BA, BComm (Saskatchewan), MBA, PhD (Michigan), CA, FCA
J.R. Hanna, BComm (McMaster), MBA, PhD, (Michigan), CA, FCA
S.N. Laiken, BA (Western Ontario), MBA (Wharton), PhD (Western Ontario), CBV, Recipient of the Distinguished Teacher Award

Associate Professors
R.E. Beam, BA (Western Ontario), CA, FCA
S.P. Guzun, BA, LLB, MA (Sydney), MBA (Manchester)
D.B. Kennedy, BMath (Waterloo), MBA (McMaster), MS, PhD (Cornell), CMA
A. Macnaughton, BA (Willard Laurier), PhD (British Columbia)
G.W. Russell, BComm, MBA (McMaster), CMA, FCMA

Assistant Professors
S. Bandyopadhyay, BTech (Indian Inst. Technology, India), MBA (Indian Inst. Management, Calcutta), PhD (Iowa)
D.C. Downie, BComm (Alberta), MSc (UBC)
K.J. Klassen, BA, MAcc (Waterloo), MSc, PhD (Stanford), CA
K.R. Vetzel, BA, MA, PhD (Toronto)

Adjunct Faculty
R.P. Ish, BA (Waterloo), CA

Faculty Member of Accounting holding cross appointment to:
Statistics

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The Accounting Advisory Council was established in 1983 to provide liaison between the School of Accountancy and senior representatives from business, government and public accounting practice. Current Council Members are:
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R. Darke, Bank of Nova Scotia
R. Francis, CA, Deloitte & Touche
M.F. Garvey, FCA, Price Waterhouse
P. Heid, FCA, BDO Dunwoody Ward Mallette
B. Hendley, University of Waterloo (ex-officio)
P.L. O’Malley, FCA, Peat Marwick Thorne
J.S. Saloman, FCA, Coopers & Lybrand
M. Stornberg, FCA, Arthur Andersen & Co.
R.B. Wells, Bank of Montreal

Actuarial Science

For faculty listing consult Statistics and Actuarial Science.

Anthropology

Associate Professor, Department Chair
A.C. Zeller, BSc (Trent), MA, PhD (Toronto)

Professors
T.S. Abler, BA (Northwestern), MS (Wisconsin, Milwaukee), PhD (Toronto)
D.A. Counts, BS (S.W. Texas State University), MA (Kentucky), PhD (Southern Illinois)

Associate Professors
M.H. Hill, BA (Washington), MA (Washington State), PhD (Southern Illinois)
H.D. Lyons*, BA (Barnard), MLitt, DPhil (Oxford)

Assistant Professor
R.W. Park, BA (Toronto), MA (McMaster), PhD (Alberta)

Faculty Member holding joint appointment with:
Women’s Studies

Applied Mathematics

Professor, Department Chair
F.O. Goodman,2 BSc, PhD, DSc (London), CMath, CPhys, FinstP, FAIP, FIMA

Professor, Associate Chair, Undergraduate Officer
S.P. Lipsitz,3 BSc (Natal), MSc (South Africa), PhD (Witwatersrand)

Associate Professor, Associate Chair, Graduate Officer
S. Sivaloganathan, BSc, MSc, DPhil (Oxford)

Professors
R.H. Bartels,4 BS, MS (Michigan), PhD (Stanford)
University Faculty
Applied Mathematics - Architecture

Associate Professors
M.C. Chidichimo, llc.phy. (Buenos Aires), PhD (Cambridge)
J. Froese, BA (Manitoba), MA (Queen's, Kingston), PhD (British Columbia)
X.Z. Liu, BSc (Shandong), MSc, PhD (Texas)
R.B. Mann, BSc (McMaster), MSc, PhD (Toronto)
B.J. Marshman, BSc, MSc, PhD (Waterloo)
D. Siegel, BA (California, Los Angeles), PhD (Stanford)
W.P. Tang, BS (Fudan), MS, PhD (Stanford)
G. Tenti, Laurea (Rome), MSc, PhD (Toronto)

Assistant Professors
S.A. Campbell, BMath (Waterloo), PhD (Cornell)
K.A. Morris, BSc (Queen's), MMath, PhD (Waterloo)

Adjunct Faculty
W.F. Ames, MS (Wisconsin)
A.T. Amos, BSc (London), DIC (Imperial College), PhD (London)
C.F.A. Beaumont, BA (McMaster), MA (Toronto) (Professor Emeritus)

J. Carminati, BSc (Victoria), MSc (Melbourne), PhD (Victoria)
H.F. Davis, SB, SM, PhD (Massachusetts Institute of Technology) (Professor Emeritus)
M.A. Donelan, PhD (British Columbia)
W.H. Hui, DSc (Southampton)
M.A. McKiernan, MA (Loyola), PhD (Illinois Institute of Technology) (Professor Emeritus)
H. Nakamura, PhD (Tokyo)
K.W. Sulston, BMath, MMath, PhD (Waterloo)

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:
4. Computer Science
5. Civil Engineering
6. Chemistry
7. Physics

Distinguished Professor Emeritus
L.A. Cummings, AB (Washington), AM (Missouri), PhD (Washington), Recipient of the OCUF (Ontario) Teaching Award

Professors
A. Banerji, BArch (Calcutta), MArch (North Dakota State)
L.W. Richards, BArch (Miami, Ohio), MArch (Yale), OAA, MRAIC
R.M. Schuster, BS, MS (North Dakota State), PhD (Iowa State), PEng
F. Thompson, BArch, MArch (Toronto), OAA, MRAIC

Associate Professors
M. Elmitt, National Diploma in Design (High Wycombe)
R.R. Hunt, AA Dip (London), RIBA, OAA, MRAIC
D.B. McIntyre, BArch (Toronto), MRAIC
R.J. van Pett, Cand.Lit., Drs.Lit., D.Lit. (Leiden)
T. Seeborn, BEng, MEng, PhD (McGill), MArch (California, Berkeley), OAA, PEng
R. Slivka, DipArch Assoc Arch (Huddersfield), MArch and U Design (Washington), RIBA
R. Wiljer, BA (Waterloo), MA (Ottawa)

Assistant Professors
H. Andinghetti, BES, BArch (Waterloo)
T. Meyer Boake, BES, BArch (Waterloo), MArch (Toronto)
M.L. Lobeisinger, BES, BArch (Waterloo)
M.P. Macdonald, BArch (TUNS), DESS (Paris VIII), OAA
D. Rewington, AA Dip (London)
V. Ryninnemi, BES, BArch (Waterloo)

Adjunct Faculty
S. Arrauli, BA (S. Illinois)
J. Ferguson, MSc (Waterloo), PEng
W. Gastmeier, BSc, MSc (Waterloo), PEng
L. Hunt, BES, BArch (Waterloo), OAA
W. Lamb, BArch (McGill), FRAIC
S. Mannell, BES, BArch (Waterloo), OAA
L. Rapoport, BES, BArch (Waterloo)
P. Syme, BArch (Toronto), OAA
P. Westbrook, BTech (Yorkson)

Faculty Members of Architecture holding cross or joint appointments to:
1. Civil Engineering
2. Fine Arts

Arabic
For faculty listing consult Religious Studies.

Architecture
Associate Professor, Director, The School of Architecture
E.R.M. Haldenby, BES, BArch (Waterloo), Recipient of the Distinguished Teacher Award

Associate Professor, Undergraduate Officer
D. McKay, BArch (Toronto)

Associate Professor, Associate Director (Rome)
L. Pignatti, BArch (Rome), MArch (Toronto)
University Faculty
Biology

Professor, Department Chair
D.G. Dixon, BSc (Sir George Williams), MSc (Concordia), PhD (Guelph), Recipient of the Distinguished Teacher Award

Professor, Associate Department Chair
W.E. Inniss, BSc, MSc (Toronto), PhD (Michigan State)

Associate Professors, Undergraduate Officers
D.R. Barton, BA (Ohio Wesleyan), MSc (Akron), PhD (Waterloo)
M. Globus, BSc, MSc (McGill), PhD (Toronto)
B. Greenberg, BSc (California, Berkeley) PhD (Colorado)
M. Griffith, BA (Mount Holyoke), MFS (Yale), PhD (Minnesota)

W.R. Hawthorn, BSc, MSc (McMaster), PhD (Western Ontario)
R.E.H. Smith, BSc (Guelph), PhD (McGill)

Professor, Graduate Officer
W.D. Taylor, BSc, PhD (Toronto)

Associate Professor, Graduate Officer
J.I. Haikila, BSc, MSc, PhD (Toronto)

Distinguished Professors Emeriti
E.B. Dumbroff, BSc, MForestry, PhD (Georgia)*
H.B.N. Hynes, BSc, PhD, DSc (London), DSc (Waterloo), ARCS, FRSC
W.B. Kendall, BSc, PhD, DSc (Liverpool), FRSC*

Professor, NSERC Industrial Research Chair in Microbial Biotechnology
O.P. Ward, BSc, PhD (Dublin)

Professors
N.C. Bols, BSc (Simon Fraser), MSc (British Columbia), PhD (Toronto), Recipient of the Distinguished Teacher Award
J.C. Carlson, BSc, MSc, PhD (Massachusetts)
A.P. Cullen, Dip Opt (City University, London), MSc (Saskatchewan), OD (Pennsylvania, College of Optometry), PhD (City University, London)
R.G.H. Downey, BSc, MSc (Queen’s, Belfast), PhD (Western Ontario), DSc (Belfast), FRSC, Recipient of the Distinguished Teacher Award
H.C. Duthie, BSc, PhD (Wales)
C.H. Fernando, BSc (Ceylon), DPhil (Oxford)
B.R. Glick, BSc (City College of New York), MSc, PhD (Waterloo)

J.Kruvv, BSc, MSc (Waterloo), PhD (Western Ontario)
J.R. Leopold, BSc, MS (West Virginia), PhD (Pennsylvania State)
C.I. Mayfield, BSc, PhD (Liverpool)
J.K. Morton, BSc, PhD (Durham), DSc (Newcastle-upon-Tyne), FLS (Professor Emeritus)*
J.J. Pasternak, BA, MA (Toronto), PhD (Indiana)
C.A. Peterson, BSc, MSc (Alberta), PhD (California, Davis)
G. Power, BSc (Durham), PhD (McGill)
C.W. Robinson, BASc (British Columbia), PhD (California, Berkeley)
J.C. Semple, BSc (Tufts), MA, PhD (Washington University, St. Louis)
J. Sivak, LScO (Montreal), MS (Indiana), PhD (Cornell), OD (Pennsylvania College of Optometry), FAAO
J.E. Thompson, BSA (Toronto), PhD (Alberta), FRSC
T. Viswanatha, MSc, PhD (Mysore), Recipient of the Distinguished Teacher Award

Associate Professors
A.M. Charles, BSc, MSc, PhD (Manitoba)
K.M. Kovacs, BSc (York), MSc (Lakehead), PhD (Guelph)
R.L. Legge, BSc (Calgary), PhD (Waterloo), NSERC University Research Fellow
B.A. Mottatt, BSc (Guelph), PhD (Toronto)
P.E. Morrison, BSc, MSc (Western), PhD (McMaster) (Professor Emeritus)*
S.M. Smith, BSc, MSc (McMaster), PhD (Manitoba), Recipient of the Distinguished Teacher Award
S. Vethanay-Globus, BSc, MA, MSc (Madras), PhD (Toronto)
P. Wainwright, BSc (Rhodes, S.A.), MA, PhD (Waterloo)
B.G. Warner, BES, MSc (Waterloo), PhD (Simon Fraser)
K. Zacharian, BSc (Madras), BA Honors (Oxford), MA, PhD (Princeton)

Assistant Professor
R.J. O’Hara-Hines, BA (New Brunswick), MA (Queen’s), MMath, PhD (Waterloo)

Assistant Professor (Part-time)
B. Sivak, BPT (McGill) MSc, PhD. (Waterloo)

Research Professor
N.R. Tumkur, BSc (Mysore), MSc (Banaras), PhD (Waterloo)

Adjunct Faculty
R. Aloni, BSc, MSc, PhD (Tel Aviv University)
B.J. Butler, BSc, MSc, PhD (Waterloo)
P.A. Catton, MD (Ottawa), LMCC, FRCP(C)

H.R.N. Eydt, BSc, MSc, PhD (McMaster)
M.A. Fields, BSc (Victoria, NZ), PhD (McGill)
S. Ghosh, BSc (Calcutta and Lancaster), MSc (Reading), PhD (Waterloo)
P.V. Hodson, BSc (McGill), MSc (New Brunswick), PhD (Guelph)
J.K. Jeglum, BS, MS (Wisconsin), PhD (Saskatchewan)
R.P. Lanno, BSc, MSc (Guelph), PhD (Waterloo)
R.S. McKinley, BSc (Guelph), MSc (York), PhD (Waterloo)
K. Munkktrick, BSc, MSc, (Guelph), PhD (Waterloo)
V.C. Nealis, BSc, MSc (Carleton), PhD (British Columbia), Great Lakes Forestry Centre
R. Playle, BSc (McMaster), MSc (Manitoba), PhD (McMaster)
R. Rulledge, BSc, MSc, PhD (Carleton)
M.R. Servos, BSc, MSc (Guelph), PhD (Manitoba)
J.T. Trevors, BSc, MSc (Acadia), PhD (Waterloo)
B. With, BSc, MSc, PhD (Waterloo)

Instructors
L. Pasternak, BA, MA (Toronto)
N.J. Scott, BSc, MBA (McMaster), MSc (Waterloo)
K.E. Trevors, BSc, Acadia, MSc (Waterloo)

Faculty Members of Biology holding cross appointments to:
1. Chemistry
2. Health Studies and Gerontology
3. Chemical Engineering

Faculty Members holding cross appointments to Biology from:
4. Physics
5. Optometry
6. Chemistry
7. Chemical Engineering
8. Geography
9. Statistics and Actuarial Science
10. Health Studies and Gerontology

*Also has Adjunct appointment
Canadian Studies

Associate Professor, Director of the Program
W.R. Needham, BComm (Carleton), MA, PhD (Queen's)

Professors, Members of the Program Board
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R.C. MacGillivray, BA (Queen's), AM, PhD (Harvard)

Associate Professors, Members of the Program Board
J.G. Nebn. BA (McMaster), MA, PhD (McGill)
T.S. Abler, BA (Waterloo), PhD (Toronto)

Participating Faculty

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J.E. Curtis, BA (Sir George Williams), MA (Central Michigan), MA (Cornell)
J. Downey, BA, BEd, MA (Memorial), PhD (London), DHL (Maine), DLitt (Memorial), LL.D (New Brunswick), President, University of Waterloo
J.R. English, BA (Waterloo), AM, PhD (Harvard), FRSC
L.L. Haworth, BA (Roffins), MA, PhD (Illinois), FRSC
R.D. Lambert, BA, MA (McMaster), PhD (Michigan)
K.M. McLaughlin, BA (Waterloo), MA (Dalhousie), PhD (Toronto), J
W.L. Mitchellson, BA, MA, PhD (York)
J.G. Nelson, BA (McMaster), MA (Colorado), PhD (Johns Hopkins)
D. Russell, BA, MA, PhD (Toronto)
J.M. Wilson, BA, MA (Toronto)

Canadian Studies

Chemical Engineering

Chair in Biochemical Engineering
M. Nwoye-Young, BSc (London), MASc (Toronto), PhD (London), PEng

Professors
C.M. Burns, BASc, MASc (Toronto), PhD (Polytechnic Institute, Brooklyn), PEng

D.J. Horton, BA (Waterloo Lutheran), MA (Waterloo), PhD (McGill)
J.H. Miller, BA, BLS (McGill), MA, MPhil (Waterloo), PhD (York), R
P.G. Socken, BA (Toronto), MA (Iowa), PhD (Toronto)

Assistant Professors
M. Archambault, BA (Montreal), MA, PhD (Toronto)
C. Diehl-Jones, BSc (Brandon), MA, PhD (Manitoba), J

Adjunct Faculty
K. Burke, BA (McMaster), MA, PhD (Waterloo)
M. Epp, BA (Manitoba), MA (Waterloo)
J. Kargar, BA, MA, PhD (Waterloo)
E.G. Muir, BA (Queen's), HRP Dip (Harvard), B Th, PhD (McGill)
J. Yardley, BA, MA, Warner (Waterloo), PhD (York)

*J* refers to faculty members at St. Jerome's College
*R* refers to faculty members at Renison College

Chemical Engineering

Professor, Department Chair
G.L. Hempel,  BSc, PhD (British Columbia), FCIC, FRSC

Professor, Associate Chair Undergraduate Studies
I.F. Macdonald, BEng (Technical University of Nova Scotia), PhD (Wisconsin)

Assistant Professor, Associate Chair Graduate Studies
T.A. Duever, BASc, MASc, PhD (Waterloo), PEng

Distinguished Professors Emeriti
P.M. Reilly, BASc (Toronto), DIC, PhD (London), FOIC, PEng, Recipient of the Distinguished Teacher Award
D.S. Scott, BSc, MSc (Alberta), PhD (Illinois), PEng

Professor, NSERC Industrial Research Chair in Biochemical Engineering
M. Nwoye-Young, BSc (London), MASc (Toronto), PhD (London), PEng

Professors
C. M. Burns, BASc, MASc (Toronto), PhD (Polytechnic Institute, Brooklyn), PEng

J.J. Ryerley, BASc, MASc (Toronto), PhD (British Columbia)
I. Chatzis, BASc, MASc, PhD (Waterloo)
F.A.L. Dullien, Dipl Ing (Budapest Technical University) MASc, PhD (British Columbia), PEng, (Professor Emeritus)*
T.Z. Fantiy, BSc, MSC (Queens'), PhD (Illinois), PEng
G.J. Fanquhar, BSc (Waterloo), PhD (Wisconsin), PEng, Recipient of the Distinguished Teacher Award
B.R. Glick, BSc (City College of New York), MSc, PhD (Waterloo)
R.Y.M. Huang, BASc (National Taiwan University), MSc, PhD (Toronto), PEng
R.R. Hudgins, BASc, MSc (Toronto), MA, PhD (Princeton), PEng
K.F. O'Driscoll, BChem (Pratt Institute), MA, PhD (Princeton), (Professor Emeritus)*
C.W. Robinson, Jr BSc (British Columbia), PhD (California, Berkeley)
P.L. Silvestro, BS, MS (Massachusetts Institute of Technology), Dr Ing (Munich), PEng
J.R. Wynnnykyl, BEng (McGill), MSc, PhD (Toronto), PEng, (Professor Emeritus)*

Associate Professors
P.L. Douglas, BASc, MASc, PhD (Waterloo), PEng
J.D. Ford, BEng (McGill), MASc, PhD (Toronto), PEng
H.L. Legge, Jr. BASc, (Calgary), PhD (Waterloo), NSERC University Research Fellow
F.T.T. Ng, BASc (Hong Kong), MSc, PhD (British Columbia)
A. Penlidis, Jr. Dipl. Eng. (Thessaloniki), PhD (McMaster), PEng, Recipient of the Distinguished Teacher Award
J.M. Sacher, BSc, PhD (Pennsylvania)

Assistant Professors
W.A. Anderson, Jr. BASc, MASc, PhD (Waterloo), PEng
H.M. Rudman, BSc, MASc, PhD (Technion Israel Institute of Technology)
R. S. Patil, BTech (Indian Institute of Technology, Kanpur), PhD (Waterloo)
M.D. Pritzker, BEng (McGill), MSc (California, Berkeley), PhD (Virginia Polytechnical Institute), NSERC University Research Fellow
J.B. Soares, BChem (UFBA), MSc (UNICAMP), PhD (McMaster)
C. Tzoganakis, DiplEng (Thessaloniki), PhD (McMaster)

Adjunct Faculty
A. Rudin, BSc (Alberta), PhD (Northwestern), PEng
G.R. Sullivan, BASc (Waterloo), DIC, PhD (Imperial College, London), PEng
University Faculty
Chemistry

Professor, NSERC/Monsanto Industrial Research Chair in Chemical Synthesis and Biomolecule Design
V.A. Snieckus, BSc (Alberta), MS (California, Berkeley), PhD (Oregon), FRSC, FCIC

Associate Professor, NSERC-Novacor Industrial Research Chair in Polyolefin and Catalyst Technology
S. Collins, BSc, PhD (Calgary)

Assistant Professors
M. Barra, BSc, PhD (Argentina)
B.M. Greenberg,5 BSc (California, Berkeley), PhD (Colorado)
M. Gauthier, BSc, PhD (McGill)
M.M. Gugelchuk, BSc, PhD (Ohio State)
J.G. Guillemette, BSc, PhD (Toronto)
V. Karanaassios, BSc (Thessaloniki), PhD (Alberta)
E.M. Meiering, BSc (Waterloo), PhD (Cambridge)
W.P. Power, BSc, PhD (Dalhousie)

Adjunct Faculty
B.D. Aguda, BSc (Philippines), PhD (Alberta), Laurentian University
G.F. Atkinson, MA, PhD (Toronto), CChem, FRSC(UK), FCIC, (Professor Emeritus)
D.A. Bristbin, BSc (Alberta), PhD (Toronto), (Professor Emeritus)
I. Hamilton, BSc, PhD (Toronto), Wilfrid Laurier University
F.W. Hartstock, BSc, MSc, PhD (Waterloo), PhD (Ottawa), Wilfrid Laurier University
S. Haworth, BSc, MS (South Dakota), PhD (Colorado), University of North Dakota
H.G. McLeod, MA, PhD (Toronto), (Professor Emeritus)
N.C. Norman, BSc, PhD (Bristol)
K.F. O'Driscoll, BChemE (Pratt Institute), MA, PhD (Princeton) FCIC (Professor Emeritus)
A.J. Paton, BSc (Saskatchewan), PhD (McMaster), Xerox Research Centre of Canada
R.G.A. Rodrigo, BA (Ceylon), PhD (Nottingham), Wilfrid Laurier University
H.D. Sharma, MSc (Delhi), PhD (Calgary), FCIC, (Professor Emeritus)
N.J. Taylor, BSc, PhD (Surrey)
I.D. Williams, BSc, PhD (Bristol), Penn State

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)
T. Rudensky, BSc, PhD (Waterloo)

Faculty Members of Chemistry holding cross appointments to:

1. Physics
2. Biology
3. Applied Mathematics
4. Chemical Engineering
5. Mathematics
6. Physics
## Civil Engineering

**Professor, Department Chair**
B.G. Hutchinson, BE (Sydney), MSc (Queen's), PhD (Waterloo), PEng, FCAE, FCSCE, Professor, Department Chair

**Professor, Associate Chair, Undergraduate Studies**
J.F. Sykes, BASc, MASc, PhD (Waterloo), PEng

**Professor, Associate Chair, Graduate Studies**
E.L. Matyas, BASc (Toronto), DSc, PhD (London), PEng

**Distinguished Professors Emeriti**
N.C. Lind, MSc (Technical University of Denmark), PhD (Illinois), FRSC, FCAE

**Professors**
S.T. Arriaratnam, BSc (Eng) (Ceylon), BSc, MSc, DSc (London), PhD (Cambridge)
E.F. Burnett, BSc (Cape Town), DSc, MSc, PhD (London), PEng
M.Z. Goh, BSc (Bucharest), PEng
M.B. Dusseault, BSc, MSc, PhD (Alberta), PEng
G.J. Faraghar, BASc, MASc (Waterloo), PhD (Wisconsin), PEng, Professor, Department Chair

**Research Assistant Professor**
S.A. Andrews, BSc, MSc, PhD (Alberta)

**Adjunct Faculty**
G.E. Cameron, BASc, MASc, PhD (Waterloo), PEng

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### Classical Studies

**Professor, Department Chair**
R.L. Fowler, BA, MA (Toronto), DPhil (Oxford)

**Associate Professor and Undergraduate Officer**
S.L. Agee, BA, MA (Queen's), PhD (British Columbia)

**Professor**
P.Y. Forsyth, AB (Mount Holyoke), MA, PhD (Toronto), Recipient of the Distinguished Teacher Award

**Associate Professors**
L.A. Cuchin, BA (Western Ontario), MA (Toronto), MA (Carleton), PhD (Ottawa)
L.L. Neum, BA (San Francisco), MA (Oregon), PhD (McMaster)
Assistant Professors
S.B.P. Haag, BA, MA (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. Schaus, BA, MA (Dalhousie), PhD (Pennsylvania)
C.J. Simpson, BA, MPhil (Nottingham), PhD (Alberta)
G. Zeyl, BA, MA (Toronto), PhD (McMaster)

Faculty Member of Classical Studies holding cross appointment to:
1 Fine Arts
2 History

Combinatorics and Optimization

University Faculty

Assistant Professors
I.P. Goulden, BM, MM, PhD (Waterloo)
D.M. Jackson, BA, MA, PhD (Cambridge)
L.B. Richmond, BSc, MSc (Manitoba), PhD (Alberta)
L.W. Schellenberg, BSc, MA, PhD (Waterloo)
S.A. Vanstone,1 BM, MM, PhD (Waterloo)
H. Wolkowicz, BSc, MSc, PhD (McGill)
D.H. Younger, AB, RS, MS, PhD (Columbia)

Associate Professors
L.J. Dickey,2 BSc, MA (Arizona), PhD (Wisconsin)
C.E. Haft, BS (Stanford), PhD (Waterloo)
A. Lubiw,3 MM (Waterloo), PhD (Toronto)
U.S.R. Murty, BA (Andhra), MA (Ottawa), PhD (Indian Statistical Institute)

Adjunct Faculty
V. Chvátil, MA (Charles), PhD (Waterloo)
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 (Copenhagen)
C. Thomassen, Cand. Scient. (Aarhus), PhD (Waterloo)

Faculty Members of Combinatorics and Optimization holding cross appointments to:
1 Computer Science
2 Pure Mathematics
3 Computer Science
4 Electrical and Computer Engineering

Computer Science

Professor, Department Chair
F.W. Tompa, ScB, ScM (Brown), PhD (Toronto)

Associate Professor and Associate Chair for Undergraduate Curricula
P.A. Buhr, BSc, MSc, PhD (Manitoba)

Associate Professor and Associate Chair for Undergraduate Studies
V.A. Dyck, BM, MM, PhD (Waterloo)

Associate Professor and Associate Chair for Graduate Studies
J.C. Ebergen, KANDIDAAT, MSc, PhD (Eindhoven)

Professors
R.H. Bartels,1 BS, MS (Michigan), PhD (Stanford)
J.A. Brzozowski,2 BASc, MASc (Toronto), MA, PhD (Princeton)
S.N. Burris,3 BSc, MA, PhD (Oklahoma)
C.J. Colbourn,7 BSc (Toronto), MMath (Waterloo), PhD (Toronto)
D.D. Cowan, BASc (Toronto), MSc, PhD (Waterloo)
P.A. Forrest,1 M Sc (Western Ontario), MSc (Australian National), PhD (Western Ontario)
K.O. Geddes,1 BA (Saskatchewan), MSc, PhD (Toronto)
J.A. George,1 BS, MSc (Alberta), PhD (Stanford), FRSC, Fellow IEEE
J.W. Graham, BA, MA (Toronto), (Professor Emeritus), Recipient of the Distinguished Teacher Award
P.-Å. Larson, BSc, MBA, PhD (Åbo Swedish University)
M. Li, MS (Wayne State), MS, PhD (Cornell)
R.C. Mullin,7 BA (Western Ontario), MA, PhD (Waterloo)
J.I. Munro, BA (New Brunswick), MSc (British Columbia), PhD (Toronto)
R.B. Simpson,1 BSc, MASc (Toronto), PhD (Maryland)
P. Thagard,6 BA (Saskatchewan), BA, MA (Cambridge), MS (Michigan, Ann Arbor), MA, PhD (Toronto)
S.A. Vanstone,1 BM, MM, PhD (Waterloo), J
J.W. Wong,2 BS, MS, PhD (California, Los Angeles)

Associate Professors
F. Bacchus, BSc (Alberta), MSc (Toronto), PhD (Alberta)
J.C. Beatty, BA (Princeton), PhD (California, Berkeley)
J.P. Black, BSc (Calgary), Dipl d’Ing (Grenoble), PhD (Waterloo)

Distinguished Professor Emeritus
W.T. Tutte, BA, MA, PhD (Cambridge), DM (Waterloo), FRS, FRSC

Professors
M.J. Best, BM, MM, PhD (Waterloo), MSc, PhD (California, Berkeley)
J.A. Bondy, BA, DPhil (Oxford)
R.F. Blake,4 MSc (Queen’s, Kingston), PhD (Princeton), Fellow IEEE, PEM
J.W. Cunningham, BM, MM, PhD (Waterloo)
J. Edmonds, BA (George Washington), MS (Maryland)
G.D. Godsil, BSc, MSc, PhD (Melbourne)

R.C. Mullin,7 BA (Western Ontario), MA, PhD (Waterloo)

M. Li, MS (Wayne State), MS, PhD (Cornell)

1 Fine Arts
2 History
S. Christodoulakis, BSc (Athens), MSc (Queen's), PhD (Toronto)
N. Coburn, BMath, MMath, MMath, PhD (Waterloo), BEd (Western)
M.H. Collins, BS Math (South Dakota), MA, PhD (Arizona)
A.R. Conn, BSc (Imperial College), MSc (Montreal), PhD (Waterloo)
W.M. Gentleman, BSc (McGill), MA, PhD (Princeton)
G.H. Gonnet, Opr U (Urbana), MMATH, Ph.D (Waterloo)
J. Kreindler, BA (McGill), LLB (London), LLB (Ottawa)
D.C.L. Lam, BSc (Rose Polytechnic Inst), MS (Michigan), PhD (Waterloo)
P.V. Poblete, BSc, Math Engineer (Chile), MMath, PhD (Waterloo)
A. Ryman, BSc (York), MSc (London), PhD (Oxford)
S. Safayeni, BSc, MSc (Washington), MAsc (Victoria)
H.P. Seidel, BS, MS, PhD (Habil) (Tubingen)
J. Sionim, BSc, MSc (Western), PhD (Kansas State)
D.W. Swayne, BSc (Waterloo), MA (York), PhD (Waterloo)
P. van Arragon, BS (Calvin College), MMath, PhD (Waterloo)
C.G. Webber, BA (York), LLB (Osgoode Hall)
M. Wein, BEng, MSc, PhD (McGill)
D. Woolf, BSc, PhD (Leeds)

Instructors/Demonstrators

K. Anderson, BMATH (Waterloo)
P. Didur, BSc, BA (Manitoba), MMath (Waterloo)
C. Kierstead, BMATH (Waterloo)
J. Rieder, BMATH (Waterloo)

Faculty Members of Computer Science holding cross and/or joint appointments to:

1. Applied Mathematics
2. Electrical and Computer Engineering
3. Psychology
4. Fine Arts
5. Earth Sciences
6. Combinatorics and Optimization

Faculty Members holding cross appointments to Computer Science from:

1. Combinatorics and Optimization
2. Philosophy
3. Pure Mathematics

*R refers to faculty members at St. Jerome's College

Croatian

For faculty listing consult Germanic and Slavic Languages and Literatures.

Dance

Professor, Department Chair

R.C. Mannell, BA (McMaster), MPE, PhD (Windsor)

Associate Professor, Associate Chair

Undergraduate Affairs

R. Priddle, BPHE (Toronto), MSc (Springfield), MA, PhD (Waterloo)

Associate Professor

P. Ryman, BA, MA (York), Al Chor (London)

Lecturer

L. Prada, BSc (Waterloo), ARAD (Adv. and ATC), (London)

Guest Artists

S. Cash, BFA (York)
C. Chadwick, (National Ballet School)
J. Miller
A. Rosas, ARAD (ATC), FISTD (National), LISTD (Modern Theatre)

Drama and Speech Communication

Associate Professor, Chair

J.S. Greenberg, BA (Sir George Williams), BEd (Toronto)

Assistant Professor, Undergraduate Officier

M.G. van Dijk, BA, MA (Wellington), PhD (Toronto)

Assistant Professor, Co-ordinator, Speech Communication

J. Tommasson Goodwin, BA (British Columbia), MA, PhD (Toronto)

Associate Professor

W.R. Chadwick, BA, MA (Toronto), PhD (London)
University Faculty
Dutch
Earth Sciences

E.L. Matysiak, BASc (Toronto), DIC, PhD (London), PEng
A.V. Morgan, BSc (Leicester), MSc (Calgary), PhD (Birmingham), Recipient of the Distinguished Teacher Award
E.J. Reardon, BA (St. Francis Xavier), PhD (Pennsylvania State)
L. Rothenburg, Dipl Phy (Moscow), PhD (Carleton), PEng
E.A. Sudicky, BSc, MSc, PhD (Waterloo), PEng

Associate Professors
E.C. Appleyard, BSc (Western Ontario), MSc (Queen's), PhD (Cambridge)
M. Coniglio, BSc (McGill), MSc (Manitoba), PhD (Memorial)
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, BASc, MSc (Waterloo), PhD (Simon Fraser)

Assistant Professors
D.W. Bloues, BSc, MSc, PhD (Waterloo)
A.D. Bogobowicz, MSc (Warsaw), PhD (Polish Academy Sciences)
T.W.D. Edwards, BSc, MSc (Queen's), PhD (Waterloo)
D.L. Rudolph, BScE (Manitoba), MSc, PhD (Waterloo)

Research Professors
A.P. Annan, BASc, MSc (Toronto), PhD (Memorial) (Waterloo Centre for Groundwater Research)
J.A. Franklin, BSc (Eng) (London), MSc, DIC, PhD (Imperial College, London), PEng

Research Associate Professors
E.C. Jowett, BASc, MASC, PhD (Toronto), PEng
G. Kachanoski, BSc, MSc (Saskatchewan), PhD (California)
E. Lipczynska-Kochany, MSc, PhD (Warsaw Technical)

Research Assistant Professors
R. Aravena, Licenciate in Chemistry (Universidad Catolica de Santiago), MSc, PhD (Waterloo)
J.F. Devin, 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)
R.V. Nicholson, BSc (Concordia), MSc, PhD (Waterloo)
W.D. Robertson, BSc, MSc, PhD (Waterloo)
M.C. Ryan, BASc (Queen's), MSc, PhD (Waterloo)

C.J. Warren, BSc (Guelph), MSc, PhD (Alberta)

Adjunct Faculty
R.W. Cleary, BS (Massachusetts, Lowell), MS, PhD (Massachusetts, Amherst)
L.D. Delorme, BSc (Saskatchewan), MSc (Alberta), PhD (Saskatchewan)
D.E. Entick, BSc (Guelph), MS, PhD (Wisconsin)
D. Elsworth, BSc (Portsmouth Polytechnic College), MSc, DIC (Imperial College, London)
P. Fritz, DiplGeol, Dr. rer. nat. (Stuttgart) FRSC
F. Goodarzi, BSc (Tehran), MSc, PhD (Newcastle-upon-Tyne)
D.J. Gregor, BA (McMaster), DSc (Univ. Geneva, Switzerland) MSc (Queen's)
M.J. Hendry, BSc, MSc, PhD (Waterloo)
J.L. Jambor, BA, MS, BC (British Columbia), PhD (Carleton)
P.K. Kaiser, Dipl. Ing. (ETH, Zurich, Switzerland), PhD (Alberta)
B.H. Kueper, BASc, MSc (Waterloo)
D.R. Lee, BSc, MSc (North Dakota), PhD (Virginia Polytechnic Institute)
D.L. Mackay, BS, MS, PhD (Stanford)
D.E. McWhorter, BSc (Colorado School of Mines), MS, PhD (Colorado State)
M.J. Melchin, BSc, MSc, PhD (Waterloo), PhD (Western Ontario)
D. Nobes, BSc, MSc, PhD (Toronto)
K.S. Novakowski, BSc, MSc, PhD (Waterloo)
J.O. Ntiragu, BSc (Ibadan), MSc (Wisconsin), PhD (Toronto)
C.J. Piacik, BA (Wisconsin), MSc, PhD (Waterloo)
R. Samson, BSc, MSc, PhD (Laval)
L.R. Snowden, BSc (Calgary), PhD (Houston)
D.K. Solomon, BS, MSc (Utah), PhD (Waterloo)
R.L. Thomas, BSc, PhD, BS (Swansea)
G. van der Kamp, BSc, MSc (British Columbia), PhD (Amsterdam)
O.L. White, BSc (Melbourne), MASC (Toronto), PhD (Illinois), PEng
N. Yassi, BSc, PhD (London)

Senior Demonstrators
J.L. Lang, BASc, MBA (Queen's)
K. LaHay, BSc, MSc (Guelph)

Faculty Members of Earth Sciences holding cross appointments to:
1 Civil Engineering

Faculty Members holding cross appointment to Earth Sciences from:
2 Civil Engineering
3 Geography
4 Systems Design Engineering
5 University of Guelph
6 Computer Science

*Also has Adjunct appointment
East Asian Studies

Professor, Director
G. Cuthbert Francis, RA (Toronto), MA (Carleton), PhD (York), R

Adjunct Assistant Professor
A. Maruoka, BA (Kyoto), MEd (OISE), R

Sessional Lecturers
M. Hunsberger, BA (Goshen), MA (Indiana), PhD (Tomsk), R
Y. Lee, 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

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Economics

Professor, Department Chair
J.R. Melvin, BSc (Manitoba), MA (Alberta), PhD (Minnesota)

Associate Professor, Associate Chair, Undergraduate Affairs
E. Carvalho,1 BA, MA, PhD (Waterloo)

Associate Professor, Associate Chair, Graduate Affairs
R.W. Bodell, BSc, Dip Ed (Sydney), MA, PhD (York)

Professors
J.A. Brux, BA (Toronto), MA, PhD (McMaster)
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 (Duke)
K.R. Stollery, BA (Southern California), MA, PhD (Queen's)
W.H. Thirsk, BSc (British Columbia), MA, PhD (Yale)
D. Wilton, BComm (McMaster), PhD (MIT)

Associate Professors
K.M. Bennett, BA, MA (Queen's), PhD (McGill)
W.M. Bossert, Diplom (Karlsruhe), MA (UBC), PhD (Karlsruhe)
J.E. Cuena, LIC (Madrid), MA (Western Michigan), PhD (Toronto)
S.W. Kardasz, BA (Loyola), PhD (Queen's)
R.G. Kumar, BStat, MSStat (Indian Statistical Institute), MA, PhD (Toronto)
F.M. Naqib, BSc (Washington), MSc (Oregon), PhD (Queen's)
W.R. Needham,2 BComm (Carleton), MA, PhD (Queen's)
T.T. Nguyen, BSc, Che (California, Berkeley), MA (Simon Fraser), PhD (Western Ontario)

Assistant Professors
D. Andofatto, BBA, BA (Simon Fraser), PhD (Western Ontario)
I. Bunch, BSc (Victoria), MA, PhD (Western Ontario)
W.M. Ho, BBSc (Chinese University of Hong Kong), MA, PhD (Western Ontario)
G.M. Myers, BA (Queen's), MA, PhD (McMaster)
E. Nosai, BA (Queen's), MA (McMaster), PhD (Queen's)
J. Redakop, BSc (Victoria), MA, PhD (Toronto)
A. Sengupta, PhD (State University of New York)
T. Wang, BSc (Beijing), MSc (Chinese Academy of Sciences), MA, PhD (Toronto)
T.S. Wirjanto, BA (Toronto), MA, PhD (Queen's)

Adjunct Associate Professor
L.P. Fletcher, BComm (Mount Allison), AM, PhD (Brown), (Professor Emeritus)

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 (IIT/Delhi), MSc, PhD (Manitoba)

Associate Professor, Associate Chair for Undergraduate Studies
W.M. Loucks, BASc (Waterloo), MASC, PhD (Toronto), PEng

Professor, Associate Chair for Undergraduate Studies
M.M.A. Salama, BSc, MSc (Cairo), PhD (Waterloo)

Associate Professor, Associate Chair for Graduate Affairs
A. Vannelli, BSc, MSc (Concordia), PhD (Waterloo)

Professor, BNRNSERC Industrial Research Chair in Very Large Scale Integrated Circuits, ITAC/NSERC Research Award
M.J. Elmasty, BSc (Carleton), MASC, PhD (Ottawa), PEng, Fellow IEEE

Professors
J.D. Aplevich, BE (Saskatchewan), PhD (Imperial College, London), PEng
I.F. Blake,1 BSc, MSc (Queen's), MA, PhD (Princeton), PEng, Fellow IEEE
J.A. Brzozowski,2 BASc, MASC (Toronto), MA, PhD (Princeton)
S.G. Chamberlain, MSc, PhD (Southampton), Fellow IEEE
Y.L. Chow, BEng (McGill), MASC, PhD (Tokyo), PEng
J.D. Cross, BSc (Wales), MSc, PhD (Carleton), PEng
J.A. Field, BE (Saskatchewan), MASC, PhD (Toronto), PEng
J.V. Hanson, BASc (Toronto), MASC, PhD (Imperial College, London), PEng, (Professor Emeritus)*
E.L. Heasell, BSc, PhD (Imperial College, London), PEng, (Professor Emeritus)*
R.H. MacPhie, BASc (Toronto), MS, PhD (Illinois), Fellow IEEE
J.W. Mark, BASc (Toronto), MEng, PhD (McMaster), PEng, Fellow IEEE
V.H. Quintana, BEng (Chile), MSc (Waisconsin), PhD (Toronto), PEng
R.S. Ramshaw, BSc, PhD (Nottingham), PEng
H.C. Ratz, BEng (Carleton), MSc (Massachusetts Institute of Technology), PhD (Saskatchewan), PEng, (Professor Emeritus)*
University Faculty
Electrical and Computer Engineering
Engineering Undergraduate Office

J. Reeve, BSc, MSc, PhD, DSc (Manchester), PEng, Fellow IEEE
D.J. Roulston, BSc (Belfast), PhD (Imperial College, London), CEng, PEng, Fellow IEEE
J. Vlach, Dip ing CSc (Technical University of Prague), Fellow IEEE, (Professor Emeritus)*
L.A.K. Watt, BSc (Manitoba), MS (Chicago), PhD (Minnesota), (Professor Emeritus)*
L.Y. Wei, BS (National Northwestern College, China), MSc, PhD (Illinois), (Professor Emeritus)*
W.J. Wilson, BE, MSc (Saskatchewan), PhD (Cambridge), PEng
J.W. Wong, BS, MS, PhD (California-Los Angeles)
M.M. Yovanovich, BSc (Queen's), MS (Buffalo), ME, ScD (Massachusetts Institute of Technology), FNAS, FAIA, PASME
Associate Professors
G.B. Agnew, BASc, PhD (Waterloo), PEng
P.P. Dasiewicz, BSc, MSc, PhD, (Waterloo), PEng
L. Deng, BS (University of Science and Technology, China), MS, PhD (Wisconsin, Madison), Senior Member IEEE
A.J. Heunis, BSc (Wilfrid Laurier), MSc, PhD (Imperial College, London), ASCE
W.P. Huang, BS (Shandong, China), MS (University of Science and Technology, China), PhD (Massachusetts Institute of Technology)
B.H. Leung, BS (New York), MS (California), PhD (California, Berkeley), PEng
A. Nathan, BSc Hons (Leeds Polytechnic, UK), MSc, PhD (Alberta)
A.K. Khansari, BSc (University of Engineering and Technology), PhD (Victoria, BC)
R.L. Howe, BA, MSc, DPhil (University College, Oxford)
R.I. Hornsey, BA, MSc, DPhil (University College, Oxford)
S. Jayaram, BE (Univ. Eng. College, Bangalore), MScEng (Indian Institute of Science, Bangalore), PhD (Waterloo), PEng
G. Kostic, BASc (Waterloo), MS, PhD (California, Berkeley)
A.K. Khandani, BSc, MSc (Tehran University, PhD (McGill)
S. Leue, Dipl. Inform. (Univ. of Hamburg, Germany), Dr. Phil. Nat. (Univ. of Bern, Switzerland)
D.E. Miller, BSc (New Brunswick), MSc, PhD (Toronto)
A. Opal, BTech (IIT/New Delhi), MASc, PhD (Waterloo)
A. Singh, BSc (Bihar Institute of Technology, India), MPhil (J. Nehru University, New Delhi), MSc, PhD (Alberta)
W. Zhuang, BSc, MSc (Dalhousie University, China), PhD (New Brunswick)
Adjunct Faculty
W. Allegrutto, BSc, PhD (British Columbia)
B. Bahadur, BSc, MSc, PhD (Gorakhpur, India)
R. Bartnikas, BASc (Toronto), MEng, PhD (McGill), Fellow IEEE, FRSC, FASTM, F INST P
A.Y. Chikhani, BSc (Cairo University, Egypt), MASc, PhD (Waterloo), PEng
J. Chrostowski, MSc, PhD (Warsaw Univ. of Technology)
D.C. Houghton, BSc (Birmingham), PhD (Cambridge)
J. Kuffel, BASc (Windsor), MSc, PhD (Waterloo), PEng
M.S. Stern, BSc (Manchester), PhD (Hull)
Laboratory Director
R.L. Wright, PEng
Faculty Member of Electrical and
Computer Engineering holding cross appointment to:
Combination and Optimization
2 Mechanical Engineering
Faculty Members holding cross appointment to Electrical and Computer Engineering from:
3 Computer Science
4 Mechanical Engineering
* Also has Adjunct appointment

Engineering Undergraduate Office

Professor, Associate Dean of Engineering
G.E. Schneider, BASc, MASc, PhD (Waterloo)

Directors
Professor, Director of General Studies (Acting)
G.E. Schneider, BASc, MASc, PhD (Waterloo)

Professor, Director of Exchange Programs
H.C. Ratz, BASc (Toronto), MS (Massachusetts Institute of Technology), PhD (Saskatchewan), PEng, (Professor Emeritus)*

Professor, Director of Admissions
M.E. Jenni, BASc, SM, PhD (Massachusetts Institute of Technology), PEng, Recipient of the Distinguished Teacher Award

Associate Professor, Director of First-Year Engineering
J.D. Ford, BASc (McGill), MSc, PhD (Toronto), PEng

Demonstrators
D.A. Fraser, BASc, MASc, BEd (Toronto), PhD (Waterloo)
J. Lowe, BASc (Carleton), Recipient of the Distinguished Teacher Award
K. Riepert, BASc (Waterloo)

Adjunct Faculty
C.F.A. Beaumont, BA (McMaster), MA (Toronto), (Professor Emeritus)
E.L. Bodnar, BA, MA (Saskatchewan), PhD (McMaster), (Professor Emeritus)
R.H. Grasley
R.G.R. Lawrence, QC, Recipient of the Distinguished Teacher Award
D.W. Schnurr, LLB (Toronto)

Faculty Members holding administrative appointments in the Engineering Undergraduate Office from:
1 Mechanical Engineering
2 Chemical Engineering
3 Systems Design Engineering
* Also has Adjunct appointment
English

Professor, Department Chair
W.R. Macnaughton, BA (Toronto), MA, PhD (Wisconsin)

Professor, President of the University
J. Downey, BA, BEd, MA (Memorial), PhD (London), DHL (Maine), DLitt (Memorial), LL.D (New Brunswick)

Professor, Associate Dean, Arts Graduate Studies and Research
C.E. Gilmore, BA (Pacific Lutheran), MA, PhD (Nebraska)

Associate Professor, Associate Chair and Undergraduate Officer
M.G. McArthur, BA (Manitoba), MA, PhD (Western Ontario)

Associate Professor, Associate Chair and Graduate Officer
A.L. Magnusson, BA (Manitoba), MA, PhD (Toronto)

Associate Professor and Co-operative Education Officer
N.F. Randall, BA (Guelph), MA (Waterloo), PhD (York)

Distinguished Professors Emeriti
W.R. Martin, BA, MA, DLitt et 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. Fogel, BA (Carleton), MA (British Columbia), PhD (Purdue), J D.R. Letson, BA (Waterloo), MA (McMaster), PhD (Toronto), J, Recipient of the Distinguished Teacher Award

Associate Professors
P.D. Beam, BA (Waterloo), MA (McMaster), PhD (Toronto)
R.R. Dubinski, BA, MA (Western Ontario), PhD (Toronto)
M.A. Garhardstein, BA, MA (Montana), PhD (Iowa)
D.G. Goodwin, BA, MA, PhD (Toronto)
R.N. Gosselink, BA (Kansas), MA, PhD (Colorado)
R. Harris, BA (Queen's), MA (Dalhousie), MSci (Alberta), MSci, PhD (Rensselaer)
M.W. Higgins,1 BA (St. Francis Xavier), MA, PhD (York), J
P.M. Hillcliffe, BA (British Columbia), MA, PhD (Toronto), J
N.C. Hultin, BA (Concordia), MA (Chicago), PhD (Johns Hopkins)

R. Lister, BA, MA, PhD (Toronto)
H.M. Logan, AB (Franklin and Marshall), PhD (Pennsylvania)
E.P. McCormack, MA (Glasgow), PhD (Manitoba), J
C.E. McGee, BA, MA, PhD (Toronto), J
J.H. Miller, BA, BLS (McGill), MA, MPhil (Waterloo), PhD (York), R
J.S. North, BA, MA (British Columbia), PhD (Alberta)
E.F. Shields, AB (Chestnut Hill), MA (Villanova), PhD (Illinois)
H. Friesen Tieszen, BA (Winnipeg), MA, PhD (Alberta), G

Assistant Professors
B. Cantar, BA, MA (Carleton), PhD (Queen's)
C. Diehl-Jones, BSC (Brandon), MA, PhD (Manitoba), J
F. Easton, BA (British Columbia), MA, PhD (Princeton)
M. Jones, BA, MA (Western), PhD (York)
C. Schryer, BA (Toronto), MA, MPhil (Guelph), PhD (Louisville)
G. Stillar, BA, MA, PhD (York)
J. Wright, BA, MA, PhD (Western Ontario)

Adjunct Faculty
A.P. Dust, MA, PhD (Illinois), (Professor Emeritus)
H.B. Ellis, BA (Rollins), MA, PhD (Illinois), (Professor Emeritus)
J. Gold, BA (Birmingham), PhD (Wisconsin), (Professor Emeritus)
C.A. Redmond, BA (Queen's), MA (Waterloo)
P.H. Smith, Jr., BA (Harvard), PhD (Pennsylvania), (Professor Emeritus)
J.S. Stone, BA, MA (British Columbia), (Professor Emeritus)

Faculty Members holding cross appointments to English from:

1 Religious Studies

' Also has Adjunct appointment

'G' refers to faculty members at Conrad

'G' refers to faculty members at Conrad

'J' refers to faculty members at Renison

Facility Members of Environment and Resource Studies holding cross and/or joint appointments to:

1 Geography
2 Systems Design Engineering

Environment and Resource Studies

Associate Professor, Department Chair
S.C. Lerner, BA (Ohio State), MA (California), Recipient of the Distinguished Teacher Award

Assistant Professor, Undergraduate Officer
G.O. Michalenko, BA, PhD (Saskatchewan)

Professors
M. Chandrashekar, B Tech (Indian Institute of Technology, Kanpur), MASC, PhD (Waterloo), PC ng
G.R. Francis, BA (Toronto), BA (McGill), MA (British Columbia), PhD (Michigan)
S. Kumar, BSc, MS (Punjab), MA, PhD (Toronto)

Associate Professors
R.B. Gibson, BA (York), MA, PhD (Toronto)
J.J. Kay, BSc (McGill), MASC, PhD (Waterloo)
P.A. Kay, BSc (Toronto), MS, PhD (Wisconsin-Madison)
R.F. Keighley, BA (Guelph), MA, PhD (Michigan State)
G.B. Priddle, BA, (Western Ontario), MA, PhD (Clark)
J E. Robinson, BSc (Waterloo), MES (York), PhD (Michigan)

Assistant Professor
S. Wiser, BA (Western Ontario), MEd (OISE), PhD (Waterloo)

Adjunct Faculty
F. Grew, BA (Waterloo Lutheran), BEd (Toronto), MSciEd (Niagara), PhD (Toronto)
J. Jackson, BA (Windsor)
R. Knapton, BSc (Lakehead), MASC (British Columbia), PhD (Manitoba)
B. Savin, HSc (Toronto), PhU (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
University Faculty
Environmental Engineering - Fine Arts

Environmental Engineering

Chair of the Environmental Engineering Board
Professor, Associate Dean of Engineering
Undergraduate Studies, 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 Chair
G.L. Rempe, 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 Chair
B.G. Hutchinson, BE (Sydney), MSc (Queen's), PhD (Waterloo), PEng, FOAE, FGSC, Recipient of the Distinguished Teacher Award
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, BEng (Madras), MSc (National University of Ireland), PhD (Toronto)

Professor, Department of Earth Sciences
J.F. Barker, BSc, MSc (McMaster), PhD (Waterloo)

Professor, Associate Dean of Environmental Studies, Undergraduate Studies, Department of Geography
G.R. McBoyle, BSc, PhD (Aberdeen), Recipient of the Distinguished Teacher Award

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, BA, MA, PhD (Waterloo)
R.T. Newkirk, BA, MSc, PhD (Western Ontario)

Assistant Professors
M.C. Delfgaauw, BEng (Amsterdam)
M.A. Becker, BES (Waterloo), LLB (Ontario)

Adjunct Faculty
K. Elliott, Diploma Creative Arts
S. Garrod, BA (McMaster), LLB, MES (York)
P. Pickford, BA (Western Ontario), LLM (Osgoode Hall)
R. Snider, BES (Waterloo), LLB (Osgoode Hall)

Faculty Members of Environmental Studies holding cross and/or joint appointments to:

1. Planning
2. Economics
3. Planning

Faculty Members holding cross and/or joint appointments to Environmental Studies from:

1. Classical Studies
2. Religious Studies
3. Architecture
4. Computer Science

"R" refers to faculty member at Renison College

Fine Arts

Professor, Department Chair
A.M. Urquhart, BFA (Buffalo)

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, AB (Mount Holyoke), MA, PhD (Toronto), Recipient of the Distinguished Teacher Award
A. Roberts, BA (Guelph), MA (Claremont)

Associate Professors
M.S. Bird, BA, MA, PhD (Iowa), R
W.B. Cowan, BSc (Waterloo), PhD (McGill)
E. Klism, MA, PhD (Toronto)
D.I. MacKay, BFA (Mount Allison), MFA (Cornell)
J. Uhde, MA (Masaryk University Brno), PhD (Waterloo)

Assistant Professors
J.G. Buyers, BFA (York), ME (Toronto)
T. Seebohm, BEng, MEng, PhD (McGill), MA (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. Religious Studies
3. Architecture
4. Computer Science

"R" refers to faculty member at Renison College
University Faculty
French Studies/Études françaises
Geography

Professor, Department Chair
D.W. Russell, BA, MA, PhD (Toronto)

Professor, Undergraduate Officer
A. Ages, BA (Carleton), MA, PhD (Ohio State)

Associate Professor, Graduate Officer
W.D. Wilson, MA, PhD (Trinity College, Dublin)

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 (Western Ontario)
R.W. Ryan, BA, MA (Dalhousie), Doctorat de 3e cycle (Université de Provence)
P.G. Socken, BA (Toronto), MA (Iowa), PhD (Toronto)

Assistant Professor
A.M. Miraglia, BA, MA, PhD (Toronto)

Language Instructors
P. Aplevich, BA, MA (Waterloo)
C. Black, Licence ès lettres (Grenoble), MA (Waterloo), Recipient of the Distinguished Teacher Award
H. McLenanahen, Licence en Phil. Rom. (Brussels), MA (Waterloo), PhD (Western Ontario)
T. Sabaryn, Licence ès lettres (Toulouse), Recipient of the Distinguished Teacher Award

"J" refers to faculty members at St. Jerome's College

B. Hyma,1 BSc, MSc (Madras), MA (Sheffield), PhD (Pittsburgh)
P.A. Kay,6 BSc (Toronto), MS, PhD (Wisconsin-Madison)
A. Keslik, MSc, PhD (UMCS - Lublin, Poland)
C.J.A. Mitchell, BA (Guelph), MA, PhD (Waterloo)
G.B. Priddle,6 BA (Western Ontario), MA, PhD (Clark)

Assistant Professors
J. Andrey, BA (Wilfrid Laurier), MA (Calgary), PhD (Waterloo)
J. Law, BA (Sheffield), MSc (McMaster), PhD (Waterloo)
P.K. Parker, BSc, BA (Mount Allison), MA, GDintL (ANU), PhD (London)
J.S. Price, BSc (Trent), MSc (Saskatchewan), PhD (McMaster)
T.D. Rutherford, BA, MA (Queen's), PhD (Wales)
M. Stone,7 BSc (Waterloo), MA (Laurier), PhD (Waterloo)

Adjunct Faculty
G. Brannon, CC
D.I. 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 in:
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

Associate Professors
T.E. Bunting, BA (York), MA (Western Ontario), PhD (Toronto)
D. Dudycha, BA (Waterloo Lutheran), MA (Waterloo), PhD (London)
C. Dufourniay, BA (Sir George Williams), MA (Laval), PhD (Toronto)
G.B. Hall,7 BA Hons (Otago, New Zealand), MA, PhD (McMaster)
University Faculty
Geological Engineering - Health Studies and Gerontology

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
B.G. Hutchinson, BE (Sydney), MSc (Queen's), PhD (Waterloo), PEng, FCAE, FCSCCE, Recipient of the Distinguished Teacher Award

Professor, Department of Earth Sciences Chair
R.W. Gillham, BSA (Toronto), MSc (Queen's), PhD (Illinois)

Professors, Department of Civil Engineering
W.C. Lennox, BASc, MSc (Waterloo), PhD (Lehigh), PEng
E.L. Matyas, BASc (Toronto), DIC, PhD (London), PEng
L. Rothenburg, Dipl. Phys (Moscow), PhD (Carleton), PEng
J.F. Sykes, 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)

Associate Professor, Department of Civil Engineering
J.C. Santamarina, Ing. Civil (Cordoba, Argentina), MSc (Maryland), PhD (Purdue)

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, Staatsexamen (Berlin and Bonn), MA, PhD (Toronto)

Assistant Professor, Associate Chair
L. Szarycz, MA (Poznan), PhD (Ottawa)

Professor, Associate Chair Graduate Studies
G. Brude-Firmin, Staatsexamen (Berlin), PhD (Yale), Recipient of the Distinguished Teacher Award

Distinguished Professor Emeritus
J.W. Dyck, AB (Bethel), MA (Missouri), PhD (Michigan)

Professors
E. Heier, BA, MA (British Columbia), PhD (Michigan), Recipient of the Distinguished Teacher Award
D.G. John, BA, MA, PhD (Toronto)
M. Kudrak, BA, MA (Waterloo), PhD (Alberta)
H.W. Panhali, BA (Waterloo), MA (Cincinnati), PhD (Waterloo)
J. Whiton, BA, MA, PhD (Minnesota)

Associate Professors
V. GrubSBC, MA (Brisbane), PhD (Aix-en-Provence)
F.K. Jakobish, BA, MA (Manitoba), PhD (Waterloo)
R. Kaplusk, BA, MA (Manitoba), PhD (Ottawa)
H. Nechta, BA, MA, PhD (Toronto)
A. Zweets, Doctorandus (Amsterdam), DPhil (Groningen)

Assistant Professors
Z. Gimpelevich-Schwartzman, MA (Minsk), PhD (Ottawa)
G. Winthrop-Young, MA (Freiburg), PhD (British Columbia)

Health Studies and Gerontology

Professor, Department Chair
P.E. Wainwright, BSc (Rhodes, S.A.), MA, PhD (Waterloo)

Professor, Associate Chair, Graduate Affairs
L. Hoffman-Goetz, BA (SUNY, Binghamton), MA, PhD (Michigan)

Professor, Associate Dean, Graduate Studies and Research, Faculty of Applied Health Sciences
M.T. Sharratt, BA, MA (Western Ontario), PhD (Wisconsin)

Associate Professor, Associate Chair, Undergraduate Studies
H.S. McColl, BSc (McGill), PhD (Purdue)

Distinguished Professor Emeritus
W.F. Forbes, BSc, PhD, DSc (London), DIC, ARCS G

Professors
A. Bono, BA (Western Ontario), MSc, PhD (Illinois)
K.S. Brown, BM, PhD (Waterloo)
A.J.R. Cameron, BA, MA, PhD (Waterloo)
J.C. Carlson, BSc, MSc, PhD (Massachusetts) G
J.E. Curtis, BA (Sir George Williams), MA (Central Michigan), MA (Cornell) G
V.T. Farewell, BM, MM (Waterloo), PhD (London)
M.E. Houston, BSc (Toronto), PhD (Waterloo)
R.C. Mancini, BA (McMaster), MPE, PhD (Windsor)
M.J. Stones, BTech (Brunel), Ph.D. (Sheffield)
M.P. Zanna, BA, PhD (Yale)

Associate Professors
L.R. Brawley, BPE (Calgary), MSc (Oregon), PhD (Penn State)
A.M. Myers, BA (Winnipeg), MA, PhD (York)

Assistant Professor
R.C. Bell, BSc, MSc (Waterloo), PhD (Cornell)
T. Hadjistavropoulos, BA (McGill), MA, PhD (Saskatchewan)
J.P. Hirdes, BSc, MA, Dipl. in Gerontology, PhD (Waterloo) G
J.A. Husted, BScN, MSc (British Columbia), PhD (Columbia)

Greek

For faculty listing consult Classical Studies.

For faculty listing consult Classical Studies.

For faculty listing consult Classical Studies.
University Faculty
Health Studies and Gerontology

History

Associate Professor, Department Chair
D.E. Wright, BA (Cambridge), PhD (McMaster)

Professor, Undergraduate Officer
P.J. Harrigan, BA (Detroit), AM, PhD (Michigan)

Professor, Graduate Officer
R.C. MacGillivray, BA (Queen's) AM, PhD (Harvard)

Professors
M.J. Craton, BA (London), MA, PhD (McMaster) FRHistS
G. Cuthbert Brandt, BA (Toronto), MA (Carleton), PhD (York), R
J.R. English, BA (Waterloo), AM, PhD (Harvard), FRSC
P.Y. Forsyth, AB (Mount Holyoke), MA, PhD (Toronto), Recipient of the Distinguished Teacher Award
R.L. Fowler, BA, MA (Toronto), DPhil (Oxford)
K.M. McAulghlin, BA (Waterloo), MA (Dalhousie), PhD (Toronto), J
W.L. Mitchinson, BA, MA, PhD (York)
W.O. Pocklull, BA (Guelph), MA (Waterloo), PhD (Queen's)

History

Associate Professors
S.J. Ager, BA, MA (Queen's), PhD (British Columbia)
N.R. Ball, BA (McMaster), MA, PhD (Toronto)
L.A. Curchin, BA (McMaster), MA (Toronto), MA (Carleton), PhD (Ottawa)
D.A. Davies, BA, PhD (Washington), Recipient of the Distinguished Teacher Award
K.D. Eagles, BA (Cambridge), MA, PhD (Washington)
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, BA (National University of Ireland, Dublin), BEd, MA, PhD (Toronto), J, Recipient of the Distinguished Teacher Award
L.L. Neuru, BA (San Francisco), MA (Oregon), PhD (McMaster), G
C.A. Snyder, BA (Waterloo), MA, PhD (McMaster), G
G.J. Stortz, BA, MA (Waterloo), PhD (Guelph), J
J.A. Want, CH, BA (Western Ontario), MA, PhD (St. Louis), J
J.W. Walker, BA (Toronto), MA (Waterloo), PhD (Dalhousie)

Assistant Professors
G.W. Hayes, BA, MA, BA (Wilfrid Laurier), PhD (Western)
L. Taylor, BA (Western Ontario), MA (London), PhD (Michigan)

Adjunct Faculty
E.P. Patterson, BA (Baylor), MA (Kansas), PhD (Washington), (Professor Emeritus)

Faculty Members holding cross appointment to History from:
1 Classical Studies
2 Systems Design Engineering
3 Religious Studies

'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

History

Associate Professor, Department Chair
D.E. Wright, BA (Cambridge), PhD (McMaster)

Professor, Undergraduate Officer
P.J. Harrigan, BA (Detroit), AM, PhD (Michigan)

Professor, Graduate Officer
R.C. MacGillivray, BA (Queen's) AM, PhD (Harvard)

Professors
M.J. Craton, BA (London), MA, PhD (McMaster) FRHistS
G. Cuthbert Brandt, BA (Toronto), MA (Carleton), PhD (York), R
J.R. English, BA (Waterloo), AM, PhD (Harvard), FRSC
P.Y. Forsyth, AB (Mount Holyoke), MA, PhD (Toronto), Recipient of the Distinguished Teacher Award
R.L. Fowler, BA, MA (Toronto), DPhil (Oxford)
K.M. McAulghlin, BA (Waterloo), MA (Dalhousie), PhD (Toronto), J
W.L. Mitchinson, BA, MA, PhD (York)
W.O. Pocklull, BA (Guelph), MA (Waterloo), PhD (Queen's), G

History

Associate Professor, Department Chair
D.E. Wright, BA (Cambridge), PhD (McMaster)

Professor, Undergraduate Officer
P.J. Harrigan, BA (Detroit), AM, PhD (Michigan)

Professor, Graduate Officer
R.C. MacGillivray, BA (Queen's) AM, PhD (Harvard)

Professors
M.J. Craton, BA (London), MA, PhD (McMaster) FRHistS
G. Cuthbert Brandt, BA (Toronto), MA (Carleton), PhD (York), R
J.R. English, BA (Waterloo), AM, PhD (Harvard), FRSC
P.Y. Forsyth, AB (Mount Holyoke), MA, PhD (Toronto), Recipient of the Distinguished Teacher Award
R.L. Fowler, BA, MA (Toronto), DPhil (Oxford)
K.M. McAulghlin, BA (Waterloo), MA (Dalhousie), PhD (Toronto), J
W.L. Mitchinson, BA, MA, PhD (York)
W.O. Pocklull, BA (Guelph), MA (Waterloo), PhD (Queen's), G

History

Associate Professor, Department Chair
D.E. Wright, BA (Cambridge), PhD (McMaster)

Professor, Undergraduate Officer
P.J. Harrigan, BA (Detroit), AM, PhD (Michigan)

Professor, Graduate Officer
R.C. MacGillivray, BA (Queen's) AM, PhD (Harvard)

Professors
M.J. Craton, BA (London), MA, PhD (McMaster) FRHistS
G. Cuthbert Brandt, BA (Toronto), MA (Carleton), PhD (York), R
J.R. English, BA (Waterloo), AM, PhD (Harvard), FRSC
P.Y. Forsyth, AB (Mount Holyoke), MA, PhD (Toronto), Recipient of the Distinguished Teacher Award
R.L. Fowler, BA, MA (Toronto), DPhil (Oxford)
K.M. McAulghlin, BA (Waterloo), MA (Dalhousie), PhD (Toronto), J
W.L. Mitchinson, BA, MA, PhD (York)
W.O. Pocklull, BA (Guelph), MA (Waterloo), PhD (Queen's), G
Independent Studies

Assistant Professor, Director
G.W. Hayes, 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 (Harvard 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)

International Studies

Assistant Professor, Director
G.W. Hayes, 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 (Harvard 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)

Kinesiology

Associate Professor, Department Chair
J.S. Frank, BSc, MSc (Waterloo), PhD (Southern California)

Associate Professor, Associate Chair, Undergraduate Studies
J.D. Williams, MS, PhD (Illinois)

Professor, Associate Chair, Graduate Studies
A.E. Patia, BTech (Indian Institute of Technology), MSc Eng (New Brunswick). PhD (Simon Fraser)

Associate Professor, Head of School of Anatomy
D.A. Hanney, 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 (Minnesota)
A. Bonen, BA (Waterloo), MSc, PhD (Illinois)
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. (Jyvaskyla)
E.A. Roy, BSc (Waterloo), MPE (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.R. Brawley, BPE (Calgary), MSc (Oregon), PhD (Pennsylvania State)
L. Hoffman-Goetz, BA (SUNY-Dinghampton), MA, PhD (Michigan)
S.M. McGill, BPE (Toronto), MSc (Ottawa), PhD (Waterloo)
R. Priddle, BPE (Toronto), MSc (Springfield), PhD (Waterloo)

Italian

Associate Professor, Undergraduate Officer
G.A. Niccoli, BA, MA, PhD (British Columbia), J

Associate Professor
V.F. Golini, BA (McMaster), MA (Colorado), PhD (California, Berkeley), J

'J' refers to faculty members at St. Jerome's College

Japanese

For faculty listing consult East Asian Studies.

Interdisciplinary Social Science

For faculty listing consult Social Development Studies.
University Faculty
Kinesiology - Management Sciences

Latin

For faculty listing consult Classical Studies.

Latin American Studies

Associate Professor, Director
M. Guillaume, BA, MA (McGill), PhD
(Laval), Recipient of the Distinguished Teacher Award

Professor
M.J. Craton, BA (London), MA, PhD
(McMaster), FRHistS

Associate Professors
A. Foran, BA (Brock), MA (Western Ontario), PhD (SUNY at Buffalo)
T. Horokvin, BA, MA (Moscow), MA, PhD (York)
C.A. Snyder, BA (Waterloo), MA, PhD
(McMaster), G

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Legal Studies

Committee Members

Associate Professors
C.G. Brunk, BA (Wheaton), MA, PhD
(Northwestern), G
F. Desroches, BA (Waterloo), MA
(Toronto), PhD (Waterloo), J
F.G. Reynolds, BSc, MSc (Manitoba),
FSA, FCIA, MAAA
J.A. Wahl, CR, BA (Western Ontario), MA,
PhD (St. Louis), J
R.P. Woolstenhulme, BA, PhD (Alberta)

Assistant Professor
S.P. Gunz, BA, LLB (Sydney), MBA
(Manchester)
E. Nelson, BA (Manitoba), PhD (London
School of Economics)

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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), Director of
Waterloo Management of Integrated
Manufacturing Systems Research
Group (WATMIMS)

M.J. Magazine, BS (City College of New
York), MS (New York University), MEng,
PhD (Florida), PEng

S.D. Saleh, BA (Cairo), MA, PhD (Case
Western Reserve)

G.N. Souls, BSc (Toronto), PEng,
(Professor Emeritus)*

R.G. Vickson, BSc (British Columbia),
PhD (Massachusetts Institute of
Technology)

Associate Professors
I. Bernhardt, BA (New York), PhD
(California, Berkeley)

D.M. Ditter, BSc (Calhoun Polytechnic),
MBA, PhD (Oregon)

Y. Gerchek, 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. Aslakson, BSc, MSc (Carleton Institute), PhD
(Carnegie Mellon)

C.G. Blake, BASc (Waterloo), MS (Johns
Hopkins), PhD (Waterloo), PEng

Korean

For faculty listing consult East Asian
Studies.

Assistant Professors
I. Bernhardt, BA (New York), PhD
(California, Berkeley)

D.M. Ditter, BSc (Calhoun Polytechnic),
MBA, PhD (Oregon)

Y. Gerchek, 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. Aslakson, BSc, MSc (Carleton Institute), PhD
(Carnegie Mellon)

C.G. Blake, BASc (Waterloo), MS (Johns
Hopkins), PhD (Waterloo), PEng
Adjunct Faculty
J.A. Buziak, BSc, BE (Sydney), MSc, PhD (Birmingham)
D.W. Conrath, BA (Stanford), MS (Carnegie Tech), MA, PhD (California, Berkeley), PEng
D. Gerwin, BS (Carnegie-Mellon), MS (Case Western), PhD (Carnegie-Mellon)
K.N. McKay, BM, MASc, PhD (Waterloo)
L. Purdy, BASc, MASc, PhD (Waterloo)
Y. Wu, BASc, MASc (China Textile University), PhD (Waterloo)

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)

Mathematics

(See also Applied Mathematics, Combinatorics and Optimization, Computer Science, Pure Mathematics, Statistics and Actuarial Science.)

Associate Professors
P.C. Brillinger, BA (McMaster), MA (Waterloo)
J.S. Devitt, BSc (Calgary), MSc (Calgary), PhD (Waterloo), (part-time)

Assistant Professor
C. Hewitt, BSc, MSc (Aberdeen), PhD (Waterloo)

Lecturers, Faculty of Mathematics
L.E. Davidson, BSc (Toronto)
R.G. Dunkley, BA (Western)
B.A. Ferguson, BM, Math, MMath (Waterloo), BED (Western)
R. Malinowski, BED (Western), BM, Math, MMath (Waterloo)
R.G. Soons, 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

Professor, Department Chair
R.J. Pick, BASc (British Columbia), MSc (Imperial College), PhD (Waterloo), PEng

Associate Professor, Associate Chair Undergraduate Studies
G.A. Davidson, BASc, PhD (Toronto), PEng

Professor, Associate Chair Graduate Studies
H.R. Martin, BSc, MSc (Queen's, Belfast), PhD (Nottingham), DSc (Queen's, Belfast), PEng

Distinguished Professor Emeritus
J.A. Schey, Dipl Ing, CSc (Budapest), Dr. Ing. h.c. (Stuttgart), Dr. Ing. h.c. (Miskolc), FASM, FSME, PEng

Professors
K.G. Adams, BSc (Queen's), MASc, PhD (Waterloo), PEng
G.C. Andrews, BSc (RMC), BASc, MASc (British Columbia), PhD (Waterloo), PEng
G.M. Bragg, BASc (Toronto), PhD (Cambridge), PEng
E. Rundin, BBA (Ontario Agricultural College), BASc, MASc, PhD (Toronto), PEng
D.J. Burns, BSc, PhD (Bristol), PEng, CEng
R.N. Dubey, BSc (Hons) (Patna), BSc (Eng) (Ranchi), PhD (Waterloo), PEng
W.W. Duley, BEng (McGill), DIC, PhD (Imperial College), DSc (University of London)
G. Glinta, MSc, PhD, DSc (Warsaw Technical University)
K.G.T. Hollands, BASc (Toronto), PhD (McGill), PEng, FOSME, FASME
J.H.G. Howard, BSc (HMC), BSc (Queen's), MSc, PhD (Birmingham), PEng
H.W. Kerr, BASc, MASc, PhD (Toronto), PEng
J.G. Lenard, BASc, MASc, PhD (Toronto), PEng

P. Niessen, BSc (McMaster), MASc, PhD (Toronto), PEng
A. Plumptre, BSc, PhD (Nottingham), PEng, CEng, FIM, FASME
G.D. Rainby, BSc, MSc (Western Ontario), PhD (Minnesota), PEng, Recipient of the Distinguished Teacher Award, FASME
G.E. Schneider, BASc, MASc, PhD (Waterloo)
P.R. Slaugan, BASc, MASc, PhD (Waterloo), PEng
A.B. Strong, BASc (Waterloo), MSc (Imperial College), PhD (Waterloo), PEng
H.F. Sullivan, BASc (Waterloo), AM, PhD (Princeton), PEng
R.A. Varis, MSc, PhD (Warsaw Technical)
M.M. Yovanovich,1 BSc (Queen's), MS (Buffalo), ME, ScD (Massachusetts Institute of Technology), FAAAA, FAIAA, FASME

Associate Professors
S. Bodh, BTech (ITT, Kanpur), MASc (British Columbia), PhD (Victoria)
R.A. Fraser, BSc (Queen's), MSc, PhD (Princeton), PEng
M.F. Golnaraghi,2 BSc, MSc (Worcester Polytechnic Institute), PhD (Cornell)
J.P. Huissoon, BA, BAI, PhD (Trinity College, Dublin), PEng
F.M. Ismail, BSc, MASc (Alexandria), PhD (McMaster)
S.B. Lambert, BASc (Waterloo), MSc (Queen's), PhD (Waterloo)
J.B. Medley, BASc, MASc (Waterloo), PhD (Leeds), PEng
M. Ranksizbulut, BSc (Robert College), MSc (Middle East Technical), PhD (Northwestern), PEng
G.D. Stubley, BASc (Waterloo), MSc (Stanford), PhD (Waterloo), PEng
D.W.L. Wang,1 BE (Saskatchewan), MASc, PhD (Waterloo)
D.C. Weckman, BASc, MASc, PhD (Waterloo), PEng

Assistant Professor
E.J. Weckman, BASc, MASc, PhD (Waterloo)

Research Assistant Professor
A.P. Brunger, BASc, ME, PhD (Toronto), PEng

Adjunct Faculty
M. Abramian, BSc (Emory-Riddle Aeronautical), MASc, PhD (Waterloo)
R.G.R. Lawrence, QC, Recipient of the Distinguished Teacher Award

Laboratory Director
M. Kaplun, Dipl Ing (Holland), MASc (Waterloo)
Faculty Member of Mechanical Engineering holding cross appointment to:
1 Electrical and Computer Engineering
2 Physics

Faculty Member holding cross appointment to Mechanical Engineering from:
3 Physics
4 Electrical and Computer Engineering
*Also has Adjunct appointment

Music

Associate Professor, Department Chair
L.J. Enns, ARCT (Toronto), BSM (Canadian Mennonite Bible College), BMus (Wilfrid Laurier), MMus, PhD (Northwestern)

Associate Professors
D.B. Huron, BSc (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)

Assistant Professor
K.R. Hull, ARCT (Toronto), BA (Waterloo), BMus, MMus (Western Ontario), PhD (Princeton)

Part-time Lecturers
T. Kroetsch, BMus (Wilfrid Laurier), ARCT (Toronto), LTCL (London), LRSM (London)
A. Martin, ARCT, BMus (Toronto), MMus (Eastman)
S. Martin, BMus (Wilfrid Laurier), MMus (Toronto)
R. Ollakkala, BMus, MMus (Western Ontario), PhD (Illinois)
J. Tutu, BSc (Emmanuel), BMus (Wilfrid Laurier), MMus (Westminster)
M. Vander Woude, BA (Music), MFA (Music) (York)
M. Wood

Studio instructors
S. Adams, Guitar
H. Bauer, Vienna State Academy, Juilliard; Violin
J. Castello, BME (Hartford), MMus (Northwestern); Trombone
C. Coleman, BM, MM (New England Conservatory, Boston); Bassoon
C. Dennison, BMus (Toronto); French Horn
G. Greer, BMus (Toronto), Double Bass
M. Elligsen Hull, BSc (Waterloo); Voice
D. Haas, Kantor (Stuttgart); Harpsichord, Organ
J. Helmers, BMus (Queen's), MMus (Indiana); Cello
K. Hubley, BMus (Cincinnati)
T. Kroetsch, BMus (Wilfrid Laurier), ARCT (Toronto), LTCL, LRSM (London); Piano
D. Ludolph, BMus (Wilfrid Laurier); Voice
J. Vaness, BMus (Toronto); Tuba
J. Mason, BM ( Shenendoah Conservatory), MM (Catholic University, Washington); Oboe
S. Mogensen, ARCT (Toronto), Artist Dip (London); Piano

T. Prudom, ARCT, BMus (Queen's), MMus (Western Ontario); Clarinet
D. Pullen, Saxophone
J. Rodrigues, Flute
J. Tickner, Trumpet
M. Wood, Percussion

Native Studies

For faculty listing consult Anthropology.

Optometry

Professor, Director, The School of Optometry
J.G. Sivak, LScO (Montreal), MS (Indiana), PhD (Cornell), OD (Pennsylvania College of Optometry), FAAO

Associate Professor, Associate Director
J.G. Strong, OD, MSc (Waterloo)

Lecturer, Undergraduate Officer
L. Sorbara, OD, MSc (Waterloo), FAAO

Professor, Undergraduate Officer
T.D. Williams, OD (College of Optometry of Ontario), MS, PhD (Indiana), FAAO, Recipient of the Distinguished Teacher Award

Associate Professors, Graduate Officers
W.R. Bobier, BSc (Queen's), OD, MSc (Waterloo), PhD (Cambridge), FAAO, MBCO
M.J. Doughty, BSc (London), MSc, PhD (Warwick), FAAO

Professor, Admissions Officer
M.J. Cullender, BSc (Concordia), OD, MSc (Waterloo), MPhil (Aston), FAAO

Associate Professor, Admissions Officer
M.M. Spatford, OD, MSc (Waterloo), Recipient of the Distinguished Teacher Award

Lecturer, Clinic Director
R. Pace, OD (Waterloo), FAAO

Lecturer, Assistant Clinic Director
K. Hadley, OD (Waterloo)
University Faculty
Optometry

Distinguished Professors Emeriti
E.J. Fisher, BA, MA (Toronto), DSc (Pennsylvania College of Optometry), FAAO*
W.M. Lyde, OD (College of Optometry of Ontario), MS, PhD (Indiana), FAAO*

Professors
W.K. Adrian,3 Dipl-Ing, Dr-Ing (TH Darmstadt), Dr habil, apl Professor (Karlsruhe), FIES, PENg
A.P. Cullen,4 Dip Opt (City University-London), MSc (Saskatchewan), OD (Pennsylvania College of Optometry), PhD (City University-London), FAAO, FBCO, DCLP
G.C. Woo, OD (College of Optometry of Ontario), MS, PhD (Indiana), LOSc (Melbourne), FVOO, FAAO, DiplV

Associate Professors
R.D. Beauchamp,2 BA (McMaster), MA, PhD (Brown)
M.C. Campbell,5 BSc (Toronto), MSc (Waterloo), PhD (ANU), FAAO, NSERC University Research Fellow
B.R. Chou, BSc (Toronto), OD, MSc (Waterloo), FAAO
D.Dilts,1 BS (California Polytechnic State University), MBA, PhD (Oregon)
J.G. Flanagan, BSc (Optom), PhD (Aston), Adjunct Associate Professor, Dept. of Ophthalmal. U. of T., MBCO, FAAO
D. Fonn, Dip Optom (S.A.), M Optom (NSW), FAAO
D.A. Ranney,8 BA, MD (Toronto), FRCS (England)
K.M. Robertson, OD, MSc, PhD (Waterloo), FAAO
R.D. Seim,9 BA (Queens'), PhD (Waterloo)

Assistant Professor
D.B. Elliott, BSc (Optom), PhD (Bradford), MBCO, FAAO
J.K. Hovis, OD, MS (Ohio State), PhD (Indiana), FAAO
B.E. Robinson, OD (Waterloo), MPH, PhD (Washington), FAAO

Research Assistant Professors
M. Atkinson, BSc (Western), MSc, PhD (Waterloo)
T. Simpson, Dip Optom (S.A.), MSc, PhD (Houston)

Assistant Professor (Part-time)*
B. Sivak, BPT (McGill), MSc, PhD (Waterloo)

Lecturers
D.B. Buck, OD (College of Optometry of Ontario), FAAO
M. Elliott, BSc (Optom) (Bradford), MSc (Waterloo), MBCO
P.K. Hrynchak, OD (Waterloo), FAAO

S.J. Leat, BSc (Optom) (UMIST), PhD (UWIST), FBCO
A.D. Plotkin, BS (Adelphi), BS, OD (Pennsylvania College of Optometry), MSc (Waterloo)
C.L. Prokopach, BSc, OD (Waterloo)
R. Wiggins, BS, OD (Indiana)

Adjunct Faculty
I. Baker, OD (College of Optometry of Ontario), FAAO
R.L. Beadleis, BS (N.C. State University), MS (Pittsburgh)
R.L. Brilliant, BS (SUNY at New Paltz), BS, OD (Pennsylvania College of Optometry), FAAO
E. Ellis, BSc, MSc, PhD (Massachusetts)
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 (Worcester), MS (Berkley), OD (New England College of Optometry)
T. Liu, BSc Med (Hons), MB, BS (Sydney), FRACP, FRCP(C)
R. Munger, BSc (Universite du Quebec a Chicoutimi), MSc, PhD (Waterloo)
G. Orsborn, MSc, OD (Ohio State University)
J. Pokar, BA (Prensylvania), MS (Georgetown), PhD (North Carolina)
A. Remole, BFA (Manitoba), OD (College of Optometry of Ontario), MS, PhD (Indiana), FAAO (Professor Emeritus)
B. Schumacher, MD (Toronto)
G. Trope, MB, Bch (S.A.), FRCS, PhD (Glasgow), FC Ophthalm (UK)
P.B. Waind, BSc (Toronto), MD (McMaster), FRCS(C)
C. Westall, BSc (City University), MSc (Indiana), PhD (Berkeley)
D. Witzakker, BSc, PhD (Bradford), MBCO
J. Wild, BSc (Optom) (City University, London), MSc, PhD (Aston), FBCO
B.P. Wilcock, DVM (Guelph), MS, PhD (Purdue)
M.E. Woodruff, OD (College of Optometry of Ontario), PhD (Indiana), FAAO (Professor Emeritus)
S.G. Zuntos, BScOptom, PhD (NSW), FAAO
S. Zigman, BA (Cornell), MS, PhD (Rutgers), FAAO

Faculty Members of Optometry holding cross appointments to:
1 Biology
2 Health Studies and Gerontology
3 Systems Design Engineering
4 Psychology
5 Physics

Faculty Members holding cross appointments to Optometry from:
6 Management Sciences
7 Kinesiology
8 Psychology

* Part-time Definite Term Appointment

Clinical Faculty – Part-time
W.B. Andrews, BA, OD (Waterloo), FAAO
A. Baldock, OD (College of Optometry of Ontario)
A. Bernardi, BSc, OD (Waterloo)
D.R. Bock, OD (Waterloo)
K. Burns, BSc (Western), OD (Waterloo)
K. Chhatwal, OD (Waterloo)
C. Dessureault, OD (Waterloo)
P. Devenny, BSc, OD (Waterloo)
J.L. Dippel, OD (Waterloo)
G. Gies, OD (Waterloo)
D.R. Goemans, 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)
C. Matyas, OD (Waterloo)
S.J.P. Monteiro, BSc, OD (Waterloo)
J. Newman, OD (Waterloo)
R.J. Scheid, OD (Waterloo)
S. Tait, OD (Waterloo)
R.J. Tarianni, OD (Waterloo), FAAO
V. Timpano, OD (Waterloo)
J. Wilkinson, BSc (University of Kent at Canterbury), OD (Waterloo)
D. Williams-Lyn, BSc (Optom), MSc (UWIST, Cardiff), PhD (Aston), FAAO
R.L. Wilson, OD (Waterloo)
M. York, OD (Waterloo)
G. Yung, OD (College of Optometry of Ontario)

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The School of Optometry Advisory Council was established in 1994 to provide liaison between the School of Optometry and its corporate supporters. Current council members are:
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Lorraine Johnson, Ciba Vision
Richard Kinch, Vistakon
Sheldon Kovesky, Allergan
Gary Orsborn, Bausch and Lomb
John Uhrig, K-W Optical
University Faculty
Peace and Conflict Studies - Philosophy

**Peace and Conflict Studies**

Associate Professor, PACS Faculty Group Chair
C.G. Brunk, BA (Wheaton), MA, PhD (Northwestern), G

Associate Professor, Director of the Program
R.J.R. Mathies, BA (Waterloo), MSc (Guelph), EdD (Toronto), G

Assistant Professor, Undergraduate Officer
T.R. Yoder Neufeld, BA (Manitoba), MDiv, ThD (Harvard), G

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Professors
J.G. Holmes, BA, MA (Carleton), PhD (North Carolina)
K. Westphues, 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.D. Moul, BA, MA, PhD (British Columbia)
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 State), R

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

Director
R.J.R. Mathies, BA (Waterloo), MSc (Guelph), EdD (Toronto), G

Research Associates
E.E. Regehr, BA (Waterloo), LLD (Wilfrid Laurier), Funded by Project Ploughshares, G

D.E. Peachey, BA (Eastern Mennonite College), MA, PhD (Waterloo), Funded by The Network: Interaction for Conflict Resolution, G

'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.

**Personnel Studies**

Associate Professor, Program Director
S.W. Kardash, BA (Loyola), PhD (Queen's, Kingston)

**Philosophy**

Associate Professor, Department Chair
J.W. Yan Evan, BA (Valparaiso), MA, PhD (Michigan State)

Associate Professor, Associate Chair and Undergraduate Officer
W.R. Abbott, BA (Kenyon), PhD (Ohio State)

Associate Professor, Associate Chair and Graduate Officer
J.A. Novak, BA (DePaul), PhD (Notre Dame)

Professors
E.J. Ashworth, BA, MA (Cambridge), PhD (Bryn Mawr), FRSC
F.F. Centore, BSc (Canisius), MA (Maryland), PhD (St. John's), J
R.A. George, MA, PhD (Michigan State)
L.L. Haworth, BA (Rollins), MA, PhD (Illinois), FRSC
B.P. Hendley, BA (Marquette), MA, PhD (Yale)
J.R. Horne, BA, MA (Western Ontario), BTh (Huron), PhD (Chicago)
A. Kerr-Lawson, BA (Toronto), MA (Chicago), PhD (McMaster)
J.T. Harnes, BA (Chicago), MA, PhD (Harvard), FRSC
D.D. Roberts, BA (Rutgers), MA, PhD (Illinois)

P. Thagard, BA (Saskatchewan), BA, MA (Cambridge), MS (Michigan, Ann Arbor), MA, PhD (Toronto)

Associate Professors
C.G. Brunk, BA (Wheaton), MA, PhD (Northwestern), G
G.T. Campbell, BA (Western Ontario), PhL, PhD (Laval), J, Recipient of the Distinguished Teacher Award
D.T. DeMarco, BA (Stonehill, Mass.), MA, PhD (St. John's), J
R.H. Holmes, BA, MA (Montana), PhD (Washington)
A.C. Minas, BA, MA, PhD (Harvard)

Assistant Professors
R.A. Nulbrow, BA (Bishop's), MA, PhD (Carleton)
J. Wubrig, BA (Swarthmore), MA, PhD (Yale)

Faculty Member of Philosophy holding cross appointments to:
1 Computer Science and Psychology

Faculty Members holding joint appointments to Philosophy from:
2 Pure Mathematics
3 Political Science

'G' refers to faculty members at Conrad Grebel College.

'J' refers to faculty members at St. Jerome's College.
University Faculty
Physics
Planning, Urban and Regional

Physics

Professor, Department Chair
J.R. Lepock, BS, MS (West Virginia), PhD (Pennsylvania State)

Associate Professor, Associate Chair of the Department
D. Hemming, BSc, PhD (Riedl)

Associate Professors, Undergraduate Officers
J.K. Brandon, BSc, PhD (McMaster), MA (Cambridge)
K.A. Woolner, BSc (London)

Professor, Graduate Officer
W.W. Duley, BEng (McGill), DIC, PhD (Imperial College), DSc (University of London)

Professor, Director (GWP)2
B.H. Torrie, BASc (Toronto), PhD (McMaster)

Distinguished Professors Emeritis
R.A. Aziz, BA, MA, PhD (Toronto)
W.B. Pearson,2 DFC, MA, DSc (Oxford), DSc (Waterloo), FRSC, FOCI*
S.F. Wang, DSc (Nagoya)

Professors
A. Anderson, MA, DPhil (Oxford), Recipient of the Distinguished Teacher Award
P. Bernath, BSc (Waterloo), PhD (Massachusetts Institute of Technology)
F.W. Boswell, BA, MA, PhD (Toronto), (Professor Emeritus)∗
D.E. Brodie, BSc, MSc, PhD (McMaster)
J.M. Corbett, BASc (Toronto), MSc, PhD (Waterloo)
J.A. Cowan, BSc (Manitoba), MA, PhD (Toronto), (Professor Emeritus)∗
S.G. Davison, PhD, DSc (Manchester)
A.E. Dixon, BSc (Mt. Allison), MSc (Uathouse), PhD (McMaster)
M.P. Vatter FitzGerald, BSc, MSc (Toronto), (PhD Case)
F.O. Goodman, BSc, PhD, DSc (London), FinstP, FAIP
J. Grindlay, BASc (Waterloo), DPhil (Oxford)
J.W. Hephburn, BSc (Waterloo), PhD (Toronto)
N.R. Isenor, BSc (Acadia), MSc, PhD (McMaster), (Professor Emeritus)
J. Kruuv,1 DASc (Waterloo), PhD (Western Ontario)
J.W. Leech, BSc, PhD (London), FinstP, (Professor Emeritus)∗
J.D. Leslie, BASc (Toronto), MS, PhD (Illinois)
S.P. Liphitz, BSc (Natal), MSc (South Africa), PhD (Witwatersrand)

W.K. Liu,2,3 BSc, MS, PhD (Illinois)
R.B. Mann,2 BSc (McMaster), MSc, PhD (Toronto)
F.R.W. McCourt,6 BSc, PhD (British Columbia)
R.G. McLennan,6 MSc (Queen's), PhD (Cambridge)
R.A. Moore, BSc, MSc (McMaster), PhD (Alberta)
A.D.S. Nagi, BA, BSc, MSc (Panjab), PhD (Delhi)
J.L. Ord, BASc (Toronto), MS, PhD (Illinois)
R.K. Pathre, BSc, MSc (Panjab), PhD (Delhi), Recipient of the Distinguished Teacher Award
M.M. Pintar, BSc, MSc, PhD (Ljubljana)
J.J. Sloan,6 BSc, PhD (Queen's)
H.J.T. Smith, BSc, PhD (London)
J. Vanderkooy, BEng, PhD (McMaster)
P.S. Wesson, BSc (London), PhD (Cambridge), FRAS

Associate Professors
M.C. Campbell,7 BSc (Toronto), MSc (Waterloo), PhD (Australian National University), FAAO
P.C. Eastman, BSc, MSc (McMaster), PhD (British Columbia)
H.K. Ellenton, BSc (Western Ontario), MA (Toronto), (Professor Emeritus)
M. Fich, BSc (Waterloo), MSc, PhD (California, Berkeley)
G.L. Harris, BA (Mount Holyoke College), MA (Wesleyan), PhD (Toronto)
K.L. Leung,6 BSc, PhD (British Columbia)
C.C. Lim, BA (DePauw), MA (Nebraska), PhD (Toronto), (Professor Emeritus)∗
H.M. Morrison, BSc, PhD (Edinburgh)
L.F. Nazar,5 BSc (British Columbia), PhD (Toronto)
H. Peemoeller, BSc (Winnipeg), MSc (Victoria), PhD (Waterloo), NSERC University Research Fellow

Assistant Professors
Z.Y. Chen, BSc (China), PhD (Maryland)
M.F Golinaragli,6 BSc, MSc (Worcester), PhD (Cornell)
G. Schulz, BSc (Simon Fraser), MSc (McMaster), PhD (Simon Fraser)

Adjunct Faculty
J.A. Blackburn, BSc (Manitoba), MSc, PhD (Waterloo)
W.J. Ruyers, BSc, PhD (Aberdeen)
J.J. Dubowski, BSc (Nottingham), MSc, PhD (Manitoba), National Research Council
P.A. Egelstaff, BSc, PhD (London), FRSC
W.E. Harris, BSc (Alberta), MSc, PhD (Toronto)
H.H. Joch, BSc (Waterloo), MSc, PhD (Guelph)
J. Lit, BSc, DipEd (Hong Kong), DSc (Laval)
F. Marsiglio, BASc (Toronto), MSc, PhD (McMaster)
B.M. Powell, BSc, PhD (London)
A.P. Roth, Maîtrise (Nancy), Doctorat de 3ème Cycle (Rennes), PhD (Ottawa), National Research Council
A. Rudin, BSc (Alberta), PhD (Northwestern)
E.C. Svensson, BSc (New Brunswick), PhD (McMaster)
P. Tikuisis, PhD (Toronto)
Z. Tun, BSc (Burma), PhD (McMaster)
M.S. Wartak, MSc, PhD (Poland)
J. Webb, BSc, PhD (Waterloo), National Research Council

Senior Demonstrators
A.B. Haner, BSc, MSc (Waterloo)
U.S. McVicar, BSc (Waterloo)

Demonstrators
J.L. Gardiner, BSc (Waterloo)
C.R. Jayasundera, BSc (Waterloo)

Faculty Members of Physics holding cross appointments to:
1. Biology
2. Chemistry
3. Applied Mathematics
4. Mechanical Engineering

Faculty Members holding cross appointments to Physics from:
* Also has Adjunct appointment
5. Applied Mathematics
6. Chemistry
7. Optometry
8. Mechanical Engineering

Planning, Urban and Regional

Associate Professor, Director, The School of Urban and Regional Planning
R.T. Newkirk,2 BA, MSc, PhD (Western Ontario)

Associate Director
To be announced

Professor and Undergraduate Officer
J.B. Theberge,1 BSCa (Guelph), MSc (Toronto), PhD (British Columbia)

Associate Professor, Graduate Officer
B. Moore Milroy, BA (McGill), MURb (Manitoba), PhD (British Columbia), MCIP, CPPI
University Faculty
Planning, Urban and Regional - Psychology

Distinguished Professor Emeritus
L.O. Gertler, BA (Queen's, Kingston), MA (Toronto), FCIP

Professors
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)
N.E.P. Pressman, BArch (McGill), MArch, urb des (Cornell), Cert USP (Manchester), MCIP, AICP, AIU

Associate Professors
P. Fion, BA, MA (Laval), PhD (Kent, Canterbury)
G.B. Hall, BA (Otago, New Zealand), MA, PhD (McMaster)
M.E. Hight, BSc, MSc, PhD (McMaster)
S. Herzog, BArch (Toronto), MOAA
J.T. Horton, BA (Wheaton), MA (Northwestern)
B. Hyma, BSc, MSc (Madras), MA (Sheffield), PhD (Pittsburgh)
N.M. Lazarowich, BA (Saskatchewan), MA, MCP, PhD (Cincinnati)
R.C. Suffling, BSc Hons (Wales), PhD (Guelph)

Assistant Professors
M.C. Delgaaaw, BEd (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. Davidone, BA (Toronto), MA (Waterloo), PhD (Western Ontario), MCIP, OPPi
S. Garrod, BA (McMaster), LLB, MES (York)
W. Green, BES (Waterloo), MCIP, OPPi
P. Pickfield, 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

6 Faculty Member holding joint appointment with Environmental Studies
* Also has Adjunct appointment

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. Woolstencroft, BA, PhD (Alberta)

Professor, Graduate Officer
A.F. Cooper, BA, MA (Waterloo), DPhil (Oxford)

Distinguished Professor Emeritus
T.H. Quilter, BA (New Zealand), PhD (London)

Professors
A. Kapur, BA (Punjab), MA (George Washington), PhD (Carleton)
J.F. Kersell, BA, MA (Queen's, Kingston), PhD (London)
J.M. Wilson, BA, MA (Toronto)

Associate Professors
S.D. Burt, BA, MA (Waterloo), PhD (York)
T.J. Downey, BA (Waterloo), MA, PhD (Western Ontario), Recipient of the Distinguished Teacher Award
T. Korovkin, BA, MA (Moscow), MA, PhD (York)

Assistant Professors
J.S. Jaworsky, BSc (Ottawa), MA, PhD (Carleton)
M.R. Moore, BA, MA (Western Ontario), PhD (London)
R.A. Nuttbrown, BA (Bishop's), MA, PhD (Carleton)

Adjunct Faculty
G.W. Corby, BA (Wilfrid Laurier), LLB (Western Ontario), LLM (London)
W.W. Johnston, QC, BA (Memorial), LLB (Queens), LLM (British Columbia)
P.J.P. Speyer, BA, LLB (Toronto)

Faculty Member of Political Scienceholding cross or joint appointment to:
1 Philosophy

Print Journalism

Professor, Director
A. Ages, BA (Carleton), MA, PhD (Ohio State)

Academic Board
University of Waterloo
M. Chichichou, lic. phy. (Buenos Aires), PhD (Cambridge)
N. Randall, BA (Guelph), MA (Waterloo), PhD (York)
B. Gluck, BSc (City College of New York), MSc, PhD (Waterloo)

Conestoga College
F. Harris, BA (British Columbia)
A. Jankowski, BA (McMaster), BJ (Carleton), MA (McMaster)
G. Frank, Journalism Dipl. (Ryerson)

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)

Associate Provost, Academic Affairs
R.K. Banks, BA, MA, PhD (Toronto)

Professor, University Dean of Graduate Studies
P.M. Rowe, BA (Toronto), MA (Dalhousie), PhD (McGill)
University Faculty
Psychology
Pure Mathematics

Professor, University Dean of Research (Interim)
T.G. Waller, BS (Southern Mississippi), PhD (Vanderbilt)

Associate Professor, Director TRACE, Academic Director Independent Studies
G.A. Griffin, BA (Colgate), MA, PhD (Wisconsin), Recipient of the Distinguished Teacher Award

Associate Professor, Distance Education Advisor, TRACE
R.D. Saim, BA (Queen's), PhD (Waterloo)

Distinguished Professors Emeriti
D.P. Crowne, BA (Antioch College), EdM (Rochester), PhD (Purdue)
J.E. Orlando, BA (Western Ontario), MA (Detroit), MA, PhD (Michigan), J
J.C. Bowers, BA (Queen's), MA, PhD (California, Los Angeles)
P.J. Nau, BA, MA, PhD (Nijmegen), J
J.E. Orlando, BA (Western Ontario), MA (Dartmouth), PhD (Waterloo), J

Distinguished Teacher Award
J. Michela, BS (Maryland), MA, PhD (California, Los Angeles)

Assistant Professors
R. Bobb, BSc (Alberta), MA, PhD (Waterloo)

Faculty Members of Psychology holding cross appointments to:

1. Optometry
2. Health Studies and Gerontology
3. Systems Design Engineering

Faculty Members holding cross appointments to Psychology from:

4. Kinesiology
5. Statistics
6. Health Studies and Gerontology
7. Computer Science
8. Philosophy
9. Optometry
10. 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
J.W. Lawrence, BSc Hons (Carleton), MSc (McGill), PhD (Carleton)

Associate Professor, Associate Chair for Undergraduate Affairs
B.E. Forroot, BSc, MSc, PhD (Alberta)

Associate Professor, Associate Chair for Graduate Affairs
K.E. Hare, BM (Waterloo), PhD (British Columbia)

Distinguished Professor Emeritus
J.D. Aczel, BA, MA, PhD (Budapest), Habil DSc (Hungarian Academy of Sciences, FRSC

Professors
J.A. Baker, BA, MA, PhD (Saskatchewan), PhD (Waterloo)
S.N. Burris, BBSc, MA, PhD (North Carolina)
L.J. Cummings, BSc (Roosevelt), MSc (de Paul), PhD (British Columbia)
K.R. Davidson, BM (Waterloo), PhD (California, Berkeley), FRSC
D.Z. Djokovic, BSc, PhD (Belgrad)
W.J. Gilbert, BA, MA (Cambridge), DPhil (Oxford)
D.A. Higgs, BSc Honours (Witwatersrand), MA (Cambridge), PhD (McMaster), on leave
P.N. Hoffman, BA (Toronto), PhD (Manchester)
P. Kannappan, BSc Hons (Annamalai), PhD (Washington)
A. Ken-Lawson, BA (Toronto), MA (Chicago), PhD (McMaster)
C.T. Ng, BSc (Chinese University of Hong Kong), MM (Waterloo)
V.P. Platonov, PhD, DSc (USSR) Academic of Sciences, Novosibirsk)
C.L. Stewart, BSc (British Columbia), MSc (McGill), PhD (Cambridge), FRSC
F.C.Y. Tang, BSc (Hong Kong), MS (South Carolina), PhD (Illinois)
F.A. Zorzitto, BSc (Waterloo), MSc, PhD (Queens), Recipient of the Distinguished Teacher Award

Associate Professors
L.L. Dickey, BSc, MA (Arizona), PhD (Wisconsin)
E.M. Moskal, BA (Toronto), PhD (Illinois)
University Faculty
Recreation and Leisure Studies - Russian and East European Studies

Assistant Professors
S.-Y. Lu, BA (McGill), MA (Harvard), PhD (Harvard)
R.D. Willard, BA (Carleton, Minnesota), MA (Toronto), MMath, PhD (Waterloo)
X. Zhang, BSc (Nanjing) PhD (British Columbia)

Assistant Professor
L. Heywood, BA (North Dakota), MA (Florida State), PhD (Wisconsin)

Adjoint Faculty
E.M. Avedon, BSS (William and Mary), MA, EdD (Columbia)
D. Reid, MA, PhD (Waterloo)

Adjunct Faculty
J. Fast, BA (Waterloo), MDiv (Mennonite Brethren Biblical Seminary), PhD (Redpath 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

Recreation and Leisure Studies

Professor, Department Chair
M.W. Higgins,2 BA (St. Francis Xavier), MA, PhD (York), J

Associate Professor and Undergraduate Officer
J. Gollnick, BA (Marquette), MA, PhD (Toronto), P

Professors
M.S. Bird,1 BA, MA, PhD (Iowa), R
M.D. Bryant, BA (Concordia College), STB (Harvard), MA, PhD (St. Michael's), R
D.J. Sahas, BA (Athens), STM (Christian Theological Seminary), PhD (Hartford Seminary Foundation)

Associate Professors
R.D. Legge, BA (Transylvania), STB (Harvard), PhD (McMaster), P
M.T. Malone,3 BA (University College, Dublin), MA, PhD (Toronto), J, Recipient of the Distinguished Teacher Award
A.J. Reimer, BChEd (Canadian Mennonite Bible College), BA (Manitoba), MA (Toronto), PhD (St. Michael's), G
T. Yoder Neufeld, BA (Manitoba), MDiv, ThD (Harvard), G

Assistant Professor
L. Dawson,4 BA (Queen's), MA, PhD (McMaster)

Lecturer
C. Varin-Bishop, BA (Waterloo), MDiv (Toronto), J

Russian

Associate Professor, Department Chair
M.W. Higgins,2 BA (St. Francis Xavier), MA, PhD (York), J

Associate Professor and Undergraduate Officer
J. Gollnick, BA (Marquette), MA, PhD (Toronto), P

Professors
M.S. Bird,1 BA, MA, PhD (Iowa), R
M.D. Bryant, BA (Concordia College), STB (Harvard), MA, PhD (St. Michael's), R
D.J. Sahas, BA (Athens), STM (Christian Theological Seminary), PhD (Hartford Seminary Foundation)

Associate Professors
R.D. Legge, BA (Transylvania), STB (Harvard), PhD (McMaster), P
M.T. Malone,3 BA (University College, Dublin), MA, PhD (Toronto), J, Recipient of the Distinguished Teacher Award
A.J. Reimer, BChEd (Canadian Mennonite Bible College), BA (Manitoba), MA (Toronto), PhD (St. Michael's), G
T. Yoder Neufeld, BA (Manitoba), MDiv, ThD (Harvard), G

Assistant Professor
L. Dawson,4 BA (Queen's), MA, PhD (McMaster)

Lecturer
C. Varin-Bishop, BA (Waterloo), MDiv (Toronto), J

Russian and East European Studies

Associate Professor, Director
R. Karpia, BA, MA (Manitoba), PhD (Ottawa)
University Faculty
Sexuality, Marriage and the Family (Studies in) - Sociology

K. Mott, BA (Wilfrid Laurier), RD (Union Theol. Vancouver), MSW (SUNY, Buffalo), R

Adjunct Assistant Professors

B. Abbott, BA (Waterloo), MSW (Wilfrid Laurier), R
J. Bawden, BA, MA (Guelph), PhD (Windsor), R
B. Bel-Rowbotham, BA, MA (Western Ontario), R
L. Fusco, BA (Hofstra), MA (Chicago), R
D. Payne, BA (Sir George Williams), MSW (Wilfrid Laurier), R
M. Thompson, 5th (Wycliffe), RN (Wellesley), BA (Waterloo), MSW (Wilfrid Laurier), R

Lecturers

J. Boyd, BA (Guelph), MSW (Wilfrid Laurier), R
S. Burke, BA (Toronto), MA (McMaster), PhD (Carleton)
S. Campbell, BA (Waterloo), MSW (Wilfrid Laurier), R
R. Cardey, BA (Waterloo), MA, PhD (Saskatchewan), CPsych
H. d’Alluy, BA (Taiwan), MED, PhD (Western)
P. Derry, BA, MA, PhD (Western Ontario), CPsych
R. Finch, BA (Waterloo), MSW (Wilfrid Laurier), R
C. Gillin-Garling, BSc (Pittsburgh), MA, PhD (Windsor), R
P. Gove, BA (Waterloo), MSW (Wilfrid Laurier), R
C. Hollidge, BA (Waterloo), MSW (Wilfrid Laurier), R
C. Kelley, BA (Johns Hopkins), MA (Maryland), MA (Waterloo)
J. Turner, BA, BSW, MSW (Toronto), R
V. Well, BA, MSW (Toronto), R
A. Wilson, BA (Clarke), MA, Iowa, MSW (Wilfrid Laurier), R
M. Zack, BSc (Toronto), MASC (Waterloo)
J. Zinkann, BA (Toronto), LLB (Osgoode), MWS (Wilfrid Laurier), R
L. Zinkann, BA, MA, MSW (Wilfrid Laurier), R

Faculty Members of Renison College holding cross appointments to:

1. Religious Studies
2. Psychology
3. Sociology
4. Fine Arts
5. History

‘R’ refers to faculty members at St. Jerome’s College

Social Work

For faculty listing consult Social Development Studies.

Society, Technology and Values

Associate Professor, Acting Director, Option Co-ordinator

S.C. Lerner, BA (Ohio State), MA (Columbia), Recipient of the Distinguished Teacher Award, Environment and Resource Studies

Associate Professor

N.R. Ball, BA (McMaster), MA, PhD (Toronto), Systems Design Engineering, Northern Telecom Professor of Engineering Impact on Society

Lecturers

D. Powell, BSc (Guelph)
D. Pullman, RRF (Rimncrest), RFrd (Western Ontario), MDiv (Biola), MA, PhD (Waterloo)

Sociology

Professor, Department Chair

R.D. Lambert, BA, MA (McMaster), PhD (Michigan)

Assistant Professor, Associate Chair for Undergraduate 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. Falliding, 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)

Assistant Professor

R. Lahue, BSc (Fordham), PhD (Waterloo), R (on leave)
J. Miller, BA, BLS (McGill), MA, MPhil (Waterloo), PhD (York), FRSA, R
M.I. Nagler,2 BA (British Columbia), MA (Chicago), PhD (Stirling, UK), R
M. Zennier, BA (Temple), MSW (Kansas), R (on leave)

Assistant Professors

T. Brenner, BA (Waterloo), MSW (Wilfrid Laurier), R
J. Majonis, BA, MA (CUNY), MSW (SUNY, Albany), PhD (Toronto), R

Assistant Professors

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‘Timkulu, BA, MA (South Africa), MA (Yale), PhD (Natal), R

Professors

M.S. Bird,4 BA, MA, PhD (Iowa), R
M.D. Bryan, BA (Concordia College), STB (Harvard), MA, PhD (St. Michael’s), FRSA, R
G. Cuthbert Brandt,5 BA (Toronto), MA (Carleton), PhD (York), R
J.O. Towler, BA (Toronto), MEd, PhD (Alberta), R

Associate Professors

R. Lahue,2 BSc (Fordham), PhD (Waterloo), R (on leave)
J. Miller, BA, BLS (McGill), MA, MPhil (Waterloo), PhD (York), FRSA, R
M.I. Nagler,2 BA (British Columbia), MA (Chicago), PhD (Stirling, UK), R
M. Zennier, BA (Temple), MSW (Kansas), R (on leave)

Assistant Professors

T. Brenner, BA (Waterloo), MSW (Wilfrid Laurier), R
J. Majonis, BA, MA (CUNY), MSW (SUNY, Albany), PhD (Toronto), R

Social Development Studies

Associate Professor, Associate Dean

M. Smyth, BA (Toronto), MA, PhD (York), R

Associate Professor, Associate Chair for Undergraduate 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. Falliding, 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)
Spanish and Latin American Studies

Associate Professor, Department Chair
A. Forni, 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. Sillain, Licenciaturas (UNR, Argentina), MA, PhD (Toronto)

Language Instructor
P. Graham, BA (McMaster)

Participating Adjunct Faculty at Wilfrid Laurier University
Professor
A.A. Borrás, BA (Kentucky), MA, PhD (Penna., State) (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
K.P. Sharp, BA (Cambridge), MA (California, Berkeley), PhD (Waterloo), FCIA, FIA, FSA

Associate Professor, Associate Chair, Graduate Studies
J.B. Whitney, BA, MA (Western Ontario), PhD (Toronto)

Distinguished Professor Emeritus
V.P. Godambe, MSc, PhD (Bonnbay), PhD (London)

Professor, GMINSFRC Industrial Research Chair in Quality and Productivity
J.F. Lawless, BSc, MSc, PhD (Waterloo)

Assistant Professors
B. Abraham, BSc (Kerala), MSc (Guelph), PhD (Watsonis)
R.L. Brown, BMath (Waterloo), FSA, FCIA, ACAS
P.P. Boyle, BSc (Queen’s, Belfast), MSc, PhD (Trinity College, Dublin), FIA (London), FCIA
W.H. Cherry, BSc, PhD (Melbourne), Recipient of the Distinguished Teacher Award
V.T. Farewell, BMath, MMath (Waterloo), PhD (London), DIC (Imperial College)
K.W. Hipel, BASc, MSc, PhD (Waterloo)
J.D. Kalbfleisch, BSc, MMath, PhD (Waterloo), FRSC
J.G. Kalbfleisch, BSc (Toronto), MA, PhD (Waterloo)
D.L. McLeish, BSc (Queen’s), MSc (Toronto), PhD (McGill)
H.H. Panjer, BA, MA, PhD (Western Ontario), FSA, FCIA
K.R. Shah, BA, MA (Bonnay), PhD (Indian Statistical Institute)
C.G. Small, BSc, Regina), MSc (Alberta), PhD (Cambridge)
D.A. Sprott, BASc, MSc, PhD (Toronto), FRSC, FRPS
M.E. Thistlethwaite, BSc (Toronto), MSc, PhD (Illinois)
W.J. Welch, BSc (Loughborough, England), MS. PhD (London)
C.F.J. Wu, BSc (Taipei, Taiwan), PhD (California)

Assistant Professors
G.W. Bennett, BSc, BA, PhD (Adelaide)
M.A. Bennett, BA (Nottingham), FSA, FCIA
C.D. Cutler, BSc (Manitoba), MSc, PhD (Carleton)
M.S. Hamada, BS, MA (Maryland), PhD (Wisconsin)
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. Rickert, BSc, PhD (Waterloo)
J.C. Robinson, BASc, MSc, PhD (Waterloo)
C.A. Struthers, BMath, MMath, PhD (Waterloo), J
G.E. Willmot, BMath, MMath, PhD (Waterloo), FSA, FCIA
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. Cook, BSc (McMaster), MSc, PhD (Waterloo)
University Faculty
Systems Design Engineering

P.J. Farrell, BSc, MASc, MSc, PhD (McGill)
R.J. O'Hara Hines, BA (New Brunswick), MA (Queen's), MMath, PhD (Waterloo)
S. Wang, BSc (Beijing), MSc (Beijing, Saskatchewan), PhD (Waterloo)

Continuing Lecturer
C. Springer, BSc, MSc (McGill)

Adjunct Faculty
G.B. Chaplin, BA (Cambridge), MSc, PhD (Oxford)
Sir D.R. Cox, FRS, PhD (Cambridge)
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)

Faculty Members of Statistics and Actuarial Science holding cross appointments to:
1. Psychology
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

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**Systems Design Engineering**

**Professors**

W.K. Adrian, Dip-Ing, Dr-Ing (TH Darmstadt), Dr habil. (Karlsruhe)
M.P. Bryden, SB (Massachusetts Institute of Technology), MSc, PhD (McGill)
M. Chandrashekhar, BTech (Indian Institute of Technology, Kanpur), MSc, PhD (Waterloo), PEng
A.P. Cullen, Dip Opt (City University-London), MSc (Saskatchewan), OOb (Pennsylvania College of Optometry), PhD (City University-London), FAAO, FBCO, DCLP
K. Huseyn, MSc (Istanbul), PhD (London), DSc (Eng)/(London), PEng, Recipient of the Distinguished Teacher Award
M.E. Jernigan, SB, SM, PhD (Massachusetts Institute of Technology), PEng, Recipient of the Distinguished Teacher Award
J.F. Lawless, BSc, MSc, PhD (Waterloo)
J.E. Robinson, BSc (Waterloo), MES (York), PhD (Michigan)

**Associate Professors**

P.H.O.N. Roe, BASc (Toronto), MSc, PhD (Waterloo)
A.K.C. Wong, BSc, MSc (Hong Kong), PhD (Cambridge), PEng
D.T. Wright, Past President of the University, OC, BASc (Toronto), MS (Illinois), PhD (Cambridge), DEng (Carleton), LL.D (Brook), DSc (Memorial), LL.D (Concordia), LHD (Northeastern), DU (Strathclyde), Docteur H.C. (Compiegne, France), Docteur H.C. (Sherbrooke), DSc (McMaster), DSc (Queen's), FCAE, FEIC, FASCE, Life Member IABSE, PEng, APEO Gold Medal, CCPE Gold Medal

**Research Assistant Professor**

N.R. Ball, BA (McMaster), MA, PhD (Toronto)

**Adjunct Faculty**

J.J. McPhee, CASc (Acadia), BEng (Technical University of Nova Scotia), MSc (Waterloo), PhD (Waterloo)
K. Ponnambalam, BE (Madras), MSc (National University of Ireland), PhD (Toronto)

**Faculty Members of Systems Design Engineering holding cross appointments to:**
1. Statistics and Actuarial Science
2. Environment and Resource Studies
3. History
4. Earth Sciences
5. Mechanical Engineering

**Faculty Members holding cross appointments to Systems Design Engineering from:**
6. Optometry
7. Psychology
8. Statistics and Actuarial Science
9. Environment and Resource Studies

* Also has Adjunct appointment
Ukrainian

For faculty listing consult Germanic and Slavic Languages and Literatures.

Women's Studies

Associate Professor, Director
H.D. Lyons, BA (Columbia), MLitt, DPhil (Oxford)

Members of the Women's Studies Board
University of Waterloo
Professors
D.A. Counts, BS (W.S. Texas State University), MA (Kentucky), PhD (Southern Illinois)
A. Wipper, BA, MA (McGill), PhD (California, Berkeley)

Associate Professors
S. Vethamany-Globus, BSc, MA, MSc (Madras), PhD (Toronto)
M. Gutiérrez, BA, MA (McGill), PhD (Laval), Recipient of the Distinguished Teacher Award
B. Hyma, BS, MS (Madras), MA (Sheffield), PhD (Pittsburgh)
P.J. Naus, PhD (Nijmegan, The Netherlands)
C.A. Struthers, BMath, MMath, PhD (Waterloo)
N. Theberge, BA (Massachusetts), MA (Boston College), PhD (Massachusetts)

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:

1 Anthropology
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.

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Vice-Chairman, P.M. Koch
Secretary, L.H.P. Claxton

Ex Officio
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President, J. Downey
Mayor of the City of Waterloo, W.B. Turnbull
Mayor of the City of Kitchener, R. Christy
Regional Chairman, K. Seiling

From the Community-at-Large
E. Agnew, Toronto
W.J. Harper, Waterloo
R.J. Hunter, Toronto
C.J. Irwin, Toronto
P.M. Koch, Ottawa
D.G. McMullen, Toronto
P.H. Sims, Kitchener
P.B. Spafford, Toronto
G. Young, Toronto

Appointed by the Lieutenant-Governor-in-Council
M. Bales, Waterloo
C.S. Boyce, London
R.R. Mahabir, Toronto
P.A. McLagan, Toronto
S. Sharzer, Ottawa
C. VanEvery-Albert, Waterford

Staff
H. Hahn (Science)
B. Scott (Research)

From Senate
Faculty Members
J.A. Brox
P.Y. Forsyth
B.P. Hendley
A. Kerr-Lawson
D.R. Letson

Governing Bodies
Board of Governors
Senate

H.D. Lyons
F.R.W. McCourt

Undergraduate Students
S. Codrington
S. Du
I.R. Hosein

Graduate Students
D. Bauer
H. Goebelle

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
Chairman, J. Downey, BA, BEd, MA, PhD, DHL, DLitt, LLD
Vice-Chairman, 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
Chairman, Board of Governors, P.H. Sims, QC, LLB, BComm
President, J. Downey, BA, BEd, MA, PhD, DHL, DLitt, LLD
Vice-President, Academic & Provost, J.G. Kalbfleisch, BSc, MA, PhD
Associate Provost, Academic Affairs, R.K. Banks, BA, MA, PhD (term to June, 1995)
Associate Provost, Finance, D.J. Battae
Librarian, M.C. Shepherd, BEd, MA (LS)
Registrar, C.T. Boyes, BA
President, Faculty Association, J.A. Brox, BA, MA, PhD
President, Federation of Students, S. Codrington
President, Graduate Student Association, H. Goebelle, BA, BSc

The Principal or President of each Federated or Affiliated College
G. Cuthbert Brandt, BA, MA, PhD (Principal, Renison)
H. Kutz-Harder, BA, MA, PhD (Principal, St. Paul's)
D.R. Letson, BA, MA, PhD (President, St. Jerome's)
E.E. Regehr, BA, LLD (Interim President, Conrad Grebel)
### Governing Bodies

#### Senate

- 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
- Interim Dean of Research
  - T.G. Waller, BS, MS, PhD

#### Elected Members

**Faculty Representatives**
- To 1995
  - S.L.J. Smith, BA, MA, PhD (Applied Health Sciences)
  - R.P. Woolstencroft, BA, PhD (Arts)
  - A.B. Strong, BASc, MSc, PhD, PEng (Engineering)
  - J. Andrey, BA, MA, PhD (Environmental Studies)
  - C.J. Colbourn, BSc, MMath, PhD (Mathematics)
  - J. Vanderkooy, BEng, PhD (Science)
  - P.J. Naus, BA, PhD (St. Jerome's)
  - H. Froese Tiessen, BA, MA, PhD (Conrad Grebel)
  - M.T. Sharratt, BA, MA, PhD (Applied Health Sciences)
  - D.G. John, BA, MA, PhD (Arts)
- To 1996
  - M.T. Sharrett, BA, MA, PhD (Applied Health Sciences)
  - T.Z. Fahidy, BSc, MSc, PhD, PEng (Engineering)
  - A. Banerji, BArch, MArch (Environmental Studies)
  - J. Wainwright, BSc, PhD, Recipient of the Distinguished Teachers Award (Mathematics)
  - J.G. Strong, OD, MSc (Science)
  - M.W. Higgins, BA, BEd, MA, PhD (St Jerome's)
  - K. Mott, BA, BD, MSW (Renison)
- To 1997
  - A.M. Pedlar, BA, MA, PhD (St. Paul's)

**Student Representatives**
- To 1995
  - T. Huang (Engineering)
  - I.R. Hosein (Mathematics)
  - J. Pak (At large)
- To 1996
  - D. Bauer (At large)
  - E.S. Tony (At large)
- To 1997
  - G.R. Ahmed, BSc, MSc
  - S.M. Gabel Rab, BSc, MASc

**Alumni Representatives**
- To 1995
  - S. Marshall, BASc
  - D. Wing, RA
- To 1996
  - A. Beynon, BA
- To 1997
  - B.G. Rees

**Board of Governors Representatives**
- To 1995
  - Vacant
- To 1996
  - Vacant
- To 1997
  - 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 October, February, April and June.
University Offices

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J.F. Kates, BA, MA, PhD, PEng, FCMC, FEIC, LLD
J.P.R. Wadsworth, LLD

Chancellor
S. Ostry, CC, BA, MA, PhD, LLD, FRSC

Chair, Board of Governors
P.H. Sims, QC, LLB, BComm

President Emeritus
B.C. Matthews, BSA, AM, PhD, DU, LLD, FUG, PAg

President and Vice-Chancellor
J. Downey, BA, BEd, MA, PhD, DHL, DLitt, LLD

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
P.H. Dirksen, BSc, MA
Director
J.P. Sprung, BA, MA
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

FACULTY OF APPLIED HEALTH SCIENCES
R.W. Norman, BA, BPE, MSc, PhD, Docteur H.C.
Dean of Applied Health Sciences
R.C.A. Johnson, BA, MA, PhD
Associate Dean, Undergraduate Studies
M.T. Sharratt, BA, MA, 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
Dean of Arts
H.S. Fournier, BA, MA, PhD
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G.E. Slethaug, BA, MA, PhD
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
J.F. Williams, BA
Secretary and Administrative Officer
B.W. Zanna, BA, MAT
Arts Academic Counsellor
I. Mackay, BSc, MSc
Co-ordinator, Mature Student Services
J.J. Wyatt, BA
Curator, UW Art Gallery

FACULTY OF ENGINEERING
D.J. Burns, BSc, PhD, PEng, CEng
Dean of Engineering
G.E. Schneider, BASc, MSc, PhD
Associate Dean, Undergraduate Studies
T.Z. Fahidy, BSc, MSc, PhD, PEng
Associate Dean, Graduate Studies and Research
W.J. Wilson, BE, MSC, PhD
Associate Dean, Computing
J.D. Weller, BA, FCA
Executive Assistant to the Dean
M.E. Jemigan, BSc SM, PhD, PEng
Director of Admissions
K. Boucher, BASc, BEd
Associate Director of Admissions

FACULTY OF ENVIRONMENTAL STUDIES
J. Kay, BA, MS, PhD
Dean of Environmental Studies
G.R. McBoyle, BSc, PhD
Associate Dean, Undergraduate Studies and Educational Liaison
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Associate Dean, Graduate Studies and Research
G.B. Hall, BA Hons, MA, PhD
Associate Dean, Computing
J.M. Holzinger, BA  
Executive Assistant to the Dean

W. Hatch, BA, MA  
Environmental Studies Counsellor

FACULTY OF MATHEMATICS  
J.D. Kalbfleisch, BSc, MMath, PhD, FRSC  
Dean of Mathematics
J. Wainwright, BSc, PhD  
Associate Dean, Undergraduate Studies
K.R. Shah, BA, MA, PhD  
Associate Dean, Graduate Studies and Research
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Associate Dean, Computing,  
Director, Mathematics Faculty Computing Facility
R.G. Dunkley, BA  
Associate Dean, Faculty Programs
S.J. Thomson, BA, MA  
Executive Assistant to the Dean

FACULTY OF SCIENCE  
J.E. Thompson, BSA, PhD, FRSC  
Dean of Science
H.M. Morrison, BSc, PhD  
Associate Dean, Undergraduate Affairs
E.C. Appleyard, BSc, MSc, PhD  
Director of Admissions
C.A. Peterson, BSc, MSc, PhD  
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I.L. Gibson, BSc, PhD  
Associate Dean, Computing
J.G. Sivak, LScO, MS, PhD, OD, FAAO  
Associate Dean of Science for Optometry
R.J. Friesen, BSc, MSc  
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

UNIVERSITY GRADUATE OFFICE  
P.M. Rowe, BA, MA, PhD  
Dean of Graduate Studies
D.L. Judge  
Associate Registrar, Graduate Studies
R.E. Garner  
Graduate Awards Co-ordinator

UNIVERSITY SECRETARY  
P.M. Rowe, BA, MA, PhD  
Dean of Graduate Studies
D.L. Judge  
Associate Registrar, Graduate Studies
R.E. Garner  
Graduate Awards Co-ordinator

OFFICE OF RESEARCH  
T.G. Waller, BS, MS, PhD  
Interim Dean of Research
P. Clough  
Acting Manager, Research Financial Services
E.B. Cross, BASc, PEng  
Associate Director, Technology Transfer and Licensing

M.J. Hadley  
Associate Director, Research Grants
P. O'Neill, BA, MA  
Manager, International Programs
B.C. Scott, BMath, MASc, CGA  
Associate Director, Contract Research
J.P. Sprung, BA, MA  
Software Coordinator
S.E. Sykes, BA, MASc, PhD  
Manager, Office of Human Research and Animal Care
E. Davison, BSc, PhD, PEng  
NRC Industrial Technology Advisor
M.F. Brunkard  
Administrative Assistant

VICE PRESIDENT, UNIVERSITY RELATIONS  
R.G.H. Downer, BSc, MSc, PhD, DSc, FRSC  
Alumni Affairs
To be announced  
Director

development
To be announced  
Director

INFORMATION AND PUBLIC AFFAIRS  
M. Van Nierop, BA  
Director

SECRETARIA  
E.M. Barnes  
Associate University Secretary
R.J. Bulfin, RMath  
Associate University Secretary
D.P. Schelliele  
Associate University Secretary
T.L. Canning  
Assistant University Secretary

INTERNAL AUDIT  
J.E. Buschert, BA, CMA  
Director

SAFETY OFFICE  
K.A. Stewart, BA, CRSP  
Safety Director

SECURITY  
A.L. MacKenzie, BA  
Director

COORDINATOR, ETHICAL BEHAVIOUR AND HUMAN RIGHTS  
M.M. Erickson, BA

ASSOCIATE PROVOST, ACADEMIC AFFAIRS  
R.K. Banks, BA, MA, PhD

AUDIO-VISUAL CENTRE  
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Director
Co-operative Education and Career Services
B.A. Lumsden, BA
  Director
W.B. Fuller, BA
  Program Administrator, Applied Health Sciences
K.B. Kenning, BA
  Program Administrator, Arts
R.A. Klawitter, BA, CIM
  Program Administrator, Mathematics, Accounting
R.A. Pullin, BSA
  Program Administrator (Acting), Environmental Studies
R.A. Pullin, BSA
  Program Administrator, Science
D.N. Thomas, BSc, MBA
  Systems Administrator
J.F. Westlake, BASc, MASc, PhD, PEng
  Program Administrator, Engineering

Library
M.C. Shepherd, BEd, MA (LS)
  University Librarian
B. MacNeil, BSc, MLS
  Associate Librarian, Information
C.D. Emery, BA, MPhil, ALA
  Associate Librarian, Collections
M. Ridley, BA, MA, MLS
  Associate Librarian, Systems
L. Beattie, BA, MA, PhD
  Co-ordinator, Library Administrative Services
S. Bellingham, BA, MLS
  Head, Special Collections Department
M. Stanley, BA
  Library Development Officer

Office of the Registrar
C.T. Boyes, BA
  Registrar
J.T. Boniface, BSc
  Associate Registrar, Records
K.A. Lavigne, BA
  Associate Registrar, Admissions and Student Awards
S.J. Little, BA
  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, Science
To be announced
  Assistant Registrar, Mathematics
B.K. LeDrew, BMath
  Assistant Registrar, Scheduling
J.H. Wade
  Assistant Registrar, Student Awards
D.L. Kasta, 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
R.D. Seim, BA, PhD
  Distance Education Advisor
J.H. Willment, BA, MA
  Advisor on Teaching and Learning
V.R. Keller, BA, BEd
  Administrative Assistant

ASSOCIATE PROVOST, FINANCE
D.J. Battae

Office of Budgets
J.M. Manson, BA, CA
  Director

Financial Services
W.P. McNamara, CMA
  Director
W.R. Gadsby, BA, CMA
  Manager, Accounts Receivable and Credit

Food Services
M.E. Murdoch, BComm
  Director

Housing and Residences Operations
H.R.N. Eydt, BSc, MSc, PhD
  Warden of Residences and Director of Housing

Telephone Services
J. Wiley
  Manager

University Club
S.M.A. McGraw
  Manager

UW Theatre Centre
A.G. Anderson
  Manager

ASSOCIATE PROVOST, GENERAL SERVICES
R.J. Elliott, BA

Bookings
D.K. Schell
  Co-ordinator

Bookstore
A.H. Klapman, BA
  Director, Text and Trade
M. Yan
  Director, Retail and Licensing

Central Stores and Mail Services
C.A. Lawrence
  Director
University Offices

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
R.P. Molinary
Director of Custodial and Grounds Services

Purchasing
D.A. Gardener
Director

UW Computer Store
J.W. Dodd, BASc, MSc
Director

Waste Management Co-ordinator
P.L. Cook

ASSOCIATE PROVOST FOR STUDENT AFFAIRS
P.D. Hopkins, BA, BPE, MA

Athletics
J. McCrae, BA, MSc
Director

Campus Centre
A. Simpson, BA
Manager

Counselling Services
J.L. Williams, BA, MA, PhD
Director
T.C.E. Cauteels Reis, BA, MEd, EdD
Counsellor
L.M. Kellar, BA, MASc
International Student Counsellor
Sexual Harassment Counsellor
N.E.W. Mann, BA, MA, MEd
Career Counsellor
S.C.M. Sundberg, BA, MASc
Counsellor
L.J. Thom, BA, MA
Study Skills Co-ordinator
V.Y. Warwick, BA, MSW, CSW
Counsellor
J.J. Wine, AB, MSc, PhD
Counsellor, Training Co-ordinator
M.L. Zinatelli, BSc, MASc, PhD
Counsellor

Health Services
B. Schumercher, MD
Medical Director
D. Angove, RN
Health Promotion

C. Hea, RN
Supervisor
A. Ledbetter, MSW
Counsellor
J. Reis, BSc, DCS, MEd
Counsellor

Services for Persons with Disabilities
F. Thomlison, BA
Co-ordinator
V. Nusca, BA, MASc
Counsellor
J. Reis, BSc, DCS, MEd
Counsellor

Honorary Members of the University
Paul Meincke, BSc, PEng
Date Conferred
May 1985
William G. Scott, BA, MA
May 1986
C. Fred MacRae, BA, MA, PhD
May 1988
Carl A.W. Totzke, BA
May 1990
D. Pat Robertson, BComm
October 1991
J. Page R. Wadsworth, LLB
October 1991
Wallace A. McLaughlin, BSc, MSc, PhD, PEng
October 1992
Norman J. Ashton, BSc, MS
October 1993
J.W. (Jack) Brown, BA
October 1994
Wallace A. Delahey, BA (Hons. PHRE)
October 1994

Distinguished Professors Emeriti
H.B. Noel Hynes, BSc, PhD, DSc,
ARCS, FRSC
Date Granted
October 1982
Biology
William T. Tutte, BA, MA, PhD, DMath,
FRS, FRSC
Combinatorics and Optimization
June 1985
William B. Pearson, DFC, MA, DSc,
FRSC, FCIC
Chemistry, Physics
February 1986
Edward J. Fisher, BA, MA, DSc, FAAO
Optometry
June 1986
W.A.E. (Pete) McBryde, MA, PhD, FCIC
Chemistry
July 1986
Jerzy T. Pindera, MSc, PhD, DSc, PEng,
F-CSME, FSEM
Civil Engineering
April 1987
J. William Dyck, AB, MA, PhD
Germanic and Slavic
January 1988
Francis W. Karasek, BS, PhD, FCIC
Chemistry
August 1988
Harold J. Fallding, BA, BSc, MA,
PhD, FRSC
Sociology
February 1989
William M. Lyle, OD, MS, PhD, FAAO
Optometry
October 1989
Park M. Reilly, BASc, DIC, PhD,
Chemical Engineering

Alfred Rudin, BSc, PhD, PEng
Chemistry

Vidyadhar P. Godambe, MSc, PhD
Statistics and Actuarial Science

Leonard O. Gertler, BA, MA, FCIP
Urban and Regional Planning

Donald S. Scott, BSc, MSc, PhD, PEng
Chemical Engineering

Shao-Fu Wang, DSc
Physics

Hiremaglur K. Kesavan, BSc, BE, MS,
PhD, PEng
Systems Design Engineering

Niels C. Lind, MSc, PhD, PEng,
FRSC, FCAE
Civil Engineering

Ronald A. Aziz, BA, MA, PhD
Physics

Ralph R. Krueger, BA, MA, PhD
Geography

Nancy-Lou Patterson, BA, DLitt
Fine Arts

W. Keith Thomas, MA, PhD
English

János D. Aczel, BA, MA, PhD,
Habil DSc, FRSC
Pure Mathematics

William P. Forbes, BSc, PhD, DSc,
DIC, ARCS
Gerontology

Peter H.J. Nash, AA, BA, CE, MA,
MCP, MPA, PhD
Geography

Douglas P. Crowne, BA, EdM, PhD
Psychology

Walter R. Martin, BA, MA, DLitt et Phil
English

John A. Schey, Dipl Ing, CSc, Dr. Ing. h.c.,
Dr. Ing. h.c., FASM, FSME, PEng
Mechanical Engineering

Lawrence A. Cummings, AB, AM, PhD
Architecture

Robert N. Farvolden, BSc, MSc, PhD
Earth Sciences

Terence H. Qualter, BA, PhD
Political Science

Erwin B. Dumberoff, BSc, MForestry, PhD
Biology

W. Bryce Kendrick, BSc, PhD, DSc, FRSC
Biology

Melvin J. Lerner, BA, MA, PhD
Psychology

Warren U. Ober, BA, PhD
English

David A. Winter, BSc, MSc, PhD, PEng
Kinesiology
The President's Committee was established in 1980 and is composed of friends of the University who annually contribute $1000 or more to the University of Waterloo.

The President's Committee members play an important role in the development of the University, not only directly through their contributions to UW, but indirectly through the example they set for Corporations and Foundations which are approached to support the University.

**Life Members**

*J.D. Aczel, Waterloo
R. Arnell, Orangeville
D. Anderson, Cambridge
M. Bernstein, Windsor
M.A. Black, Kitchener
E.M. Bronfman, Toronto
P.F. Bronfman, Toronto
R.L. Brown, Waterloo
R. Chen, Brampton
M.C. Cowpland, Ottawa
R.W. Cruze, Waterloo
*J.S. Dellandrea, Waterloo
K.R. Dey, Mississauga
D. Dickson, Tarpon Springs, FL
D. Dixon, Kitchener
R.V. Dixon, Kitchener
J.P. Duffy, Waterloo
J.W. Dyck, Waterloo
E.B. George, Kitchener
M.S. Good, London
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