The Undergraduate Calendar

Except where otherwise indicated, the information in this Calendar applies to the 1993-94 academic year which commences in May, 1993.

The University of Waterloo publishes:
* An Undergraduate Admissions Handbook
* An Undergraduate Calendar
* A Graduate Studies Calendar
* A Correspondence Program Calendar
* A Part-Time Studies Calendar

Inquiries

Inquiries and formal applications for admission should be directed to:
The Registrar
University of Waterloo
Waterloo, Ontario, Canada N2L 3G1
Telephone (519) 885-1211, ext. 2268
Fax (519) 746-2882

The Registrar's Office is located on the second floor of Ira G. Needles Hall. Office hours are from 8:30 a.m. to 4:30 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

Pages are numbered sequentially in the General Information section. In the subsequent chapters, the digits preceding the colon indicate the chapter number and the digits following the colon indicate the page number within the particular chapter.

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 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 reserves 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 1:17 of this Calendar.
# Undergraduate Calendar 1993-94

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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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</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.
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<th>Programs Available</th>
<th>Honors Core</th>
<th>Honors Regular</th>
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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.
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 toward 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 – 1993

### Meetings

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<thead>
<tr>
<th>Event</th>
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<tbody>
<tr>
<td>Meeting – Senate Executive Committee</td>
<td>March 1</td>
<td>Monday</td>
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<tr>
<td>Preregistration Begins – Undergraduate Programs – Fall Term</td>
<td>March 1</td>
<td>Monday</td>
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<tr>
<td>Preregistration Ends – Undergraduate Programs – Fall Term</td>
<td>March 5</td>
<td>Friday</td>
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<tr>
<td>Meeting – University Senate, 7:30 p.m.</td>
<td>March 15</td>
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<tr>
<td>Campus Day</td>
<td>March 16</td>
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<tr>
<td>Meeting – Board of Governors Executive Committee</td>
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### Lectures

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<td>Lectures End – Winter Term</td>
<td>April 2</td>
<td>Friday</td>
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<tr>
<td>Meeting – Senate Executive Committee</td>
<td>April 5</td>
<td>Monday</td>
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<tr>
<td>Meeting – Board of Governors, 3:30 p.m.</td>
<td>April 6</td>
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<tr>
<td>Examinations Begin – Winter Term</td>
<td>April 8</td>
<td>Tuesday</td>
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<tr>
<td>Good Friday – University Holiday*</td>
<td>April 9</td>
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<tr>
<td>Meeting – University Senate, 7:30 p.m.</td>
<td>April 19</td>
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<tr>
<td>Course Drop/Withdrawal Deadline – Correspondence – Winter Term</td>
<td>April 21</td>
<td>Wednesday</td>
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<tr>
<td>Examinations End – Winter Term</td>
<td>April 21</td>
<td>Wednesday</td>
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<tr>
<td>Final Examination Results Due – Winter Term</td>
<td>April 29</td>
<td>Thursday</td>
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<tr>
<td>Winter Work Term Ends – Co-operative Programs</td>
<td>April 30</td>
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### Examinations

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<tr>
<td>Examinations – Correspondence – Winter Term</td>
<td>May 1</td>
<td>Saturday</td>
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<tr>
<td>Registration Begins – Undergraduate Programs – Spring Term</td>
<td>May 3</td>
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<tr>
<td>Registration – Graduate Studies – Spring Term</td>
<td>May 3</td>
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<tr>
<td>Lectures Begin – Spring Term</td>
<td>May 3</td>
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<tr>
<td>Meeting – Senate Executive Committee</td>
<td>May 3</td>
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<td>Spring Work Term Begins – Co-operative Programs</td>
<td>May 4</td>
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<td>May 5</td>
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<td>Start of Late Fees – Spring Term</td>
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### Course Change Deadline and Convocation Dates

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<td>End of Course Change Period – Spring Term – See Individual Faculty Chapters</td>
<td>May 17</td>
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<tr>
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<td>Victoria Day – University Holiday*</td>
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<tr>
<td>Spring Convocation (Applied Health Sciences, Environmental Studies, Independent Studies) – 2:00 p.m.</td>
<td>May 26</td>
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<td>Spring Convocation (Arts) – 2:00 p.m.</td>
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<tr>
<td>Spring Convocation (Science) – 2:00 p.m.</td>
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### Application and Course Change Deadlines for New Students

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<td>Tuesday</td>
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<tr>
<td>Meeting – Board of Governors, 3:30 p.m.</td>
<td>June 1</td>
<td>Tuesday</td>
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<tr>
<td>Meeting – Senate Executive Committee</td>
<td>June 7</td>
<td>Monday</td>
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<tr>
<td>Preregistration Begins – Co-operative Programs – Winter Term</td>
<td>June 9</td>
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<td>June 11</td>
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<tr>
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### Application and Course Change Deadlines for Returning Students

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<td>Application and Course Change Deadlines for Returning Students – Correspondence – Fall Term</td>
<td>June 30</td>
<td>Wednesday</td>
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### Other Dates

<table>
<thead>
<tr>
<th>Event</th>
<th>Date</th>
<th>Day</th>
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<tbody>
<tr>
<td>Canada Day – University Holiday*</td>
<td>July 1</td>
<td>Thursday</td>
</tr>
<tr>
<td>University Holiday*</td>
<td>July 2</td>
<td>Friday</td>
</tr>
<tr>
<td>Registration – Summer Session</td>
<td>July 5</td>
<td>Monday</td>
</tr>
<tr>
<td>Lectures Begin – Summer Session</td>
<td>July 5</td>
<td>Monday</td>
</tr>
<tr>
<td>Start of Late Fees – Summer Session</td>
<td>July 6</td>
<td>Tuesday</td>
</tr>
<tr>
<td>Course Drop/Withdrawal Deadline – Correspondence – Spring Term</td>
<td>July 21</td>
<td>Wednesday</td>
</tr>
<tr>
<td>Lectures End – Spring Term</td>
<td>July 30</td>
<td>Friday</td>
</tr>
</tbody>
</table>

* Some University Departments may be open for limited service on these days.
### 1993 Continued

<table>
<thead>
<tr>
<th>Event</th>
<th>Date(s)</th>
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<tbody>
<tr>
<td>Civic Holiday – University Holiday*</td>
<td>August 2</td>
<td>Monday</td>
</tr>
<tr>
<td>Examinations Begin – Spring Term</td>
<td>August 3</td>
<td>Tuesday</td>
</tr>
<tr>
<td>Examinations – Correspondence – Spring Term</td>
<td>August 7</td>
<td>Saturday</td>
</tr>
<tr>
<td>Lectures End – Summer Session</td>
<td>August 13</td>
<td>Friday</td>
</tr>
<tr>
<td>Examinations End – Spring Term</td>
<td>August 14</td>
<td>Saturday</td>
</tr>
<tr>
<td>Examinations – Summer Session</td>
<td>August 14</td>
<td>Saturday</td>
</tr>
<tr>
<td>Final Examination Results Due – Spring; Summer</td>
<td>August 20</td>
<td>Friday</td>
</tr>
<tr>
<td>Spring Work Term Ends – Co-operative Programs</td>
<td>August 27</td>
<td>Friday</td>
</tr>
<tr>
<td>Fall Work Term Begins – Co-operative Programs</td>
<td>August 30</td>
<td>Monday</td>
</tr>
<tr>
<td>Labour Day – University Holiday*</td>
<td>September 6</td>
<td>Monday</td>
</tr>
<tr>
<td>Examination Results Due – Correspondence – Spring Term</td>
<td>September 7</td>
<td>Tuesday</td>
</tr>
<tr>
<td>Registration Begins – Undergraduate Programs – Fall Term</td>
<td>September 7</td>
<td>Tuesday</td>
</tr>
<tr>
<td>Meeting – Senate Executive Committee</td>
<td>September 7</td>
<td>Tuesday</td>
</tr>
<tr>
<td>Registration – Graduate Studies – Fall Term</td>
<td>September 7</td>
<td>Tuesday</td>
</tr>
<tr>
<td>Registration Ends – Undergraduate Programs – Fall Term</td>
<td>September 10</td>
<td>Friday</td>
</tr>
<tr>
<td>Lectures Begin – Fall Term</td>
<td>September 13</td>
<td>Monday</td>
</tr>
<tr>
<td>Start of Late Fees – Fall Term – See Chapter 3 for Details</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Application and Course Change Deadlines for New Students –</td>
<td>September 13</td>
<td>Monday</td>
</tr>
<tr>
<td>Correspondence – Winter Term</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Meeting – University Senate, 7:30 p.m.</td>
<td>September 20</td>
<td>Monday</td>
</tr>
<tr>
<td>Meeting – Board of Governors Executive Committee</td>
<td>September 21</td>
<td>Tuesday</td>
</tr>
<tr>
<td>End of Course Change Period – Fall Term – See Individual Faculty</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Chapters</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Meeting – Senate Executive Committee</td>
<td>October 4</td>
<td>Monday</td>
</tr>
<tr>
<td>Meeting – Board of Governors, 3:30 p.m.</td>
<td>October 5</td>
<td>Tuesday</td>
</tr>
<tr>
<td>Application and Course Change Deadlines for Returning Students –</td>
<td>October 8</td>
<td>Friday</td>
</tr>
<tr>
<td>Correspondence – Winter Term</td>
<td>October 11</td>
<td>Monday</td>
</tr>
<tr>
<td>Thanksgiving Day – University Holiday*</td>
<td>October 18</td>
<td>Monday</td>
</tr>
<tr>
<td>Meeting – University Senate, 7:30 p.m.</td>
<td>October 23</td>
<td>Saturday</td>
</tr>
<tr>
<td>Fall Convocation (Applied Health Sciences, Arts – 10:00 a.m.;</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Engineering, Environmental Studies, Independent Studies, Mathematics,</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Science – 2:00 p.m.)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Meeting – Senate Executive Committee</td>
<td>November 1</td>
<td>Monday</td>
</tr>
<tr>
<td>Preregistration Begins – Co-operative Programs – Spring Term</td>
<td>November 3</td>
<td>Wednesday</td>
</tr>
<tr>
<td>Preregistration Ends – Co-operative Programs – Spring Term</td>
<td>November 5</td>
<td>Friday</td>
</tr>
<tr>
<td>Meeting – University Senate, 7:30 p.m.</td>
<td>November 15</td>
<td>Monday</td>
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<tr>
<td>Lectures End – Fall Term</td>
<td>December 6</td>
<td>Monday</td>
</tr>
<tr>
<td>Meeting – Senate Executive Committee</td>
<td>December 6</td>
<td>Monday</td>
</tr>
<tr>
<td>Examinations Begin – Fall Term</td>
<td>December 9</td>
<td>Thursday</td>
</tr>
<tr>
<td>Meeting – University Senate, 7:30 p.m.</td>
<td>December 20</td>
<td>Monday</td>
</tr>
<tr>
<td>Examinations End – Fall Term</td>
<td>December 22</td>
<td>Wednesday</td>
</tr>
<tr>
<td>Fall Work Term Ends – Co-operative Programs</td>
<td>December 24</td>
<td>Friday</td>
</tr>
<tr>
<td>Christmas Holidays*</td>
<td>December 24</td>
<td>Friday</td>
</tr>
<tr>
<td>Winter Work Term Begins – Co-operative Programs</td>
<td>December 29</td>
<td>Wednesday</td>
</tr>
</tbody>
</table>

* Some University Departments may be open for limited service on these days.
### 1994

<table>
<thead>
<tr>
<th>Event</th>
<th>Date</th>
<th>Day</th>
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<tbody>
<tr>
<td>University Holiday*</td>
<td>January 3</td>
<td>Monday</td>
</tr>
<tr>
<td>Course Drop/Withdrawal Deadline — Correspondence — Fall Term</td>
<td>January 4</td>
<td>Tuesday</td>
</tr>
<tr>
<td>Final Examination Results Due — Fall Term</td>
<td>January 4</td>
<td>Tuesday</td>
</tr>
<tr>
<td>Registration Begins — Undergraduate Programs — Winter Term</td>
<td>January 4</td>
<td>Tuesday</td>
</tr>
<tr>
<td>Registration — Graduate Studies — Winter Term</td>
<td>January 4</td>
<td>Tuesday</td>
</tr>
<tr>
<td>Lectures Begin — Winter Term</td>
<td>January 4</td>
<td>Tuesday</td>
</tr>
<tr>
<td>Meeting — Senate Executive Committee</td>
<td>January 4</td>
<td>Tuesday</td>
</tr>
<tr>
<td>Registration Ends — Undergraduate Programs — Winter Term</td>
<td>January 4</td>
<td>Tuesday</td>
</tr>
<tr>
<td>Start of Late Fees — Winter Term — See Chapter 3 for Details</td>
<td>January 6</td>
<td>Thursday</td>
</tr>
<tr>
<td>Meeting — University Senate, 7:30 p.m.</td>
<td>January 17</td>
<td>Monday</td>
</tr>
<tr>
<td>Meeting — Board of Governors Executive Committee</td>
<td>January 18</td>
<td>Tuesday</td>
</tr>
<tr>
<td>Examinations — Correspondence — Fall Term</td>
<td>January 22</td>
<td>Saturday</td>
</tr>
<tr>
<td>Application and Course Change Deadlines for New Students —</td>
<td>January 24</td>
<td>Monday</td>
</tr>
<tr>
<td>Correspondence — Spring Term</td>
<td></td>
<td></td>
</tr>
<tr>
<td>End of Course Change Period — Winter Term — See Individual Faculty Chapters</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Meeting — Board of Governors, 3:30 p.m.</td>
<td>February 1</td>
<td>Tuesday</td>
</tr>
<tr>
<td>Meeting — Senate Executive Committee</td>
<td>February 7</td>
<td>Monday</td>
</tr>
<tr>
<td>Examination Results Due — Correspondence — Fall Term</td>
<td>February 10</td>
<td>Thursday</td>
</tr>
<tr>
<td>Application and Course Change Deadlines for Returning Students —</td>
<td>February 14</td>
<td>Monday</td>
</tr>
<tr>
<td>Correspondence — Spring Term</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Meeting — University Senate, 7:30 p.m.</td>
<td>February 21</td>
<td>Monday</td>
</tr>
<tr>
<td>Study Period† — Engineering and Mathematics§</td>
<td>February 21</td>
<td>Monday, Tuesday</td>
</tr>
<tr>
<td>Study Period† — Other Faculties</td>
<td>March 7</td>
<td>Monday</td>
</tr>
<tr>
<td>Meeting — Senate Executive Committee</td>
<td>March 7</td>
<td>Monday</td>
</tr>
<tr>
<td>Preregistration Begins — Undergraduate Programs — Fall Term</td>
<td>March 11</td>
<td>Friday</td>
</tr>
<tr>
<td>Preregistration Ends — Undergraduate Programs — Fall Term</td>
<td>March 15</td>
<td>Tuesday</td>
</tr>
<tr>
<td>Campus Day</td>
<td>March 21</td>
<td>Monday</td>
</tr>
<tr>
<td>Meeting — University Senate, 7:30 p.m.</td>
<td>March 22</td>
<td>Tuesday</td>
</tr>
<tr>
<td>Meeting — Board of Governors Executive Committee</td>
<td>March 31</td>
<td>Thursday</td>
</tr>
<tr>
<td>Lectures End — Engineering and Mathematics — Winter Term</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Good Friday — University Holiday*</td>
<td>April 1</td>
<td>Friday</td>
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<tr>
<td>Meeting — Senate Executive Committee</td>
<td>April 4</td>
<td>Monday</td>
</tr>
<tr>
<td>Lectures End — Other Faculties — Winter Term</td>
<td>April 5</td>
<td>Tuesday</td>
</tr>
<tr>
<td>Meeting — Board of Governors, 3:30 p.m.</td>
<td>April 5</td>
<td>Tuesday</td>
</tr>
<tr>
<td>Examinations Begin — Winter Term</td>
<td>April 8</td>
<td>Friday</td>
</tr>
<tr>
<td>Meeting — University Senate, 7:30 p.m.</td>
<td>April 18</td>
<td>Monday</td>
</tr>
<tr>
<td>Course Drop/Withdrawal Deadline — Correspondence — Winter Term</td>
<td>April 20</td>
<td>Wednesday</td>
</tr>
<tr>
<td>Examinations End — Winter Term</td>
<td>April 21</td>
<td>Thursday</td>
</tr>
<tr>
<td>Final Examination Results Due — Winter Term</td>
<td>April 28</td>
<td>Thursday</td>
</tr>
<tr>
<td>Winter Work Term Ends — Co-operative Programs</td>
<td>April 29</td>
<td>Friday</td>
</tr>
<tr>
<td>Registration Begins — Undergraduate Programs — Spring Term</td>
<td>May 2</td>
<td>Monday</td>
</tr>
<tr>
<td>Registration — Graduate Studies — Spring Term</td>
<td>May 2</td>
<td>Monday</td>
</tr>
<tr>
<td>Lectures Begin — Spring Term</td>
<td>May 2</td>
<td>Monday</td>
</tr>
<tr>
<td>Meeting — Senate Executive Committee</td>
<td>May 2</td>
<td>Monday</td>
</tr>
<tr>
<td>Spring Work Term Begins — Co-operative Programs</td>
<td>May 2</td>
<td>Monday</td>
</tr>
<tr>
<td>Registration Ends — Undergraduate Programs — Spring Term</td>
<td>May 3</td>
<td>Tuesday</td>
</tr>
<tr>
<td>Start of Late Fees — Spring Term — See Chapter 3 for Details</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Examinations — Correspondence — Winter Term</td>
<td>May 7</td>
<td>Saturday</td>
</tr>
<tr>
<td>Meeting — University Senate, 7:30 p.m.</td>
<td>May 16</td>
<td>Monday</td>
</tr>
<tr>
<td>End of Course Change Period — Spring Term — See Individual Faculty Chapters</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* Some University Departments may be open for limited service on these days.
† 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.
<table>
<thead>
<tr>
<th>Event</th>
<th>Date</th>
<th>Day</th>
</tr>
</thead>
<tbody>
<tr>
<td>Victoria Day – University Holiday*</td>
<td>May 23</td>
<td>Monday</td>
</tr>
<tr>
<td>Meeting – Board of Governors Executive Committee</td>
<td>May 24</td>
<td>Tuesday</td>
</tr>
<tr>
<td>Spring Convocation (Applied Health Sciences, Environmental Studies,</td>
<td>May 25</td>
<td>Wednesday</td>
</tr>
<tr>
<td>Independent Studies) – 2:00 p.m.</td>
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<tr>
<td>Spring Convocation (Arts) – 2:00 p.m.</td>
<td>May 26</td>
<td>Thursday</td>
</tr>
<tr>
<td>Spring Convocation (Science) – 2:00 p.m.</td>
<td>May 27</td>
<td>Friday</td>
</tr>
<tr>
<td>Spring Convocation (Mathematics – 10:00 a.m.; Engineering – 2:00 p.m.)</td>
<td>May 28</td>
<td>Saturday</td>
</tr>
<tr>
<td>Examination Results Due – Correspondence – Winter Term</td>
<td>June 2</td>
<td>Thursday</td>
</tr>
<tr>
<td>Meeting – Senate Executive Committee</td>
<td>June 6</td>
<td>Monday</td>
</tr>
<tr>
<td>Meeting – Board of Governors, 3:30 p.m.</td>
<td>June 7</td>
<td>Tuesday</td>
</tr>
<tr>
<td>Preregistration Begins – Co-operative Programs – Winter Term</td>
<td>June 8</td>
<td>Wednesday</td>
</tr>
<tr>
<td>Preregistration Ends – Co-operative Programs – Winter Term</td>
<td>June 10</td>
<td>Friday</td>
</tr>
<tr>
<td>Meeting – University Senate, 7:30 p.m.</td>
<td>June 20</td>
<td>Monday</td>
</tr>
<tr>
<td>Canada Day – University Holiday*</td>
<td>July 1</td>
<td>Friday</td>
</tr>
<tr>
<td>Registration – Summer Session</td>
<td>July 4</td>
<td>Monday</td>
</tr>
<tr>
<td>Lectures Begin – Summer Session</td>
<td>July 4</td>
<td>Monday</td>
</tr>
<tr>
<td>Start of Late Fees – Summer Session – See Chapter 3 for Details</td>
<td>July 27</td>
<td>Wednesday</td>
</tr>
<tr>
<td>Course Drop/Withdrawal Deadline – Correspondence – Spring Term</td>
<td>July 28</td>
<td>Thursday</td>
</tr>
<tr>
<td>Lectures End – Spring Term</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Civic Holiday – University Holiday*</td>
<td>August 1</td>
<td>Monday</td>
</tr>
<tr>
<td>Examinations Begin – Spring Term</td>
<td>August 2</td>
<td>Tuesday</td>
</tr>
<tr>
<td>Examinations – Correspondence – Spring Term</td>
<td>August 6</td>
<td>Saturday</td>
</tr>
<tr>
<td>Lectures End – Summer Session</td>
<td>August 12</td>
<td>Friday</td>
</tr>
<tr>
<td>Examinations End – Spring Term</td>
<td>August 13</td>
<td>Saturday</td>
</tr>
<tr>
<td>Examinations – Summer Session</td>
<td>August 13</td>
<td>Saturday</td>
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<tr>
<td>Final Examination Results Due – Spring; Summer</td>
<td>August 19</td>
<td>Friday</td>
</tr>
<tr>
<td>Spring Work Term Ends – Co-operative Programs</td>
<td>August 26</td>
<td>Friday</td>
</tr>
<tr>
<td>Fall Work Term Begins – Co-operative Programs</td>
<td>August 29</td>
<td>Monday</td>
</tr>
<tr>
<td>Examination Results Due – Correspondence – Spring Term</td>
<td>September 6</td>
<td>Tuesday</td>
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</tbody>
</table>

*Some University Departments may be open for limited service on these days.
<table>
<thead>
<tr>
<th>Year</th>
<th>Month</th>
<th>Date</th>
<th>Year</th>
<th>Month</th>
<th>Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>1993</td>
<td>January</td>
<td>2</td>
<td>February</td>
<td>1</td>
<td>March</td>
</tr>
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<td>1994</td>
<td>January</td>
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<tr>
<td>1995</td>
<td>January</td>
<td>2</td>
<td>February</td>
<td>1</td>
<td>March</td>
</tr>
</tbody>
</table>
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-Waterloo; enter the Conestogo Parkway by following Hwy. 7 East signs, then follow the Parkway and exit at University Ave. West; drive in a westerly direction on University Ave. to University of Waterloo. The second route follows the first route to the Conestogo Parkway; enter the Parkway, following Hwy. 7 & 8 West Stratford; continue on the Parkway and exit at Fischer-Hallman Rd. Turn left at the Fischer-Hallman Rd traffic lights and continue north west until you reach University Ave. Turn right on to University Ave. and drive easterly until you reach the University of Waterloo.
The University of Waterloo

The campus, looking east, with Conrad Grebel College in the foreground.
The Undergraduate Calendar

The Undergraduate Calendar is published once a year by the Office of the Registrar, University of Waterloo. The Calendar serves to provide a list of academic courses and programs, policies, and regulations regarding admissions, examinations, and fees, as well as general information about the University. For registration purposes more complete information is provided in Course Offerings Lists and Timetables which are published for each academic term.

If there is any doubt as to the interpretation of the contents of the Calendar, enquiries can be directed to the Registrar.

The Calendar is arranged in chapters which fall into five divisions. The first division describes the various services offered at 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 last division lists the membership of the governing bodies of the University and the officers of the various administrative units.

Except where otherwise indicated, this Calendar applies to the 1993-1994 academic year, which commences in May, 1993. More specific information on effective dates for tuition and other fees, admission requirements, and course and program offerings may be found in the relevant chapters.

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-western 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 ovm – 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 (OD) – blue 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 \( \frac{3}{4} \)”, trimmed with two rows of white soutache braid (except where noted), \( \frac{3}{4} \)” 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 (Arts – Applied Psychology, Engineering)
Master of Arts (MA) – green (Applied Health Sciences, Arts, Environmental Studies – Geography, Planning and Resource Development)
Master of Environmental Studies (MES) – orange with green soutache braid trim (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 \( \frac{3}{4} \)” 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.

University Jurisdiction
The University exercises its statutory jurisdiction and authority with respect to the operation, protection and control of its property and plant and the regulation of persons on campus insofar as is necessary to ensure the orderly performance of the University's functions. In certain situations, the authority of the University may be exercised with respect to the behaviour of members of the University community while off campus if such behaviour is found to be in conflict with the policies, procedures and practices of the University.

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 is organized under several academic units as follows: The Faculty of Applied Health Sciences, The Faculty of Arts, The Faculty of Engineering, The Faculty of Environmental Studies, The Faculty of Mathematics, and The Faculty of Science. Within this framework are various departments and schools. Students who wish to follow a more independent and unstructured program of study than the traditional one may seek admission to the Independent Studies Program.

Enrolment for each Faculty including church colleges and off-campus students as of November 1, 1992:

<table>
<thead>
<tr>
<th>Faculty of Applied Health Sciences</th>
<th>Full Time</th>
<th>Part Time</th>
</tr>
</thead>
<tbody>
<tr>
<td>Faculty of Arts</td>
<td>1285</td>
<td>336</td>
</tr>
<tr>
<td>Faculty of Engineering</td>
<td>4532</td>
<td>5697</td>
</tr>
<tr>
<td>Faculty of Environmental Studies</td>
<td>3144</td>
<td>295</td>
</tr>
<tr>
<td>Independent Studies Program</td>
<td>1530</td>
<td>473</td>
</tr>
<tr>
<td>Faculty of Mathematics</td>
<td>3221</td>
<td>396</td>
</tr>
<tr>
<td>Faculty of Science</td>
<td>2391</td>
<td>1349</td>
</tr>
<tr>
<td>Total Undergraduate Enrolment</td>
<td>16133</td>
<td>8549</td>
</tr>
<tr>
<td>Graduate Student Enrolment</td>
<td>1777</td>
<td>401</td>
</tr>
</tbody>
</table>
The Church Colleges
There are four church-related colleges associated with the University.

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 situated 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.


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 and through the quarterly publication Grail: An Ecumenical Journal. Both Grail and the Centre 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 interdisciplinary 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 91 women. Its students enjoy the sense of community and support that a small college can provide as well as all of the advantages of a major university.

Conrad Grebel College
Conrad Grebel College provides, under the sponsorship of the Mennonite Conference of Eastern Canada, residential, teaching, research and community education programs from a Christian perspective. The College 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 150 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 enable students to understand the relationship between religious growth and experience as they relate to the dynamics of personality 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 Mathematics (MMath)
- Master of Science (MSc)
- Master of Philosophy (MPhil)
- Doctor of Philosophy (PhD)

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

### Honorary Degrees

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

- Doctor of Divinity (DD)
- Doctor of Engineering (DEng)
- Doctor of Environmental Studies (DES)
- Doctor of Laws (LLD)

### 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 term 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.

### Part-Time Studies, Distance Education, and Continuing Education

The Teaching Resource and Continuing Education (TRACE) Office is responsible for major policy development and co-ordination of activities related to correspondence courses, continuing education and to part-time studies in general.

Credit courses are available on campus in the late afternoon and evenings to accommodate students who work during the day. Courses are also offered at off-campus
locations in various communities. For those who live too far away or who have commitments which make attending classes at set times difficult, the University has an extensive Distance Education Program. There are also non-credit continuing education courses offered on campus at various times during 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:

Part-Time Studies
University of Waterloo
Waterloo, Ontario N2L 3G1
Telephone: (519) 888-4002
Fax: (519) 746-6393
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.

PART-TIME STUDIES 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.

PART-TIME STUDIES OFF CAMPUS
Several University of Waterloo credit courses are offered each year in centres such as Kitchener and Waterloo, Cambridge, and other communities. Most of these courses meet one evening a week for three hours in the Fall, Winter, or Spring terms. Students earning credit in these courses may apply them toward a degree along with credits earned on campus or through correspondence study.

The public is invited to attend off-campus courses as free public lectures. During the first two weeks of lectures, anyone normally admissible who wishes to take a course for credit may apply to do so at the lecture location.

DISTANCE EDUCATION COURSES
The University of Waterloo operates one of the largest university-level distance education programs in Canada. More than 300 university credit courses are offered over the Fall, Winter, and Spring terms. Students should obtain a Calendar from the Correspondence 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 may be earned entirely through correspondence. In working towards a degree, students may combine on-campus and off-campus courses with distance education courses. Fees for correspondence 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 Correspondence Calendar. Copies may be obtained from:

Correspondence Office
University of Waterloo
Waterloo, Ontario N2L 3G1
(519) 888-4050
Fax: (519) 746-6393

SPECIAL PROGRAMS

BSN Program for Registered Nurses
Registered nurses in Waterloo Region may take certain courses at the University of Waterloo which can be applied toward the Bachelor of Science-Nursing degree at the University of Western Ontario, McMaster University, Ryerson and the University of Ottawa. These courses are available on campus or through correspondence. Further information is available from Part-Time Studies, University of Waterloo.

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
A series of degree credit courses has been assembled by the University and the Association of Ontario Land Surveyors 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 practising surveyors. Sufficient courses are available to complete the requirements by correspondence. To be admitted, an applicant must hold the Commission as an Ontario Land Surveyor (or its equivalent from another jurisdiction).
Diploma in Occupational Health Nursing
A Diploma in Occupational Health for Registered Nurses is offered through the Department of Health Studies and includes courses in Science, Arts, Health Studies, and Systems Design. Admission to the program is limited to registered nurses who have two years experience in an occupational health setting. Nurses who do not meet this requirement may be admitted conditionally pending fulfillment of the requirement. Ten of the eleven term courses required for the Diploma are available by correspondence. The final course is offered on campus only.

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.

Continuing Education for the Police Profession
Courses taken part time at UW can qualify police officers for three designations awarded by the Canadian and Ontario Police Colleges:
- The Certificate in General Police Studies;
- The Certificate in Advanced Police Studies;
- The Diploma in Police Management Studies;
These courses can also count towards a Bachelor's degree at UW.

Other Continuing Education Opportunities
The University of Waterloo offers a variety of continuing education opportunities including the following:
- Certificate and Diploma Programs in Economic and Industrial Development
- professional development courses in the School of Optometry
- the Diploma in Gerontology
- certificates in Social Work through Renison College

The University co-operates with a number of outside organizations regarding their program and designations. Certain UW courses count for credit in the following:
- Appraisal Institute of Canada
- Association of Canadian Pension Management
- Canadian Credit Union Institute Fellows' Program
- 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)
- 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

The University co-operates with a number of outside organizations regarding their program and designations. The University offers some non-credit courses throughout the year. There is a broad range of courses for career and personal development.

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, and are processed only after academic timetables are finalized.

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

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

For further details, contact the Registrar's Office.

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

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

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

Assigned
Common
Letter
Weighting
Grades
Factors* 
Assigned
Percentage
Grades*

A+ 95 90-100
A 89 85-89
A- 83 80-84
B+ 78 77-79
B 75 73-76
B- 72 70-72
C+ 68 67-69
C 65 63-66
C- 62 60-62
D+ 58 57-59
D 55 53-56
D- 52 50-52
F+ 46 42-49
F 38 35-41
F- 32 32-34

* 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
NCR No credit granted
NMR No mark reported
UR Grade under review, decision pending
WD Withdraw after the drop deadline

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

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

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

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

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

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

Examination Regulations
The following are excerpts from the Senate Regulations governing Examination Procedures. A booklet containing a more complete version of these regulations may be obtained from the Registrar’s Office or from the office of the Dean in each Faculty. Specific regulations pertaining to each Faculty may be found in the individual Faculty program sections of this Calendar, Chapters 8-15.

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

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

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

Study Breaks
Each term the formal lecture period, as defined by the dates shown on pages 8-11 of this Calendar, normally ends two or three days before final examinations begin. The periods between the end of the formal lecture period and the beginning of final examinations shall be ones in which no instructor shall be permitted to administer, and no student shall be required to sit for examinations, tests or lectures.
Final Examinations
No instructor shall be permitted to administer, and no student shall be required to sit for, final examinations during the formal lecture period. Final examinations shall be interpreted in the ordinary sense of the word, usually covering all, or a very substantial portion of, the material dealt with in one academic term or year.

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

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

Other Tests and Examinations
Instructors are encouraged to hold other tests or examinations during the regularly scheduled class times for their courses. An instructor who chooses to schedule a test or examination 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 University, 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' 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 and Procedures

The following is a summary of the disciplinary policies and procedures as contained in the Report of the Senate Committee on Academic Regulations and Discipline which was approved by Senate on April 20, 1981 and amended on May 15, 1989.

I. Any action which prejudices the integrity of the University's scholarly activities shall be considered to be an academic offence and shall be punishable by appropriate disciplinary action.

II. Academic Offences

Academic Offences shall include but shall not be limited to the following:

- Cheating on examinations, tests, assignments, or work term reports
- Impersonating another student or allowing oneself to be impersonated
- Plagiarism
- Theft of examination papers or other material, or the use of stolen material
- Falsifying academic records or submitting false credentials
- Submitting a false medical or other certificate
- Submitting work for one course which has been or is being submitted for another course without express permission to do so
- Behaviour which interferes with the rights of other students to pursue their studies
- Behaviour in a laboratory which endangers oneself or other students

III. Jurisdiction and Principles

The Associate Deans, Graduate and Undergraduate, of each Faculty are charged with enforcement of this policy. Problems which cannot be resolved informally between the professor(s) and the student(s) shall be referred to the Faculty Committee on Student Appeals by the Associate Dean. Formal charges concerning violations of this policy shall be heard by a tribunal chosen from the Faculty Committee on Student Appeals in question.

IV. Penalties

Should a student be found guilty of committing an academic offence, the penalty recommended will be one or more of the following:

- Reprimand
- Submission of a failing grade on an examination, test, assignment, course, or term
- Probation
- Suspension
- Expulsion

V. Right of Appeal

Students may appeal the decision of a Faculty Committee on Student Appeals to the University Committee on Student Appeals on grounds of denial of

natural justice, substantive new evidence, or if the penalty imposed involves suspension for more than one year, or expulsion.

Reference copies of the Policy are available from any of the following: Associate Deans, the Registrar's Office, the University Graduate Office, the University Secretariat and the Ombudsperson.

Student Appeal Policy and Procedures

Introduction

The Student Appeal Policy and Procedures, approved in 1989 by the UW Senate and Board of Governors, acknowledges the University's responsibility to deal fairly with student appeals, as noted in the first section of the policy which is cited below:

The University has the authority to determine who may register and who may graduate; in academic and non-academic decisions, it is the policy of the University to ensure that conditions of fairness prevail. It shall be the right of every student to appeal decisions based on University policies. The conduct of such appeals shall be based on the following principles:

- Fairness shall be the overriding consideration in dealing with student appeals. Fairness or natural justice requires that all parties be aware of the evidence to be considered and be given an opportunity to be heard during the process, and that individuals whose judgment is being queried must not sit in judgment of their own decisions;
- Sound academic decisions shall not be overturned on the basis of non-academic technicalities;
- Students are entitled to know the reasons for which decisions are made;
- The academic freedom of students shall be protected.

The steps a student may take to secure a remedy for the types of grievances described in the policy are detailed in the policy document, as are the associated time limits involved. Terms of reference for Faculty- and University-level Committees on Student Appeals (FCSA/UCSA) and procedural rules for the conduct of formal hearings are set out in appendices. Reference copies of the policy document are available from any of the following: Associate Deans, the Registrar's Office, the University Graduate Office, the University Secretariat and the Ombudsperson. A brief description of the major features of the policy, including a section entitled "Tips on Preparing an Appeal", is available from the Federation of Students and from the Graduate Student Association.

Appeals/Petitions

The policy classifies grievances into two types of appeals and differentiates them from petitions. Type 1 grievances allege errors in academic judgment; such grievances are handled at the Faculty level to ensure that people knowledgeable in the field judge the academic merits involved. Type 2 grievances are much broader, covering such
matters as procedural error or instances of bias or prejudice; such grievances may ultimately be dealt with by a University-level committee.

Unlike grievances, which concern alleged errors in academic judgment or in procedure, petitions are requests from students seeking relief from normal Faculty or University rules and regulations because of special circumstances such as illness or bereavement. Petition forms (Form D) and advice on their completion may be sought from any of the following: the Registrar’s Office in Needles Hall; undergraduate student advisors; Associate Deans. Consult individual Faculty sections of this calendar for Faculty-specific details.

Reassessment
Type 1 grievances include requests for reassessment of a student's work, and may involve an independent third party. Each Faculty has established the conditions under which students may request a formal reassessment of their work and the procedures for adjudicating such requests to ensure that students are treated fairly.

Procedures and Guidelines
Procedural steps for the resolution of grievances are detailed in the policy document in three main stages, with progressive stages becoming increasingly formal:

1. The Informal Inquiry stage is initiated by the student going directly to the appropriate instructor, officer, or University authority whose decision or action is being questioned. In general, students who wish to raise questions or who have a grievance are strongly encouraged to communicate informally with their instructors, Department Chairs, the appropriate Associate Dean of their Faculty and/or the appropriate administrative officer before seeking a review under formal procedures. Experience has shown that the great majority of questions or complaints can be resolved satisfactorily through informal communication.

2. Unresolved grievances may then proceed to the Formal Inquiry Stage which involves the student and usually the appropriate Associate Dean and Department Chair. A student initiates formal procedures by filing an Application for Formal Inquiry or Reassessment (Form A), which may be obtained from Faculty Associate Deans. Form A must be filed within two weeks of receiving the response to the informal inquiry or when there is no timely response. Upon receipt, the Associate Dean ensures that a copy of Form A is submitted to the Chair (or Associate Chair) of the department involved or to the appropriate committee. The Chair or Committee investigates and makes a reasoned judgment concerning the grievance which is sent back to the Associate Dean who, in turn, conveys the Faculty’s decision to the student in writing with reasons.

3. The Formal Appeal Stage is the final stage and may involve the student and respondent appearing before a Faculty- or University-level tribunal, depending on the type of grievance and the outcome of a pre-hearing convened to determine, among other things, whether any or all of the issues in dispute may be resolved without recourse to a formal hearing before a tribunal. A student initiates this stage by filing an Application for a Formal Hearing, which may be obtained from Faculty Associate Deans for Type 1 grievances (Form B) or the University Secretariat for Type 2 grievances (Form C).

An Application for a Formal Hearing must be filed within three weeks of receiving the decision on the Formal Inquiry. Upon receipt, a copy of Form B or Form C is made available to the respondent who must reply in writing; a copy of this reply is made available to the appellant. If, following the pre-hearing, there is to be a formal hearing, it will be conducted according to the detailed procedural rules described in the policy document.

The Ombudsperson may serve as a mediator in cases where the parties feel such involvement may be helpful in resolving a grievance. As noted in the policy document, a student must lodge a grievance (Form A) within six 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. Upon graduation, a student's right to appeal ceases.

Grievances arising from unethical behaviour such as sexual harassment, discrimination or abuse of supervisory authority should be directed to the Ethics Committee (c/o University Secretariat, Needles Hall).

Note
Revisions to the Student Appeal and Academic Discipline policies for 1993-94 are awaiting final approval at time of printing.

Ownership of Student's 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;
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).

Student and Administrative Services

There are a number of centralized services which the student at the University may use as much or as little as he or she desires. More detailed information is available from each of the departments or organizations listed.

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.

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.

The University of Waterloo

Student Academic Records; Use of Computing Facilities

Policy on Research with Human Participants

Student and Administrative Services

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.

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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 Boards, 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 Board Chairs. 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 Vice-President Operations and Finance works with the Business 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 Sexuality Resource Centre. This Vice-President also oversees the Boards of Entertainment, Communication and Creative Arts, 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 Boards of Academic Affairs, External Liaison, Public Issues, Internal Liaison, Women’s Issues, and Human Rights. The VPUA is the external liaison with the three levels of government and the Canadian Federation of Students.

The Board of Academic Affairs’ responsibilities include monitoring all University Academic Policies and Regulations and establishing communications with undergraduate students who sit as representatives on Administrative boards.

The Board of Communications is responsible for overseeing the various publications of the Federation. These include the federation video, as well as calendars, flyers and information published less frequently.

The Board of Entertainment helps to co-ordinate and supervise all campus-wide programs such as Orientation, Homecoming, Winter Carnival, Summerfest, pubs, and concerts.

The Board of External Liaison handles activities which connect and relate the student to the local, national, and international communities.

The Creative Arts Board provides assistance and participation to most on-campus musical, drama, and dance activities.

The Public Issues Board works to provide an out-of-the-classroom education, sponsors programs and speakers on campus to broaden the student-learning experience.

The Board of Internal Liaison is an important Board that co-ordinates and assists activities between the Federation, Societies, Residences, Clubs, and Athletics.

The Human Rights Board ensures that the University of Waterloo provides an environment wherein its members can pursue academic excellence as well as personal and social growth, free from all forms of discrimination and harassment. It further promotes human rights as outlined in the Canadian Charter of Rights.

The Women’s Issues Board works to articulate women’s issues and concerns within the University community and to encourage women to participate in student and university governing bodies.

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. The Ombudsperson’s Office is located in the Campus Centre, Room 150. 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, Resumé 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, Room 235, or to telephone 898-4042.

Campus Centre
The Campus Centre (CC) 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 CC 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 Association and the Ontario Women's Interuniversity Athletic Association. Both Associations compete with 16 other Ontario universities in over 30 activities. Campus Recreation provides an intramural program at competitive, recreational, and instructional levels, including such sports as slow-pitch, fitness, scuba, ballroom dancing and many others. The Physical Activities building, a golf course, numerous outdoor fields, Columbia Icefield arena and other facilities, 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 Gift Shop
The Bookstore and Gift Shop are located in South Campus Hall and provide students with required textbooks, stationery, engineering, and art supplies, and approximately 25,000 titles of non-required books.

Bookstore Directory
On the main floor students will find Humanities textbooks, general and reference books, electronics, and art and stationery supplies. Textbooks for the following disciplines are stocked on the lower floor: Accounting, Engineering, Economics, Math and Computer Sciences, Applied Health Sciences, and Environmental Studies. Textbooks are arranged by department (subject) and by author.

Pricing Policy
The Bookstore sells required textbooks at discounted prices.

A special order service, for books that are not generally stocked, is provided at no charge. If a title is "in print", it can almost always be ordered.

Gift Shop Directory
Located across from the Bookstore, the Gift Shop offers an extensive line of UW insignia apparel and gifts. Free UW gift and apparel catalogues available for mail orders. Special orders accepted anytime for UW Graduation rings and UW Alumni watches.

Refund Policy
COURSE BOOKS: Price will be refunded in full during the first two weeks of each term if the book is in MINT CONDITION and a SALES RECEIPT is presented.

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.

GIFT SHOP: Refund or exchange within 2 WEEKS from date of sale; item must not be used or worn, in MINT CONDITION and a SALES RECEIPT presented. All red tag Sales Ticket items are FINAL SALE (no refund or exchange).

Bookstore and Gift Shop Hours
September to April:
Monday to Friday 9:00 a.m. - 5:00 p.m.
Saturday 12:00 p.m. - 4:00 p.m.

May to August:
Monday to Friday 8:30 a.m. - 4:30 p.m.
Saturday 12:00 p.m. - 4:00 p.m.
(Closed Saturdays during July and August)

Extended hours will be posted at the beginning of each term.

General Inquiries, ext. 2902
Textbook Information, ext. 3996
Gift 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 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 885-4280. Visa and Mastercard are accepted for most events. Most shows have special discount prices for students.

Counselling Services
Room 2090, Needles Hall
Professionally trained counsellors are available to help students with educational and 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 2855 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 Friday.

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 and Safety Department
Health and Safety Building
The Health and Safety Department includes 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. For emergencies, there is a doctor on call who can be reached 24 hours a day by dialing 888-4096. Physicians’ fees at Health Services, as well as laboratory work, x-rays, and most referrals are paid by the Ontario Health Coverage (OHIP) or other provincial health plans. More details are available at the Health and Safety Department.

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.

Sexual 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. Sexual harassment, discrimination, and the abuse of academic authority, for example, are inimical to this environment. A Co-ordinator for Ethical Behaviour and Human Rights is available as a resource to all members of the University community on matters involving ethical/human rights issues. All forms of sexual harassment are covered by the University's policies (see in particular Policy 33, Ethical Behaviour). The Sexual Harassment Counsellor, available through Counselling Services, provides information and advice (on a completely confidential basis) to students in matters pertaining to sexual harassment.

Alternative resource personnel include: Counselling Services, the Health and Safety Department and the Ombudsperson.

Mature Student Services
The Mature Student Services office provides both academic information 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 counseling can be made by phone (ext. 2429) or by visiting the office in the Modern Languages Building, Rooms 224 and 225. Office hours are 8:30 a.m. to 4:30 p.m., Monday through Friday.

Child Care
There are three licensed child care facilities located on the University of Waterloo campus. On the north campus, just off Columbia Street, are the Hildegard Marsden Co-operative Day Nursery and the Klemmer Farmhouse Co-operative Nursery. The Marsden centre offers professional services for infants (from 3-18 months), toddlers (from 18-33 months), preschoolers (two to five years), and for children after school and on PD days. Fourteen fully qualified staff members operate this year-round facility. Fees vary according to the child's age. For more information, call ext. 4750. The Klemmer Farmhouse offers professional full-and half-day programs for children from 18 months to five years of age. Five staff members operate this year-round nursery with the co-operative assistance of parents. Fees vary depending upon the time a child spends at Klemmer. For more information, call 865-5181. 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.

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.
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, coordination 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 Office oversees the 40 University exchange agreements currently in place.

5. Office of Human Research and Animal Care: The Manager, Human Research and Animal Care, in consultation with the members of the Committee on Research Involving Human Subjects, reviews University research proposals involving human subjects for ethical and medical acceptability and legal liability. This process ensures that the safety, rights and welfare of the participants are adequately protected as outlined in the Office of Human Research Guidelines. As the official liaison officer between the University and local public and separate school boards, the Manager is also responsible for approving and making arrangements for all studies which require the participation of elementary and secondary school students and/or teachers. (For more information, see Research with Human Participants, page 1:12).

The Committee on Animal Care reviews University activity involving animals according to the requirements of The Animals for Research Act and the Canadian Council on Animal Care. The Manager monitors the animal facilities on-campus and advises the Dean of Research and the Committee on 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.

Residences
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 Waterloo Co-operative residence. The Co-op residence is situated just off campus, and is owned and operated by students. Also situated just off campus is the
University Married Students’ Apartments complex which contains 240 one-bedroom and 360 two-bedroom apartments. An off-campus housing information service is also provided.

Inquiries should be made as follows:

For Village I, Village II, townhouses, and Minota Hagey write:
Housing Office
Village I
University of Waterloo
Waterloo, Ontario N2L 3G1
or phone (519) 884-0544

For off-campus information write:
Off-Campus Housing Office
Village I
University of Waterloo
Waterloo, Ontario N2L 3G1
or phone (519) 666-4408

For Federated and Affiliated Colleges, Waterloo Co-op Residence, and Married Students’ Apartments, write:

Conrad Grebel College
Westmount Rd. N.
Waterloo, Ontario N2L 3G6
or phone (519) 884-0220

Married Students’ Apartments
159 University Ave. W.
Room 0104
Waterloo, Ontario N2L 3E8
or phone (519) 888-4040

Notre Dame College
Waterloo, Ontario N2L 3G2
or phone (519) 884-2460

Renison College
Westmount Rd. N.
Waterloo, Ontario N2L 3G4
or phone (519) 884-4400

St. Jerome’s College
Waterloo, Ontario N2L 3G3
or phone (519) 884-8110

St. Paul’s United College
Waterloo, Ontario N2L 3G5
or phone (519) 885-1460

Waterloo Co-operative Residence Inc.
268 Phillip St.
Waterloo, Ontario N2L 6G9
or phone (519) 884-3670
Fax (519) 888-6398

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 2060, ext. 2614. Office hours are 8:30 a.m. to 4:30 p.m., Monday to Friday.

Teaching Resource Office
The Teaching Resource 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.

Facilities for Students with Disabilities
The University has developed a number of services and has available assistive devices for use by students with disabilities:

- All buildings on campus have at least one wheelchair-accessible entrance. Most buildings have wheelchair-accessible washrooms or are linked to a building that does. Improvements are continually being made to improve campus accessibility.
- Village I and II have wheelchair-accessible rooms and disabled students are given priority for acceptance. Students may request a trial stay in residence prior to making application to assess and evaluate the facilities.
- A Centre for Sight Enhancement, with up-to-date technical equipment, has been established in the School of Optometry to aid visually disabled students. For information call ext. 3561.
- Library services: book retrieval, campus delivery (with off campus link), photocopying, term loan, and dial-in access to the library’s catalogue. Adaptive equipment/facilities (Porter Library): scanners, magnifiers, printers, microcomputers, tape recorders, and reading rooms. Call the Librarian, Services for Persons with Disabilities at 888-4861 (telephone/TDD) for details.
- The Co-ordinator of Services for Persons with Disabilities will assist disabled students to access campus services and facilities. For information or assistance, call 888-4635. Off-campus TDD users may call 888-4044. On-campus TDD users call ext. 4044.

Other campus services and facilities available to TDD users include:
- Correspondence Office 888-4794
- Librarian, Services for Persons with Disabilities 888-4861
- Dana Porter Library Information Desk 888-4772
- Davis Centre Library Information Desk 888-4771
- Library renewals 888-4773
- Security Office 888-4811

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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 responsibility for the University's continuing education offerings, part-time studies, and the correspondence 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 held in 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, correspondence tutor-makers, lab instructors, or those in similar teaching roles.

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

**Visitors Reception Centre**
The Secondary School Liaison Office invites prospective students and parents to visit the Centre which is located in the Optometry building, Room 308. From September to April, the Centre is open daily, Monday to Friday, from 8:30 a.m. to 4:30 p.m. Campus tours leave from the Centre at 10:30 a.m. and 1:30 p.m. and are about 1½ hours long. Students can also arrange to visit specific departments and meet with Faculty members about programs or facilities. Visitors to the campus are invited to phone to make arrangements. The number to call is (519) 885-1211, ext. 3614.

Although prospective students are welcome to visit the campus at any time, regular tours are not scheduled from May to August, nor is the Visitors Reception Centre open for this term. Students may tour the campus on their own or call the appropriate faculty office if they wish to make special arrangements. The Secondary School Liaison Office will assist, if necessary, with these arrangements.

**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 (1980) 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.
Admissions

Fall Orientation – We’re Number One with these students.
General Information

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

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, 1993.

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 competent authority, a student will not profit from University studies.

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 Accounting 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 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.

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

General Admission Requirements

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

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

Applicants educated outside of Ontario must submit evidence of having obtained a level of education equivalent to that required of applicants from Ontario (see chart on pages 2:5-2:9) as well as meeting admissions average requirements.

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

English Proficiency Test

Applicants whose native language is not English are advised to take the "Test of English as a Foreign Language" (TOEFL). Normally, a score of 600 is required to satisfy the Admissions Committee that the applicant's knowledge of the English language is adequate to pursue university studies successfully. The expenses involved in administering the test must be borne by the applicant.

 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 1993-94 Admission Requirements for Year One Programs on pages 2:5-2:9 for general admission requirements and specific program requirements and recommendation.

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
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
B.A. or B.A.Sc. (first or second division).

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 a background equivalent to that provided by OAC Mathematics and Science courses. Admissions Committees for less technical programs will review the applicant's personal and professional development, formal training, work experience and community service before making a decision.

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

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

Non-Degree Status
Mature students or others who are not interested in pursuing a degree may apply for admission on a non-degree basis. Credit courses successfully completed by students admitted under this provision 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 admitted and registered 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 first class honours or high second class honours 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 first class honours or high second class honours 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). An overall average of 60% on six Ontario Academic Courses is the minimum required for consideration, but higher averages normally are required for admission to individual programs in which the demand for places by qualified applicants exceeds the supply of places available. The actual averages required for admission to particular programs are determined each year on the basis of the number of applicants and the qualifications of those applicants. The admission average is calculated using the best six marks which include marks for courses required for admission. The length of time taken by an applicant to complete the secondary school program will not of itself be a determining factor in the admission decision providing the student has proceeded normally through the program without repeating any courses or credits.

The University reserves the right to withdraw the Offer of Admission made to an applicant on the basis of interim marks or incomplete standing, 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 1993-94

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<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></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>The following comments are intended as guidelines only. Competition for available places each year may result in changes to the factors which affect admission decisions. Competition is keen for all programs because the number of qualified applicants usually exceeds the number of places available. 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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<td>Applied Health Sciences</td>
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<td>Dance</td>
<td>Six Ontario Academic Courses as well as an audition (see &quot;Comments&quot;).</td>
<td>Applicants are encouraged to include OAC English in their program.</td>
<td>Applicants living within a reasonable commuting distance of Waterloo must attend an audition class in the spring. Applicants unable to travel to Waterloo must send a performance video tape which indicates their level of technique, submit a letter explaining their educational goals as well as at least one letter of reference from their dance instructor (certificates from the R.A.D. or I.S.T.D. will also be considered). Those admitted will be required to take an audition for placement during the first week of classes.</td>
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<tr>
<td>Honours Co-op Health Studies</td>
<td>Six Ontario Academic Courses including: Biology, Chemistry.</td>
<td>OAC Physics and Calculus are strongly recommended for applicants considering the Pre-Health-Professions Option.</td>
<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>
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<tr>
<td>Honours Co-op Kinesiology</td>
<td>Six Ontario Academic Courses including: Calculus, Chemistry, one of Biology or Physics with a minimum grade of 60% in each of the required courses.</td>
<td>Both OAC Biology and Physics are recommended.</td>
<td>Applicants with averages in the mid to low 70's, based on required courses, are given first consideration. The Kinesiology program includes required university courses in Biology, Calculus, Chemistry, Computer Sciences, Physics, Psychology and Sociology. Applicants are encouraged to complete a 'Personal Information Form'.</td>
</tr>
<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 with overall averages in the mid to low 70's are given first consideration. 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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<td><strong>Arts</strong></td>
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<td><strong>Applicants are expected to complete and submit the Arts 'Admission Information Form'.</strong></td>
<td><strong>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'.</strong></td>
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<tr>
<td>Regular</td>
<td>Six Ontario Academic Courses including English and one other Arts-related course.</td>
<td><strong>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, a Mathematics course is strongly recommended for applicants who are considering social science programs such as Psychology and Geography. Calculus is preferred for applicants interested in majoring in Economics.</strong></td>
<td><strong>In recent years, most students admitted have had averages in the mid to high 70’s. In certain circumstances, applicants with lower averages may be considered on the basis of additional indicators. Entry to General, Honours, and major programs, including departmental Co-op, occurs following Year One and is based on academic performance in Year One.</strong></td>
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<tr>
<td>Renison-Social Development Studies (Regular)</td>
<td>Six Ontario Academic Courses including English and one other Arts-related course.</td>
<td><strong>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, a Mathematics course is strongly recommended.</strong></td>
<td><strong>In recent years, most students admitted have had averages in the mid to high 70’s. In certain circumstances, applicants with lower averages may be considered on the basis of additional indicators. Applicants who are not admitted to Social Development Studies are considered for Regular Arts through Renison.</strong></td>
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<tr>
<td>Accountancy Studies (Co-op)</td>
<td>Six Ontario Academic Courses including English.</td>
<td><strong>Applicants should include OAC Accounting, Calculus and one other OAC Mathematics course, preferably Finite Mathematics, in their program. Students who do not take these OAC courses will not be disadvantaged when being considered for admission but will be required to take introductory courses in these subjects in Year One.</strong></td>
<td><strong>Applicants with averages in the mid 80’s will be given first consideration. Students will register in either Co-op Chartered Accountancy or Co-op Management Accountancy. Applicants not admitted to Arts Accountancy Studies (Co-op) will be considered for admission to Arts Regular only, when interest in this alternative is well-supported on the Arts 'Admission Information Form'.</strong></td>
</tr>
<tr>
<td>Applied Studies (Co-op)</td>
<td>Six Ontario Academic Courses including English and one other Arts-related course.</td>
<td><strong>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 encouraged to include courses from Mathematics and Science.</strong></td>
<td><strong>In recent years, most students admitted have had averages of 90% or higher. Applicants with averages in the high 70’s range have been admitted, on the basis of additional indicators, to Arts Applied Studies Regular, entering the first work term in Year Two. Applicants not admitted to Arts Applied Studies, may be considered for the Arts Regular program.</strong></td>
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<tr>
<td><strong>Engineering</strong></td>
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<td><strong>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 Science 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.</strong></td>
<td><strong>The majority of admitted students have averages of 75% or higher. A number of applicants with lower averages are admitted 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.</strong></td>
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Computer
Electrical
Geological
Mechanical
Systems Design

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<tr>
<td>Chemical</td>
<td>Six Ontario Academic Courses including:</td>
<td><strong>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 Science 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.</strong></td>
<td><strong>The majority of admitted students have averages of 75% or higher. A number of applicants with lower averages are admitted 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.</strong></td>
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### Environmental Studies

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<td>Architecture (pre-professional program)</td>
<td>Six Ontario Academic Courses including: English or French, Physics, Calculus, Algebra and Geometry. An interview is also required (see &quot;Comments&quot;).</td>
<td>Applicants are encouraged to include Finite Mathematics in their program; as well, independent art studies, secondary school art programs or other creative fields of study are strongly recommended.</td>
<td>Applicants with an average of 75% or higher are given first consideration. 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 problem-solving exercise and secondary school achievement.</td>
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<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>Applicants with an average of 75% or higher are given first consideration. 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>
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<tr>
<td>Honours Co-op Geography</td>
<td>Six Ontario Academic courses including English.</td>
<td>Applicants are encouraged to include OAC courses in Geography and Mathematics in their program.</td>
<td>Applicants with an average of 70% or higher are given first consideration.</td>
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<tr>
<td>Honours Regular Geography</td>
<td>Six Ontario Academic courses including English.</td>
<td>Applicants are encouraged to include OAC courses in Geography and Mathematics in their program.</td>
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<tr>
<td>Urban and Regional Planning</td>
<td>Six Ontario Academic Courses including English. An interview is also required (see &quot;Comments&quot;).</td>
<td>Applicants are encouraged to include an OAC Mathematics in their program.</td>
<td>Applicants with an average of 70% or higher are given first consideration. 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 the secondary school record 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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### 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>
<td>Honours Co-op Mathematics</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>Applicants are encouraged to develop as much breadth as possible by choosing courses from the arts, humanities, social sciences and physical sciences. 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 majority of admitted students have averages of 75% or higher. The Admissions Committee gives close attention to evidence indicating an exceptional aptitude and interest in mathematics, teachers' recommendations, performance in the Descartes Mathematics Contest, the number and variety of OAC credits and involvement in extracurricular activities. Students not offered admission to the program of their choice are considered for all other Mathematics programs. Students wishing to pursue the Teaching Option in Year Two should apply to Honours Co-op Mathematics.</td>
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<td>Accounting Options</td>
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<tr>
<td>Honours Regular Mathematics</td>
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<td>Science</td>
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<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>The majority of admitted students have averages in the high 70's or higher. Students 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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### Science

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<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 are encouraged to include OAC Biology if they are considering the Pre-Health-Professions Option.</td>
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<tr>
<td>Honours Regular Environmental Science</td>
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<td>Honours Regular Science and Business</td>
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The majority of admitted students have averages of 75% or higher. The Admissions Committee gives close attention to evidence indicating an exceptional aptitude and interest in mathematics, teachers' recommendations, performance in the Descartes Mathematics Contest, the number and variety of OAC credits and involvement in extracurricular activities. Students not offered admission to the program of their choice are considered for all other Mathematics programs.

Students wishing to pursue the Teaching Option in Year Two should apply to Honours Co-op Mathematics.
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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>
<td></td>
</tr>
<tr>
<td>Honours Regular 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 both Algebra and Geometry and Finite Mathematics if they are considering Honours Co-op Applied Chemistry. 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 and Honours Co-op Applied Chemistry – 70% in Chemistry and 70% in Mathematics.</td>
</tr>
<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>
</tr>
<tr>
<td>Honours Regular Physics</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Optometry</td>
<td></td>
<td>Application is made after completion of at least one year of university Science.</td>
<td></td>
</tr>
</tbody>
</table>
**Application Procedures**

1. Applicants who have never enrolled at Waterloo for full-time studies, part-time studies or correspondence 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. 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.

   a) Applicants who wish to take courses by correspondence should write to the Correspondence Program, University of Waterloo, Waterloo, Ontario N2L 3G1 or call (519) 888-4950.

   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

   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>
</tr>
</thead>
<tbody>
<tr>
<td>May 1993</td>
<td>March 1, 1993</td>
</tr>
<tr>
<td>July 1993</td>
<td>June 1, 1993</td>
</tr>
<tr>
<td>September 1993</td>
<td>May 1, 1993</td>
</tr>
<tr>
<td>January 1994</td>
<td>November 1, 1993</td>
</tr>
</tbody>
</table>

**Correspondence Program**

Students not previously registered at UW | Students previously registered at UW |
---|---|
Fall Term | Fall Term |
June 1, 1993 | June 30, 1993 |
Winter Term | Winter Term |
September 13, 1993 | October 8, 1993 |
Spring Term | Spring Term |
January 24, 1994 | February 14, 1994 |

**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.

**Processing Applications**

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

All Ontario Secondary School applicants will be notified on or after June 11, 1993 of the status of their application for admission. Ontario Secondary School applicants who do not receive an offer of admission at this time will have their applications deferred until the final marks are received by the University. When these marks have been received, qualified applicants will be considered until the remaining places are filled. Ontario Secondary School applicants who complete their studies in the Fall semester will be considered when final grades are received.

Ontario Secondary School applicants who receive an offer of admission dated on or before June 11, 1993 are required to confirm acceptance by June 25, 1993.

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, 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). Students not wishing to have this information released may indicate their wishes on the application form.

Registration and Fees
Following admission, students will be required to preregister for courses and then make final arrangement for registration. See Chapter 3 for an explanation of these procedures.
Fees and Registration
Preregistration, Registration, Fees

**Preregistration**

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

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

2. **Returning Students:**
   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 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:**
   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.
Preregistration, Registration, Fees

LATE REGISTRATION (Full- and Part-time students)

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

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

*Subject to change

See Registration Newsletter for dates when late fees start.

FINAL REGISTRATION DATES

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

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

<table>
<thead>
<tr>
<th>Term Starting</th>
<th>Last Date to Register</th>
</tr>
</thead>
<tbody>
<tr>
<td>May 1993</td>
<td>June 30, 1993</td>
</tr>
<tr>
<td>July 1993</td>
<td>July 30, 1993</td>
</tr>
<tr>
<td>September 1993</td>
<td>October 29, 1993</td>
</tr>
<tr>
<td>January 1994</td>
<td>January 31, 1994</td>
</tr>
<tr>
<td>May 1994</td>
<td>June 30, 1994</td>
</tr>
</tbody>
</table>

WITHDRAWALS

(Individual Faculty sections should be consulted for academic penalties for late withdrawal.)

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.
2. Students withdrawing in the first three weeks of a term (first week for Summer Session) will receive a full refund less a $25 registration charge. Part-time students will be charged $10.
3. Students withdrawing during weeks four to seven of a term (second week of Summer Session) will receive a refund of 50%.
4. Refunds are not provided to students after week seven of a term (week two of Summer Session).
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.

BANKING INFORMATION

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

It is the student's responsibility to ensure that funds are available at registration; late fees will not be waived for students who have failed to make timely transfer arrangements.
8. The Federation Hall Fee is 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 from their studies will have this noted on their transcript, along with the effective date of withdrawal. This practice does not apply to those students who voluntarily withdraw prior to, and during, the full refund period.

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).
SCHEDULE OF FEES

1993 PRELIMINARY Schedule of Fees – Undergraduate Programs – Tuition and Incidental 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 1993. 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.

<table>
<thead>
<tr>
<th>Faculty</th>
<th>Basic Term Fee (Note 1, 3)</th>
<th>Co-op Fee (Note 2)</th>
<th>Total Tuition Fees</th>
<th>Total Incidental Fees</th>
<th>Total Fees per Term</th>
</tr>
</thead>
<tbody>
<tr>
<td>Applied Health Sciences</td>
<td>1013.00</td>
<td>340.00</td>
<td>1013.00</td>
<td>117.01</td>
<td>1130.01</td>
</tr>
<tr>
<td>– Regular</td>
<td>1013.00</td>
<td></td>
<td>1013.00</td>
<td>117.01</td>
<td>1130.01</td>
</tr>
<tr>
<td>– Co-op</td>
<td>1027.00†</td>
<td>340.00</td>
<td>1367.00</td>
<td>141.78</td>
<td>1508.78</td>
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<tr>
<td>Architecture</td>
<td></td>
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<td></td>
</tr>
<tr>
<td>– Year 1</td>
<td>1100.00</td>
<td></td>
<td>1100.00</td>
<td>119.01</td>
<td>1219.01</td>
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<tr>
<td>– Upper Year, Co-op</td>
<td>1100.00</td>
<td>340.00</td>
<td>1440.00</td>
<td>143.78</td>
<td>1583.78</td>
</tr>
<tr>
<td>Arts</td>
<td></td>
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<td></td>
</tr>
<tr>
<td>– Regular</td>
<td>1013.00</td>
<td></td>
<td>1013.00</td>
<td>121.01</td>
<td>1134.01</td>
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<tr>
<td>– Accountancy Studies PAS*</td>
<td>1027.00†</td>
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<td>1027.00</td>
<td>196.01</td>
<td>1427.01*</td>
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<tr>
<td>– Co-op</td>
<td>1027.00†</td>
<td>340.00</td>
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<td>– Accountancy Studies Co-op</td>
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<td>220.76</td>
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<td>Engineering</td>
<td></td>
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<tr>
<td>– Co-op</td>
<td>1114.00†</td>
<td>340.00</td>
<td>1454.00</td>
<td>227.28</td>
<td>1681.28</td>
</tr>
<tr>
<td>Environmental Studies</td>
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</tr>
<tr>
<td>– Regular</td>
<td>1013.00</td>
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<td>1013.00</td>
<td>119.01</td>
<td>1132.01</td>
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<tr>
<td>– Co-op</td>
<td>1027.00†</td>
<td>340.00</td>
<td>1367.00</td>
<td>143.78</td>
<td>1510.78</td>
</tr>
<tr>
<td>Independent Studies</td>
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<tr>
<td>– Regular</td>
<td>1013.00</td>
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<td>1013.00</td>
<td>114.01</td>
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<tr>
<td>Mathematics</td>
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<tr>
<td>– Regular</td>
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<td>– Co-op</td>
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<td>340.00</td>
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</tr>
<tr>
<td>– Co-op Accounting</td>
<td>1027.00†</td>
<td>340.00</td>
<td>1367.00</td>
<td>221.28</td>
<td>1588.28</td>
</tr>
<tr>
<td>Optometry</td>
<td></td>
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<tr>
<td>– Regular</td>
<td>1100.00</td>
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<td>1100.00</td>
<td>173.01</td>
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<tr>
<td>Science</td>
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<td>1013.00</td>
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<tr>
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<td>340.00</td>
<td>1367.00</td>
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<tr>
<td>Summer Session</td>
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<tr>
<td>– Half Course (0.5 credits)</td>
<td>228.00</td>
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<tr>
<td>– Full Course (1.0 credits)</td>
<td>456.00</td>
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<tr>
<td>Unit Course Fee (Note 4)</td>
<td>228.00</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* The total fee for the Professionally Accredited Stream (PAS) of this program includes the required Internship Fee of $204.00 per term.

† Includes $14.00 work report marking fee (see Note 3).
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 1993. 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 $6227.00 per term plus incidental fees as shown below. The Unit Course Fee is $1245.40 per term course.

2. Registration in any other undergraduate program:
   - Basic tuition fees are $3820.00 per term plus incidental fees as shown below. The Unit Course Fee is $764.00 per term course.

INCIDENTAL FEES

1. The following incidental fees are compulsory:
   - Federation of Students (see Note 8) $24.65
   - Interuniversity Athletics $31.75
   - Health Insurance (see Note 6)
     - Regular $28.73
     - Co-op $53.50
   - Federation Hall (see Note 7) $7.50
   - Student Coordinated Plan (see Note 16) $10.00

2. The following incidental fees must be paid on registration but are refundable on request from the organization listed below within three (3) weeks after the start of lectures for the term:
   - Student Society (see Note 9)
     - Applied Health Sciences $3.00
     - Architecture $5.00
     - Arts $7.00
     - Engineering $10.50
     - Environmental Studies $5.00
     - Independent Studies $-0
     - Mathematics $7.50
     - Optometry $6.00
     - Science $6.00
   - Voluntary Student Contribution (see Note 15)
     - Accounting $75.00
     - Engineering $75.00
     - Science $50.00

3. The following incidental fees are voluntary, not a requirement of registration and are refundable on request from the organization listed below within three (3) weeks after the start of lectures for the term:
   - WPIRG (see Note 10) $3.28
   - Sandford Fleming Foundation (see Note 11) $3.00
   - Radio Waterloo (see Note 12) $4.00
   - Imprint — including G.S.T. (see Note 13) $4.10
   - Science Foundation (see Note 14) $3.00

Note 1 — Term

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

Note 2 — Co-operative Fee

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

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

Note 3 — Tuition Rates for Co-op Students

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

Students who have registered for the normally scheduled number of academic terms, but are required to register for additional terms in order to complete their academic degree requirements are exempted from the Co-op and Work Report Marking portion of their fees for such terms.

Please contact the Assistant Registrar for your Faculty to request a fee adjustment if this situation applies to you.

Note 4 — Unit Course Fee

The fee assessed at $228.00 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 her/his official duties as a diplomatic or consular officer or representative or official properly accredited of a country other than Canada, or of the United Nations or any of its agencies or of any intergovernmental organizations in which Canada participates or as a dependent member of the staff of any such diplomat, consular officer, representative or official; or a member of a foreign military force or of a civilian component thereof admitted to Canada under the Visiting Forces Act, and any dependents of such personnel;

4. A dependent* of a visitor who is admitted to and remaining in Canada under clause 10(c) of the Immigration Act, 1976 for the purpose of engaging in employment;

5. 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;

6. 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;

7. 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;

8. 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 $39.06 for a Regular student per term and $72.72 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 Student 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 8 to 11 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 8 to 11 of this Calendar.

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

This fee applies to Engineering students only and is voluntary, refundable and not a requirement for registration. Requests for refunds should be directed to the on-campus Engineering Society office, within three (3) weeks after the start of lectures for the term as indicated on pages 8 to 11 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 8 to 11 of this Calendar.
Note 13 – Imprint
The student newspaper.
This fee is voluntary, refundable and not a requirement for 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 8 to 11 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 as indicated on pages 8 to 11 of this Calendar.

Note 15 – Voluntary Student Contribution (Accounting, Engineering, Science)
These voluntary contributions have been established by foundations or associations controlled by students in the programs concerned. Proceeds will be used to update laboratory facilities, teaching equipment, or provide course enrichment not otherwise possible. Further details are available from the relevant organizations. Payment of the contribution is required at registration, but a student who does not wish to participate may obtain a refund by applying to the organizations concerned within three (3) weeks after the start of lectures as indicated on pages 8 to 11 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 – Other Costs
The fees shown do not include the costs of text books, class notes, Correspondence 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 $25.00
- Letter of Permission $ 3.00
- Request for Copy of Academic Record (Student Examination Report)
Awards and Financial Aid

We're proud of our students!
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 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 is defined as having a value equal to one-term full-time tuition at the University of Waterloo.)

Awards and Financial Aid

Regulations Governing University of Waterloo Undergraduate Awards

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 Chemistry, Engineering, Mathematics and Physics as follows:

Chemistry

Students must write the CHEM 13 NEWS Competition.

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.
**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.

**Carousel Dance Centre Entrance Award**

The Carousel Dance Centre has an award fund of $1,000 per year which it may allocate to students in amounts ranging in value from $200 to $500. Students who have participated in the full curriculum of Carousel for a minimum of three years and who are enrolled full time in first-year Dance at the University of Waterloo will be considered for the awards by the Directors of the Carousel Dance Centre.

**FACULTY OF ARTS SCHOLARSHIPS**

The Faculty of Arts is offering several entrance scholarships in recognition of academic excellence. Entrance scholarships are awarded on the basis of secondary school performance and include a four-year $5,000 award and numerous Arts Scholar Awards valued at $100.

**Federal-Provincial Conference Simulation Entrance Award**

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

**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 will be in the form of a fellowship and will be dependent on the student maintaining a B+ overall average.

**RJR MacDonald Accounting Entrance Scholarship**

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

**J. Sayer Minas Entrance Scholarship**

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

**Robin K. Banks/Paciolo 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 extra-curricular 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.

**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 $1,380 to $2,380; (3) one or two awards valued at $2,000 for Year One and renewable for Years Two, Three and Four each having a total value of $5,200. 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.
Awards and Financial Aid
University of Waterloo Entrance Awards

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.

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

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

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

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

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

FACULTY OF MATHEMATICS SCHOLARSHIPS
René Descartes Scholarships, Fellowships and Bursaries
The René Descartes Foundation offers 200 annual awards ranging in value from $300 in Year One to $10,000 distributed over four years. One hundred of these have values of $1,000 or greater. All applicants to the Faculty of Mathematics are candidates if they have written the Descartes Mathematics Contest and have submitted the Applicant Supplementary Information Form. Preference is given to those who have made the Faculty of Mathematics their first choice of program.

K.D. Fryer Scholarship
This award is given in recognition of an incoming first-year student's excellent high school record and a sustained superb performance on the Math contests (including the Descartes Contest) as conducted by the Canadian Math Competition Office of the Faculty of Mathematics. The recipient will also have demonstrated an interest in extracurricular activities or a devotion to the development of additional talents in music or the arts. The student will receive a $16,000 scholarship in support of an entire undergraduate Math program at Waterloo.

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 Paciolo 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 extracurricular 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

Biology Scholarships
Biology offers several awards valued at $1,350 for Year One and renewable for Year Two for a total value of $2,000. Students must maintain an 83% average at the end of Year One for renewal.

Biochemistry Scholarships
Scholarships offered as funds permit, provided by the Departments of Biology and Chemistry.

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
Two scholarships valued at $4,000 may be offered for Year One and renewable for Year Two, Three and Four for a possible total of $10,000. Several scholarships valued at $2,000 for Year One and renewable for Year Two. Three and Four for a possible total of $5,000 will also be offered. A year average of 84% is required for renewal of entrance scholarships.

Earth Sciences Scholarships
Scholarships valued at one-term tuition may be offered to students entering Year One of an Earth Sciences program.

Percy Hermant Centennial Bursary Scholarships
These are the gift of Sydney Hermant. The Bursary Scholarships are awarded on the basis of financial need and academic achievement in first-year General Science at any Canadian university to a student who is proceeding into Year One, School of Optometry. Six scholarships are available, each of a total possible value of $2,000, being $500 per year over the four professional years (Years One, Two, Three and Four) provided a satisfactory standing is maintained. One scholarship is awarded to a student who is a resident of one of the Maritime provinces; two scholarships are awarded to students who are residents of Ontario; three scholarships are awarded to three students who are residents of the Western provinces. The various Provincial Optometrical Associations are consulted in awarding these bursary scholarships. Applications should be submitted to the Student Awards Office before September 15th of each year.

Sir Isaac Newton Scholarships
The Department of Physics awards Sir Isaac Newton (SIN) Scholarships to recognize and encourage academic excellence in students proceeding towards an Honours Physics degree. The awards are made mainly on the basis of the SIN Physics Competition, written in secondary schools early in May. The awards are valued at $1,200 for Year One. Satisfactory academic performance leads automatically to SIN Assistantships in upper years. These carry a stipend of $700 and involve a minor academic or research project within the Department. In addition, SIN Assistants may also win upper year SIN Scholarships described later, so the total value could approach $7,000. (These scholarships may be limited by other major concurrent awards held by the recipient.)

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 instalments 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., 151 Slater Street, Ottawa, Ontario K1P 5N1, 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 effort and contribution to school and community life.
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 $1,000 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 extra-curricular activities within the school or community. This award honours Walter A. Bean, LL.D, a distinguished friend of the University and business and community leader in Kitchener-Waterloo for several decades.

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.

Gladys and Norman Raiter Memorial Scholarships
A number of entrance scholarships are awarded to the top eligible students graduating from secondary school in the Region of Waterloo. The awards are made in conjunction with Waterloo County Entrance Scholarships.

Mr. and Mrs. C.W. Snider Memorial Scholarships
A number of entrance scholarships are awarded to the top eligible female students graduating from secondary schools in the Region of Waterloo. They are awarded in conjunction with Waterloo County Entrance Scholarships.

University of Waterloo Upper-Year Awards

FACULTY OF APPLIED HEALTH SCIENCES AWARDS

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

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

Mark Forster Memorial Scholarship
This 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 semester 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 3B term or the third year of the Regular program.

Michael Gellner Memorial Scholarship
An 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.

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 31 each year.

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
The 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 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 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.
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 2B with a minimum overall average of 80%. 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 Correspondence Prize

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

Classical Studies Essay Prize

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

Classical Studies Prize in Greek

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

Classical Studies Scholarship For New Majors

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

Classical Studies 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 Classical Studies.

Auggie Corvino Memorial Award

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

Currie Scholarship

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

Drama and Speech Communication Senior Scholarship

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

J.W. Dyck Honours Scholarship

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

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 enRoute Card, was created to recognize scholastic achievement in accounting programs.

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 441 (Accounting Information Systems 1) 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 156 who intends to specialize in French.

Department of French Prize
A prize of $100 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 entering the Professionally Accredited Stream (PAS) 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 $100 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.

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 in PAS III who has an outstanding performance in ACC 381, 382 and 680. The winner is selected by the Management Accountancy Studies area.

McDonald's Second Year Fine Arts Scholarship
McDonald's Restaurants of Canada has made available a scholarship with a value of approximately $200 to be awarded to a full-time Fine Arts major on the basis of performance in first-year courses and presentation of a portfolio.

J.C. 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.

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.

Nicole Rolland Prize
An annual prize of $100 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 single or joint honours student in French who has completed the first term of his or her final year (4A or equivalent). 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 Correspondence Spanish.

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 County Quilter's Guild Award
An award of $200 is presented by the Waterloo County Quilter's Guild to a student registered either part-time or full-time in Fine Arts. The recipient is selected by the Fine Arts Department based on performance and courses taken relating to textiles.

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 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 of the Province of Ontario 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.

Beynon Memorial Research Assistantship
The Centre for Society, Technology and Values (CSTV) and the Beynon Foundation are co-sponsoring the Beynon Memorial Research Assistantship. The Assistantship, valued at $600 per term, is open to any full-time Engineering student. Application is made by submitting a one-page Action Plan to the Centre for Society, Technology and Values. The Action Plan should outline a project which the student will undertake for five hours a week. The project must attempt to increase Engineering students’ awareness of the humanitarian potential of Engineering. Application deadline is the second Thursday of each term.

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 extra-curricular activities. Applications should be submitted during the 3B term.

Canadian Posture and Seating Centre Scholarship
Two awards 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 September 30th.

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

Canadian Society for Civil Engineering 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 September 30th.

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

Canadian Society for Mechanical Engineering Gold Medal
The Canadian Society for Mechanical Engineering provides a gold medal and certificate to be presented to a graduating student in recognition of outstanding academic achievement in Mechanical Engineering.
Keith Carr Memorial Award
An annual award valued at $600 is presented to a student in third- or fourth-year Chemical Engineering who has an excellent academic record and has demonstrated strong leadership abilities both at the University and in the outside community. Students should apply in Winter or Spring term each year.

Morgan Champness Memorial Award
Two awards of $100 each are given to fourth-year Mechanical Engineering students who demonstrate outstanding leadership in 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.

Chevron Canada Resources Limited Scholarship
Three awards of $1,000 are awarded to outstanding undergraduate students entering the final year in Engineering. One award of $1,000 will be awarded to an outstanding undergraduate student entering third-year Earth Sciences. Preference will be given to students who have displayed an indicated interest in the field of petroleum. Scholarships are not awarded on the basis of academic excellence alone; other factors such as personality, initiative, community involvement, will also be considered. Applications from Earth Science students should be submitted during the 3B term. Applications from Engineering students should be submitted during the 3B term.

Consulting Engineers of Ontario (CEO) Scholarship
Initiated in 1990/91, the Consulting Engineers of Ontario (CEO) provide a scholarship valued at $500 to one student in every Engineering school in Ontario. The selection of the recipient will be made by the Dean of Engineering/Scholarship Committee from the students enrolled in the third year of any Engineering program.

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

Delcan Scholarship in memory of Charles E. DeLeuw
The DeLeuw Cather and Company of Canada Limited, in memory of the company's founder, is making an annual award available to a fourth-year Civil Engineering student with the transportation option. The award is in the amount of $500 and will be given to the student showing high academic achievement, good character and financial need. Applications should be submitted during the 4B term.

Digital Equipment of Canada Ltd. Award of Merit
A certificate and a cash award of $250 is presented each year to an outstanding third-year student in Computer Science or Computer Engineering. No application necessary.

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 Co-ordinator 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
The $800 award is presented to a student entering fourth-year Chemical Engineering who has a good academic record, has demonstrated a strong interest in extra-curricular activities and athletics and has 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 Cooperative 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.

Fluor Daniel Canada Inc. Scholarship
Two scholarships valued at $2,000 each are presented to two third-year students in Chemical, Civil, Electrical or Mechanical Engineering. Students who obtain a minimum average of 75% or better at the end of Year Two will automatically be considered for the scholarship. One award will be presented to a female and one to a male student in the third year of their Engineering program. Candidates may not hold another major University of Waterloo award in Year Three. No application is necessary.

Gandalf Data Limited Award
An annual award of $1,000 is available to an outstanding undergraduate or graduate student in Electrical, Systems Design or Computer Engineering who is in need of financial support to continue studies and who has an interest in the data communications industry. Students in 1B or above are eligible to apply.

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.

Hewlett-Packard (Canada) Limited Award
Thirty calculators will be awarded to the top ten students entering second-year Engineering, Mathematics and Science.

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.

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.)

Norcen Energy Computer Science, Geological and Chemical Engineering Awards
Three awards of $1,200 are awarded to outstanding undergraduate students entering Year Two or above in Computer Science, Geological Engineering and Chemical Engineering. Awards will be allocated to students who have demonstrated an interest in the community, extra-curricular activities and who have experience related to the oil and gas industry. Applications should be submitted by October 30th each year.

Ontario Construction Education and Research Foundation (OCERF) 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 September 30 each year directly to the Department.
Ontario Hydro Electrical Engineering Award
An annual award of $1,700 is made to a student entering third-year Electrical Engineering who has good academic standing, strong written and oral communications skills, has demonstrated leadership ability and has been involved in extra-curricular activities within the University or community. Applications should be submitted during the 2B term.

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 two $750 awards. The recipients must be in either Engineering or Science, have demonstrated interest in the rubber industry and have high academic standing. Consideration will also be given to experience gained in work terms in a rubber-related field. Applications should be submitted during the 3B term.

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

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./Breslube 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.

Shell Canada Limited Award
One award valued at $2,000 is available to a third- or fourth-year Engineering or Computer Science student who has an interest in the petroleum industry, has achieved a high level of academic excellence and has demonstrated an interest in extra-curricular activities. Applications should be submitted by September 30th each year.

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.

Society of Manufacturing Engineers Awards
Four awards of $150 each are available to students in Mechanical, Electrical, Chemical and Systems Design Engineering. The awards are given on the basis of an outstanding written report or project related to the field of manufacturing engineering.

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

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

Undergraduate Research Assistantships
These awards are valued at $600 per term and provide an opportunity for undergraduates to participate in original Engineering research. 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
Two awards of $250 each are presented annually to outstanding third- or fourth-year Civil Engineering students who demonstrate 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.

M.S. Yolles and Partners Limited Scholarship
An award of $500 is made to one Civil Engineering student in each of the 3B terms. The award is to be made to a student who is interested in a career in structural engineering and, in particular, the design of buildings. The award is intended to encourage those students who plan on a career in Consulting Engineering. The award is conditional upon the student taking the structural analysis and design stream in the 4A and 4B terms. Applications should be submitted during the 3B term.
FACULTY OF ENVIRONMENTAL STUDIES AWARDS

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

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

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

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

Ballenford Architectural Books Cultural History Prize
An annual award of $500 is presented by Ballenford Architectural Books for highest overall academic performance in the cultural history courses taken during the first four years of study in the Architecture program.

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

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

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

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

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

Environment and Resource Studies Scholarships
Interested students in their second, third or fourth year should submit a letter of application outlining the nature and significance of their recent or current activities on environmental issues, along with a copy of their most recent mark report to the Undergraduate Scholarship Committee no later than October 21st each year.

Kaderali 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
An annual scholarship of $500 is presented to a third- or fourth-year student in Urban and Regional Planning based on high academic standing and an interest in planning.

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 Paquette 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.

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

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

Royal Architectural Institute of Canada Medal
The medal is presented to a graduating student on the basis of high proficiency in the BArch Program.

Lorne H. Russwurm Memorial Scholarship
An annual scholarship valued at $600 has been established in memory of Lorne Russwurm, an internationally known researcher and a Professor of Geography from 1967 until his death in January 1987. Professor Russwurm was highly regarded by students for his excellence as a teacher and advisor. The recipient will normally be an undergraduate Geography student entering second, third or fourth year who began studies as a mature student. No application necessary.

Marj Schaefer Award
An award of $300 is given to an Architecture student in good academic standing who has made a notable contribution to the school community.

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

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

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

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

Alan Weeks Memorial Award
Established in memory of Alan Weeks, an award is presented annually to a full-time student enrolled in Year Three of Honours Urban and Regional Planning based on academic achievement. Students who demonstrate the greatest degree of personal growth in the conceptual and innovative aspects of design during their second year (PLAN 256, Environmental Design) will be considered. No application is necessary.

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

FACULTY OF MATHEMATICS AWARDS
Andersen Consulting Scholarship
One award valued at $1,000 is given to a student entering 4A term in either the Faculty of Engineering or a Cooperative 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.

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.

Digital Equipment of Canada Ltd. Award of Merit
A certificate and a cash award of $250 is presented each year to an outstanding third-year student in Computer Science or Computer Engineering. No application necessary.
Awards and Financial Aid
University of Waterloo Upper-Year Awards

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 Eckter Medal in Actuarial Science
This prize was established to recognize the contribution of Samuel Eckter 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 $2,000 is presented to an outstanding undergraduate entering the final year of Computer Science. The award will be based on academic performance in several Computer Science courses. Applications should be submitted during the third year or 3B term.

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 enRoute Card, was created to recognize scholastic achievement in accounting programs.

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 441 (Accounting Information Systems 1) and one to the student achieving the highest mark in CS 486 (Introduction to Artificial Intelligence).

L. Fejer Award in Mathematics
The scholarship will not exceed $3,200 per annum and may be awarded wholly or in part to one or more graduate students or senior undergraduate students enrolled in the Faculty of Mathematics and proceeding to a degree at the University of Waterloo.

Preference will be given to those whose field of specialization is functional equations and/or information theory. Applications should be made by letter to the René Descartes Foundation, Faculty of Mathematics, University of Waterloo.

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

Hewlett-Packard (Canada) Limited Award
Thirty calculators will be awarded to the top ten students entering second-year Engineering, Mathematics and Science.

Microsoft Technical Scholarship
Two awards valued at $5,000 are awarded to full-time, undergraduate second- or third-year Computer Science students. 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 Computer Science Department and must be submitted by November 15 for Co-op and Regular students registered in the Fall term and by January 22 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.)

Norcen Energy Computer Science, Geological and Chemical Engineering Awards
Three awards of $1,200 are awarded to outstanding undergraduate students entering Year Two or above in Computer Science, Geological Engineering and Chemical Engineering. Awards will be allocated to students who have demonstrated a strong interest in extra-curricular activities and have evidence of leadership qualities. Consideration may be given to financial need. Applications should be submitted by October 30th each year.

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./Bristolube 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.

Shell Canada Limited Award
One award valued at $2,000 is available to a third- or fourth-year Engineering or Computer Science student who has an interest in the petroleum industry, has achieved a high level of academic excellence and has demonstrated an interest in extra-curricular activities. Applications should be submitted by September 30th each year.

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.

Sun Life of Canada Award
This $500 award is awarded to an outstanding student who is entering the third year of the Honours Actuarial Science Program. 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.

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 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.

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, Soflens Division 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.

Bernell 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 Bernell 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 is 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.

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

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.

Chevron Canada Resources Limited Scholarship
Three awards of $1,000 are awarded to outstanding undergraduate students entering the final year in Engineering. One award of $1,000 will be awarded to an outstanding undergraduate student entering third-year Earth Sciences. Preference will be given to students who have displayed an indicated interest in the field of petroleum. Scholarships are not awarded on the basis of academic excellence alone; other factors such as personality, initiative, community involvement, will also be considered. Applications from Earth Science students should be submitted during the 2B term. Applications from Engineering students should be submitted during the 3B term.

E.J. Chisholm Memorial Scholarship
This $250 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%.

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 pre-optometry 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.

Percy Hermant General Proficiency Prizes
The gifts of the Hermant Family are awarded to the final-year students in the School of Optometry ranking first and second in general proficiency.

Hewlett-Packard (Canada) Limited Award
Thirty calculators will be awarded to the top ten students entering second-year Engineering, Mathematics and Science.

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.

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 LaCourclere 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/Bo绑架 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.

Douglas T. MacPherson Scholarship
AOCO Limited/Limitee 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 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.

Jerome T. Miller Memorial Prize
A $50 prize was established in 1968 by relatives and friends in memory of the late Jerome Thomas Miller, BSc, MSc '66 (Honours Chemistry and Physics). The cash prize is awarded each year, on the basis of marks, to the student in third year of a program which combines studies in Chemistry and Physics.
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.

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 two $750 awards. The recipients 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.

Optometry 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.

Plastic Contact Lens Outstanding Achievement Award
This award of $1000 and an engraved plaque is presented annually by the Plastic 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.

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
- Nancy O. Bray
- J.L. Daniel
- Nicola Duthie
- Anne Fiedtkou
- Roman Guzowsky
- David Lamb
- B.H. Luneberg
- Wade Mesher
- Mary R. Mitchell
- E.J. (Ted) Mulrooney
- John A. Reeves
- Randall E. Soley
- Robert G. Sommerville
- Michael Souliere

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).

Reginald Williams Memorial Scholarship
The award of $250, 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 female students should apply by January 31 each year.

Elgin County Scholarship
Elgin County offers two scholarships of $300 each to the two students from Elgin County attaining the highest academic standing.

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.

Huron County Scholarships
Huron County Council is offering two $200 scholarships to be awarded to the male and female from Huron County who obtain the highest standing regardless of the year in which they are registered.

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.

William (Bill) Jack Award for Aggregate Related Issues
The William Jack Award valued at $2,500 has been established by the Aggregate Producers Association of Ontario (APAO) to honour the past and continuing contributions of Bill Jack, one of its former Presidents. The Scholarship is awarded annually based on the best contribution to "Aggregate Industry Issues" in the form of an essay or technical report prepared by an undergraduate student at the University of Waterloo.

James D. Leslie Prize
This $500 prize was established to recognize the contribution of Professor J.D. Leslie, the first Director of the Correspondence 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 Correspondence 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 resume 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
 petrol at $800 per month for 3 or 4 months. Applications and information are available from the University Graduate Office or from the Department Chair. U.G.O. Deadline: January 9.

University of Mannheim Exchange Scholarship
Travel, accommodation and living allowance are provided for a student of the “Waterloo in Germany Program” for a year of study at the University of Mannheim.

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.

Tom York Memorial Award
The Tom York Memorial Award was established in memory of Dr. Thomas L. York (1948-88), 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 prose fiction creative writing. 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, c/o Dr. Pauline Greenhill, St. Paul’s United College, Westmount Road, North, Waterloo, Ontario N2L 3G5.

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

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 Awards
Three awards of $100 each to second-, third- and fourth-year Arts or Mathematics/Chartered Accountancy Option students.

Waterloo-Wellington Chartered Accountants Association Awards
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 Awards
Three awards of $200 each to second-, third- or fourth-year Electrical or Computer Engineering students.

Babcock & Wilcox Canada Limited Awards
Three awards of $200 each to second-, third- or fourth-year Mechanical Engineering students.

Dofasco Awards
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.

George J. Dufault Awards
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 Awards
Awards of $200 each to second-, third- and fourth-year students in those classes of each undergraduate Department of Engineering in which industrially sponsored awards have not yet been established.

The Sir Casimir Stanislaus Gzowski Award for Work-Report Proficiency
This award, in the amount of $200, is presented to a Civil Engineering student in each of the 1B Spring and 2A Fall terms, provided in each case that the student is in good academic standing. It is given to the student who has submitted the best work report (graded “Outstanding”) in the class in the first work term. In the event that no student completes an “Outstanding” work report, no award will be presented.

Inco Limited Awards
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 Awards
Three awards of $200 each to second-, third- or fourth-year Chemical Engineering students.

MacLaren Engineers Inc. Awards
Three awards of $200 each to second-, third- or fourth-year Civil Engineering students.

Northern Telecom Canada Ltd. Work-Term Report Award
Six awards of $200 each to second-, third- or fourth-year Electrical or Computer Engineering, Systems Design Engineering students and three awards of $100 each to second-, third- or fourth-year Computer Science/Information Systems Option students.

Novacor Chemicals (Canada) Ltd. Awards
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./Brelube Division Awards
Two awards of $200 each to students in Year Three of Computer Science, Chemical Engineering or an Environmental Engineering option in other Engineering programs.

FACULTY OF ENVIRONMENTAL STUDIES WORK-TERM REPORT AWARDS

R.M. Irving Work Term Report Award
Awards of $100 to second-, third- or fourth-year Geography students.

FACULTY OF MATHEMATICS WORK-TERM REPORT AWARDS

Dofasco Awards
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 Awards
Three awards of $100 each to second-, third- or fourth-year Mathematics, Non-Specialist students.

Equitable Life Insurance Company of Canada Award
One award of $100 to a second-, third- or fourth-year Actuarial Science student.

Institute for Improvement In Quality and Productivity Award
Up to nine awards of $200 each to second-, third- or fourth-year Engineering, and $100 each to Mathematics or Arts Accounting students.

Manulife Financial Work-Term Report Award
One award of $100 to a second-, third- or fourth-year Actuarial Science student.

Microsoft Corporation Award
Three awards of $100 each to third- or fourth-year Computer Science students.

Motorola Canada Limited Award
Three awards of $100 each to second-, third- or fourth-year Applied Mathematics, Business Administration, Combinatorics and Optimization, Operations Research, Statistics or Teaching Option students.

Mutual Life Assurance Company of Canada Award
One award of $100 to a second-, third- or fourth-year Actuarial Science student.

Northern Telecom Canada Ltd. Work-Term Report Award
Six awards of $200 each to second-, third- or fourth-year Electrical or Computer Engineering, Systems Design Engineering students and three awards of $100 each to second-, third- or fourth-year Computer Science/Information Systems Option students.

Peat Marwick Thorne Work-Term Report Awards
Three awards of $100 each to second-, third- and fourth-year Arts or Mathematics/Chartered Accountancy Option students.

QUANTUM Information Resources Ltd. Award
Three awards of $100 each to second-, third- or fourth-year Computer Science students.

Safety Kleen Canada Inc./Brelube Division Awards
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 Awards
Three awards of $100 each to second-, third- or fourth-year Mathematics/Management Accounting students.
**Waterloo-Wellington Chartered Accountants Association Awards**
Three awards of $100 each to second-, third- or fourth-year Arts or Mathematics/Chartered Accountancy Option students.

**FACULTY OF SCIENCE WORK-TERM REPORT AWARDS**

**Borden Chemical Company Canada Limited Awards**
Three awards of $100 each to second-, third- or fourth-year Applied Chemistry students.

**Eli Lilly Canada Inc. Awards**
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.

**Kerr Addison - Minnova Inc. 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 Awards**
Three awards of $100 each to second-, third- or fourth-year Applied Physics students.

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**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). Students in a Regular Program should apply in the Winter term, by January 31st. Students in a Co-op Program should apply by the last day of the month in which lectures begin (limited funds may restrict applicants to one bursary per academic year). 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**

**BP Canada Bursary**
Two bursaries of $500 are offered annually to two students enrolled in Earth Sciences, Engineering, Commerce or Economics at the University of Waterloo.

**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.

**BP Canada Bursary**
Two bursaries of $500 are offered annually to two students enrolled in Earth Sciences, Engineering, Commerce or Economics at the University of Waterloo.

**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.

Women In Support of Engineering Bursary
One or more awards to a total value of $500 are given to male and female engineering students who are experiencing financial difficulties.

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 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.

Emco Limited Bursary
Emco Limited has established a bursary program available to upper-year students in Computer Science, Mechanical and Electrical Engineering.

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

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 memory 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.

BP Canada Bursary
Two bursaries of $500 are offered annually to two students enrolled in Earth Sciences, Engineering, Commerce or Economics at the University of Waterloo.
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.

Klaus Stenzel Memorial Bursaries

The family of Mr. Stenzel, founder of KDS Optical Company Ltd., has established a bursary program in his memory. These awards, in the amount of $1,000 each, are given to two students in each of the third and fourth years of the Optometry program on the basis of financial need and academic and clinical proficiency. Bursary applications should be submitted to the Student Awards Office by September 15.

UNIVERSITY-WIDE BURSARIES

Jerzy W. Anders Memorial Award

A $500 award has been established in memory of Jerzy Anders, a graduate of the University of Waterloo. The award is given to mature individuals who were forced to interrupt their university education due to financial difficulties or family obligations and are experiencing financial hardship upon re-entering the academic world. Mature students experiencing financial difficulties should write to the Assistant Registrar, Student Awards detailing their circumstances.

Atkinson Charitable Foundation Bursaries

The Foundation has established a bursary program which gives assistance to students of merit and proven financial need. Awards are made only to students who are bona fide residents of the Province of Ontario.

Barkley's of Avonmore Bursary

One bursary is awarded annually to a student from a Third World Country. Foreign students must complete a special bursary application form and arrange an appointment with the Assistant Registrar, Student Awards.

Birks Family Foundation Bursary

Bursaries are made available by the Foundation to deserving undergraduates.

C.U.P.E. Local 793 Bursary

A bursary fund has been established by the University of Waterloo Union (CUPE Local 793). Applicants must be either a Union employee, a spouse of a Union employee or a child or grandchild of a Union employee and must provide verification of this status via a "Union Bursary Validation Form", (available from the Union Local Office, GSC 120).

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 established a bursary fund at the University of Waterloo to assist one or more women, studying full time in second, third or fourth year who have attained second class standing and are in need of financial assistance. Preference will be given to women not holding tuition scholarships. Mature female students meeting these requirements are encouraged to apply.

Canadian Federation of University Women – Kitchener-Waterloo Part-Time Bursaries

A limited Bursary Fund has been established for mature female students who are studying on a part-time basis. Candidates must be pre-registered or registered in a degree program, have completed at least two half-credit University of Waterloo courses and be working toward an undergraduate degree through part-time studies. An application form as well as an explanation regarding financial need must be submitted. Special application is required.

John Dobson Foundation Bursary

Bursaries are made available by the Foundation to deserving undergraduates. The bursaries are awarded in conjunction with University of Waterloo Bursaries.

Ron Eydt Travel Award

Undergraduate students who participate in one of the approved exchange programs between the University of Waterloo and other universities are eligible for financial assistance through 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 $50 bursary has been established by the Committee for Emergency Relief for Foreign Students. Foreign students experiencing financial difficulties should complete the bursary application and arrange an appointment with the Assistant Registrar, Student Awards.

K.D. Fryer – F.A.S.S. Award
A bursary fund has been established in memory of Kenneth D. Fryer, one of the founders and long time supporters of the F.A.S.S. theatre company. Funds are available to full- and part-time students at any level in any discipline offered by the University of Waterloo. A minimum average of 60% will be required of the applicants and financial need, as determined by the Awards Office, will be the basis for awarding these funds.

J.G. Hagey Alumni Bursary
In memory of J.G. Hagey, President Emeritus of the University, and in recognition of his significant contributions to post-secondary education, the University of Waterloo Alumni has established a bursary fund. Several bursaries to a maximum of $200 each are awarded annually to students showing financial need. All students attaining a 60% or equivalent standing in their previous academic years are eligible to apply.

Interprovincial Pipe Line Company Bursary
The Company provides $2,000 for bursaries for students beyond the first year who are in need of financial assistance. Preference will be given to students whose normal residence is in Canada or the USA.

Hildegard Marsden Bursary Fund
A bursary fund has been established in memory of Hildegard Marsden, Dean of Women for more than 20 years, for her service to students and the University of Waterloo community at-large. This award is for students in third or fourth year of their degree program who demonstrate financial need, and is given in the Winter term. Preference will be given to female applicants. An application form must be submitted to the Student Awards Office by January 31st.

Mature Student Alumni 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.

Awards and Financial Aid
Bursaries
University Loan Funds

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

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.

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 instituted by the Alumni Association, University of Waterloo. Loans up to $200 with repayment periods of up to four months are available to students in all faculties.

University of Waterloo Foreign Student Emergency Loan
Undergraduate foreign students in their final year of studies encountering financial difficulties should arrange to speak with either the Foreign Student Officer or 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
Provincial and Federal policies for OSAP are currently under review. Further details should be available by March 30, 1993.

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 four plans:

1. The Canada Student Loans Plan provides assistance in the form of interest-free loans to students who wish to pursue post-secondary studies.
2. The Ontario Student Loans Plan makes interest-free loan assistance available to students whose needs are not fully met by the Canada Student Loans Plan.
3. 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.
4. The Ontario Work-Study Plan establishes a means whereby students can actively finance the cost of their education through part-time employment on campus. Positions are posted outside the Student Awards Office.

First-year students must apply no later than July 1, and preferably earlier, to know the amount of award before classes start in the Fall; Nov. 1 for classes that start in the Winter; and March 1 for classes that start in the Spring. Returning students must apply no later than June 15 for Fall; Oct. 15 for Winter; and Feb. 15 for Spring.
Canada Student Loans Program – Part-Time Loans Plan
Guaranteed loans for part-time students attending post-secondary courses are now available under a program funded by the Government of Canada and administered by the provincial governments. Interest-bearing loans will be provided to qualifying needy students for tuition, books, transportation, day care and incidentals.

Further details and application forms for the above are available in the Student Awards Office.

Note
Students from provinces other than Ontario should approach the provincial assistance authority in their home provinces 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-operative Education – A door to your future.
Co-operative Education and Career Services

Department of Co-operative Education and Career Services

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S.J. Kimberley, BA (Toronto), CA
J. Martin, BA (Windsor), CHRP
R. Mateyk, BASc (Toronto), PEng
P.J. Mazzel, BSc, MSc (Queen's), PEng
W.B. Moore, BA (McGill)
G.C. Murphy, PEng
R. Parker, BSc (Montreal), MBA (Toronto)
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Placement Advisors
A.F.H. Blieth
R.A. Hawes, BSc (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 work terms are established in consultation with Co-operative employers.
### Work/Study Sequence

#### Program (By Faculty)

<table>
<thead>
<tr>
<th>Program</th>
<th>Year 1</th>
<th>Year 2</th>
<th>Year 3</th>
<th>Year 4</th>
<th>Year 5</th>
<th>Year 6</th>
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<tr>
<td><strong>Applied Health Sciences</strong></td>
<td>1A</td>
<td>1B</td>
<td>2A</td>
<td>2B</td>
<td>3A</td>
<td>3B</td>
</tr>
<tr>
<td>Health Studies, Kinesiology,</td>
<td>2A</td>
<td>2B</td>
<td>3A</td>
<td>3B</td>
<td>4A</td>
<td>4B</td>
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<tr>
<td>Recreation and Leisure Studies</td>
<td></td>
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</tbody>
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| **Arts**                          |        |        |        |        |        |        |
| Applied Studies with Honours     | 1A     | 1B     | 2A     | 2B     | 3A     | 3B     |
| French, Teaching Specialization  |        |        |        |        |        |        |

| **Accountancy Studies**           |        |        |        |        |        |        |
| Chartered Accountancy            | 1A     | 1B     | 2A     | 2B     | 3A     | 3B     |
|                                  |        |        |        |        | 4A     | 4B     |

| **Management Accountancy**        |        |        |        |        |        |        |
|                                  | 1A     | 1B     | 2A     | 2B     | 3A     | 3B     |
|                                  |        |        |        | 4A     | 4B     |        |

| **Economics (Applied)**           |        |        |        |        |        |        |
| Regular                          | 2A     | 2B     | 3A     | 3B     | 4A     | 4B     |

| **English – Literature**          |        |        |        |        |        |        |
| Regular                          | 2A     | 2B     | 3A     | 3B     | 4A     | 4B     |

| **English – Rhetoric and         |        |        |        |        |        |        |
| Professional Writing             | 2A     | 2B     | 3A     | 3B     | 4A     | 4B     |

| **Anthropology, Political Science, Psychology, Sociology** |        |        |        |        |        |        |
| Regular                          | 2A     | 2B     | 3A     | 3B     | 4A     | 4B     |

| **Engineering**                   |        |        |        |        |        |        |
| Chemical, Civil, Computer**,      | 1A     | 1B     | 2A     | 2B     | 3A     | 3B     |
| Electrical, Mechanical, Systems Design† |        |        |        |        | 4A     | 4B     |
| Stream 8                         |        |        |        |        | 4B     |        |

| **Geological**                   |        |        |        |        |        |        |
| Regular                          | 2A     | 2B     | 3A     | 3B     | 4A     | 4B     |

| **Environmental Studies**         |        |        |        |        |        |        |
| Architecture                      | 2A     | 2B     | 3A     | 3B     | 4A     | 4B     |

| **Environment and Resource Studies** |        |        |        |        |        |        |
| Regular                          | 2A     | 2B     | 3A     | 3B     | 4A     | 4B     |

| **Geography**                    |        |        |        |        |        |        |
| Regular                          | 2A     | 2B     | 3A     | 3B     | 4A     | 4B     |

| **Urban and Regional Planning**   |        |        |        |        |        |        |
| Regular                          | 2A     | 2B     | 3A     | 3B     | 4A     | 4B     |

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

### Arts

### Program Details

- **Stream 8 only**
- **Stream 4 only**
- (*) Optional work term
- (S) Specialization work term
- (Δ) Point of admittance to specialization
- (↓) Point of selection of Chartered Accountancy or Management Accountancy Studies
- (↓) Indicates anticipated continuation into the Master of Accounting (MAcct) portion of the five-year 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.

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(continued on next page)
## Work/Study Sequence (continued)

### Program (By Faculty)

<table>
<thead>
<tr>
<th>Stream 8</th>
<th>1A</th>
<th>1B</th>
<th>2A</th>
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</tr>
</tbody>
</table>

* This term is spent at a Faculty of Education.
† Teaching work term
U After the 2B term, accounting students may follow any one of the academic/work term sequences indicated above subject to minimum enrollment targets and availability of suitable Co-op placements.
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
\(\dagger\) Optional work term
\$ Specialization work term
\(\Delta\) Point of admission to specialization
\(\Delta\) Point of selection of Chartered Accountancy or Management Accountancy Studies
\(\|\) Indicates anticipated continuation into the Master of Accounting (MAcc) portion of the five-year 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 placed by the interview process, the Department will attempt to find suitable work experience for that student.

Seeking Employment and Employer Interviews

Seeking Employment

Students are expected to seek employment through the interview process arranged by the Department of Co-operative Education and Career Services. 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 assignment must have the position evaluated by the Department before it may be considered for credit. Students intending to find their own jobs may not take part in the normal application and interview process arranged by the Department. Non-compliance with the above may result in a student being placed “On Own – University Imposed”.

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 published in the “Want Ads” and specified during the orientation program.

Re-posting and Late Posting

Students may apply for a specified maximum number of additional interviews with employers who submit their job descriptions late, as well as with employers who receive limited response to their initial advertisement.

Release of Information

For those students seeking employment through the interview process, copies of their Co-operative Student Record, academic grades and resumes are made available to prospective employers. A file which includes the Co-operative Student Record, mark reports, “Employer Evaluation of Co-operative Student” forms, records of Co-ordinator interviews, etc., is kept on each Co-operative student. This confidential file is made available for examination with proof of identification. No information may be removed from the file. Copies of “Employer Evaluation of Co-operative Student” forms will be released only upon written authorization from the employer, as this form is considered to be an extension of the employer’s 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”.

Ranking Employers

Students are required to rank all employers by whom they are interviewed. Ranking an employer indicates an agreement to work with that employer. Refusal to accept the job will normally be recorded on the Co-operative Student Record as: “Failed work term – refusal to honour previous agreement”.

Deleted Job Choices

The deletion of a job choice will be considered when the student consults with the appropriate Co-ordinator or Program Administrator. Failure to obtain approval for a ranking deletion may result in the student being placed “On Own – University Imposed”.

Acceptance of Employment

When students are placed, they are notified to 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 placement.

Work Terms

Quantity

Upon entry to a Co-op program, a student is expected to follow the work-term/academic-term sequence which corresponds to that particular program. A student may, for one reason or another, fail to satisfactorily complete the full complement of work terms. For these students and for students given advanced admission to a Co-op program, a certain minimum number of satisfactory work terms must be completed before graduation, namely, a number of work 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".

Co-operative Education and Career Services
Work Terms

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 toward 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 - Unable to Find Suitable Employment: The student was unable to obtain suitable employment through the normal placement process. If suitable employment is subsequently found, Student Records will be altered accordingly.

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 discuss deleted job rankings.

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 where 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
See page 5:5.

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.

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.

I.E. Paterson (President)
Imperial Optical Canada
R.R. Mahabir (Past-President)
Metropolitan Toronto Police
G. Heckman (Vice-President)
Royal Bank of Canada
J.W. Shaddick (Secretary)
London Life Insurance Co.
S.E. Roberts (Membership Chair)
Procter & Gamble Ltd.
R. Francis (Assistant Membership Chair)
Deloitte & Touche
J. Bailey
Ontario Hospital Association
M. Barrados
Office of the Auditor General
D.B. Betdam
Clarke Henning & Betdam Limited
J. Bishop
Environment Protection Labs
C.S. Boyce
3M Canada Inc.
J. Campbell
Bell Canada
S. Cheda
Ministry of Culture and Communications
P. Clark
Dow Chemical Canada Inc.
F. Clegg
Microsoft Canada Inc.
T.F. Corcoran
Ontario Government
D.R. Cox
Northern Telecom Limited
S.P. Crawford
The Co-operators Group Limited
S.B. Fisher
Peat Marwick Thorne

Students Advising Co-op Group (SAC)

The Students Advising Co-op Group is the formal liaison between students and the Department. The Group consists of Co-op students appointed by the various Student Societies and anyone else who wishes to join. These members advise the Department on matters of policy from the students' points of view.
Career Services

Program Administrator
T.H. Fitzgerald, BA (St. Lawrence)

Marketing Co-ordinator
J. Cullen, BA (Waterloo)

Career Advisors
M. Bryan, BA (Waterloo)
C.A. Olheiser

All UW students and alumni, from both Regular and Co-op programs, are encouraged to use these facilities and services (NH Rm. 1115 and Rms. 1001-05).

Career Resource Centre, NH 1115, ext. 3001
Employer Information: files, videos, directories; sample work-term reports and work-term summaries.
Career Planning: self-assessment, careers by major, occupational descriptions, job search, resume writing and interviewing.
Education: a brochure on applying to Graduate School is available and discussion session on this topic is held in September. Calendars, Canadian, U.S. and International Directories; professional school and test information, Teachers' College and Community College resources. Attend "Education Talks" in September.
Study or Work Abroad: program information and guides to going overseas are available.

Career Preparation, NH 1001, ext. 2572
Career Planning and Job Search Publications: printed materials and other resources on career planning and job search.
Information Sessions and Career Preparation Workshops: available to all students, at all levels. Topics include: self assessment, resume and letter writing, researching occupations and employers, job search, networking, job interviews. Sign-up sheets and handouts are available one week prior to the presentation date.
Individual Appointments: if additional assistance is required, an appointment may be made to speak with a Career Advisor.

Student Career Advisors, NH 1003, ext. 4047
During the Fall and Winter terms, peer resource persons are available. These students are located in most faculties and are trained in the areas of resume critiquing and job search.

Employment Services, NH 1001, ext. 4047
Part-time, Off-campus Jobs: advertised throughout the year, on a bulletin board outside the Career Resource Centre.
Summer Jobs: Binders, containing summer job postings, are available October to May, in the Career Resource Centre.

New Graduate Employment Service: Graduating students (Regular and Co-op), who are looking for permanent employment, may register with Career Services in September of their final year, for interviews held during both Fall and Winter terms. Co-op students, who will be on a final work term in the Fall, should register the preceding May.
Alumni Employment Service: Year-round service available to students and to UW alumni, who are able to begin a new full-time, permanent position within one to two months. To register for computer-matched jobs, submit an application form and ten resumés. "Apply Direct" immediate openings are posted on the Career Services bulletin board in Needles Hall.
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 1992. The list does not acknowledge the individual departments within some of the organizations who participated.

- A & L Canada Laboratories
- A & L Computer Software Ltd.
- Acorn Advanced Ceramics Inc.
- Abbott Laboratories Ltd.
- ABC Data and Telecom Ltd.
- ABC Group
- ABC Hospital
- Abtek Research & Consulting Inc.
- AC and I Services
- ACCIS
- Acer Consultants Ltd.
- ABCO Compounds Inc.
- Acres International Ltd.
- Actel Resources Inc.
- Adam Scott Collegiate
- Addon Electronics
- Addiction Research Foundation
- Addition-Eile
- Adventure Village
- Adult Occupational Centre
- AID-Advanced Technical Services
- Advance Medal Computer
- Advanced Scientific Computing Ltd.
- Astra Canada
- Afrika Community Technical Service
- AGR Management Ltd.
- Air Canada
- Air Solutions Inc.
- Albert Campbell Collegiate Institute
- Alberta & Southern Gas Co. Ltd.
- Alberta Ballet
- Alcan
- Alcanated Canada Inc.
- Alexander Consulting
- Atlas Research Inc.
- Allelix Crop Technologies
- Allen & Sherritt
- Allen Ennslen Barrett Architects
- Alliarg Inc.
- Allinson-Ross Corp.
- Allstate Insurance Co. of Canada
- Amada Ltd.
- American Express Canada Inc.
- Amethyst Corp.
- Akzha Canada Ltd.
- Amphex Canada Corp.
- AMS Management Systems Canada
- Ancient Forest Exploration & Research
- Andersen Consulting
- Arthur Andersen & Co.
- Arndisch Design Group Inc.
- Angkor Construction
- Antel Optronics Inc.
- Apex Woodworking
- APG Inc.
- APlus Software
- Apogee Research International Ltd.
- Apotel Inc.
- Apple Canada Inc.
- Applewood Heights Secondary School
- Applied AI Systems Inc.
- Applied Microelectronic Institute
- Applied Silicon Inc.
- Apps Medical Research Centre
- Aquifer Engineering Ltd.
- Arbortronics
- Arcteron Inc.
- Archipelago Group Inc.
- Architech Microsystems Inc.
- Architel Systems Corp.
- S.A. Armstrong Ltd.
- Armtec
- David W. Am Law Office
- Armour Research Centre
- Armscraft Corp.
- Artful Applications
- Arts Special Programs
- Asa Brown Boepti Inc.
- Ashland Chemicals
- Ashley-Koffman Foods
- Associated Bankers Insurance Co. Ltd.
- Associated Geotechnical Systems Inc.
- Associated Spring
- Associated Tube Industries Ltd.
- Association of Kin Clubs
- Association of Municipalities of Ontario
- Astra Pharma Inc.
- ATi Technologies Inc.
- Atkins Architect Inc.
- Atkinson Tremblay & Associates Inc.
- Atlantic Italian Bakery
- Atlantic Packaging Products Ltd.
- Atlantis Aerospace
- Atlas Block Co. Ltd.
- Atlas Steel
- Atlas Supply Co. of Canada Ltd.
- Atoucha Canada Ltd.
- Atoma International
- Atomic Energy of Canada Ltd.
- ATS Haggie & Associates Inc.
- Attachmate
- Ault Foods Ltd.
- Auto Systems
- Autodesk
- Automation Engineering Associates Ltd.
- Avenue Structures Corp.
- Aylesbury Vale District Council
- B.C. Hydro and Power
- Babcock & Wilcox Canada
- Bache Securities Inc.
- Bailey Controls
- Bailey Hoogevans Canada Inc.
- Baldona Golf Club
- R.J. Ball
- Ballet British Columbia
- Bank of Canada
- Bank of Montreal
- Bank of Nova Scotia
- Bar-Bro Co. Ltd.
- Barton Myers Associates
- BASF Canada Inc.
- Bata Shoes
- Bateman McKay Chartered Accountants
- Bay Mills Ltd.
- Bayer AG
- Baysis Medical Co. Inc.
- Bayly Medical Clinic
- Behyview Wildwood Resorts
- BDO Dunwoody Ward Mallette
- Beak Consultants Ltd.
- Beam of Canada
- Beatons Mill & Jefferson
- Beatrice Foods Inc.
- Beaver Lumber Co. Ltd.
- Anthony Bechu Architect
- Beckett & Dubeau Chartered Accountants
- G.K. Bell & Associates
- Bell Canada
- Bell Mobility Cellular
- Bell Northern Research Ltd.
- Ben-Mar Family Fun Centre
- Benelux Manufacturing
- Benetech Ernst & Young
- Bennett Surveying
- Berner & Co. Inc.
- Benz Inc.
- Beutel Goodman & Co. Ltd.
- BFF Industries Ltd.
- Bickers Pickles
- Bill Mason Outdoor Centre
- Bing Thom Architects
- Bingeman Park
- Bio Fax Canada Inc.
- Bio-Mega Inc.
- Birn Inc.
- Birch Business Systems
- Birnbaum Prenick Stekel & Co. Chartered Accountants
- Bishop Strachan School
- Bloor Canada Ltd.
- H.L. Blachford Ltd.
- Blade Technologies
- Blenheim Golf Club
- Block Drug Co. Canada Ltd.
- Blount Canada Ltd.
- Blue Sky Software Corp.
- Blue Streak High Grade Motor Products
- BNR Sanpo Kosan Bldg.
- Albert Bochaier Enterprises
- Boeing of Canada Ltd.
- Boilermakers Ltd.
- Boise Cascade Canada Ltd.
- Boner Inc.
- Borden Canada
- C. Borgal Architect
- Borough of East York
- Robert Bosch Inc.
- Bowmanville Foundry
- Boyne River Natural Science School
- BP Canada Inc.
- J.P. Braenska & Associates Ltd.
- Bradson
- Bramalea Secondary School
- Brampton Centennial Secondary School
- Brant County Health Unit
- Brant District Health Council
- Brantford Commit
- Brantford Public Utilities Commission
- Braun Consulting Engineers Ltd.
- Breilthaupt Centre
- Breivik Scorgie Wasyliko Morrison
- Brenda Rusnak Physiotherapy Clinic
- Brentwood Furniture Inc.
- Bresuk Inc.
- Brisbin Brook Baynon Architects
- British Standards Institution
- Broadway Gardens
- Brock Telecom Ltd.
- Brock University
- Brosz and Associates
- Brown & Root Ltd.
- Bruce Peninsula Health Services
- Buiteltech
- G.B.B. Buck Consultants Ltd.
- Budd Canada Inc.
- Budget Rent-A-Car
<table>
<thead>
<tr>
<th>Organization Name</th>
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<tbody>
<tr>
<td>Budgusters Pest Management Inc.</td>
<td>City of Kanata</td>
</tr>
<tr>
<td>Bunte &amp; Bunte Chartered Accountants</td>
<td>City of Kitchener</td>
</tr>
<tr>
<td>Burl-Eng Manufacturing Inc.</td>
<td>City of London</td>
</tr>
<tr>
<td>Burns Fry Ltd.</td>
<td>City of Mississauga</td>
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<td>R.J. Burnside &amp; Associates Ltd.</td>
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<td>Bunch Correctional Centre</td>
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<td>Busby Bridge Architect</td>
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<td>Buskro Graphic Engineering Ltd.</td>
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<td>C.A.V. Productions</td>
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<td>C.E.M. Engineering Group</td>
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<td>CAD Resource Centre</td>
<td>City of St. Catharines</td>
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<td>Cadillac Fairview Corp. Ltd.</td>
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<td>Cadillac Laboratories</td>
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<td>Calgary Board of Education</td>
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<td>Callender Associates</td>
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<td>Cambridge Physiotherapy &amp; Rehabilitation Center</td>
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<td>Cambridge Testing Services Ltd.</td>
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<td>Camco Inc.</td>
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<td>Clarke Henning &amp; Co.</td>
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<td>CAMI Automotive Inc.</td>
<td>Clarke Stark &amp; Diegel</td>
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<td>Camp Bimini</td>
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<td>Camp Kawartha Inc.</td>
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<td>CLE Consulting Group Ltd.</td>
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<td>Campbell Lawless</td>
<td>CN Tower</td>
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<td>Campbell Soup Co.</td>
<td>CNIB Lake Joseph Centre</td>
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<td>Canac Telecom</td>
<td>Co-operators Insurance Co.</td>
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<td>Canada 3000 Airlines Ltd.</td>
<td>Coca-Cola Ltd.</td>
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<td>Canada Colors &amp; Chemicals Ltd.</td>
<td>Cognos Inc.</td>
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<td>Canada Games Complex</td>
<td>Cold Springs Farm Ltd.</td>
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<td>Canada Law Book Inc.</td>
<td>Cole Sherman &amp; Associates Ltd.</td>
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<td>Canada Life Assurance Co.</td>
<td>Colgate Palmolive Canada Inc.</td>
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<td>Canada Mortgage &amp; Housing Corp.</td>
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<td>Canada Post Corp.</td>
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<td>Canada's Wonderland</td>
<td>Columbia Centre for Integrated Health Services</td>
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<td>Canadian Agra Cubing Ltd.</td>
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<td>Canadian Broadcasting Corp.</td>
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<td>Canadian Centre for Creative Technology</td>
<td>Comdale Technologies Inc.</td>
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<td>Canadian Centre for Occupational Health and Safety</td>
<td>Commonwealth Historic Resource Management Ltd.</td>
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<td>Commonwealth Hospitality Ltd.</td>
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<td>Canadian Forces Command &amp; Staff College</td>
<td>Communications Engineering Services Ltd.</td>
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<td>The Canadian Heritage Arts Society</td>
<td>Community Information Centre of Metropolitan Toronto</td>
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<td>Canadian Imperial Bank of Commerce</td>
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<td>Canadian Instrumentation and Research Ltd.</td>
<td>Companhia de Seguros Tranquidades</td>
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<td>Canadian International Development Agency</td>
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<td>Canadian Museum of Civilization</td>
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<td>Canadian National Railways</td>
<td>Computer Task Group of Canada Inc.</td>
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Co-operative Education and Career Services
Organizations Employing Co-operative Students

Corporate Insurance Group
Cousin Patterson Wardman Ltd.
Council of Ontario Construction Associations
County of Bruce
County of Hastings
County of Huron
County of Lambton
County of Perth
County of Peterborough
County of Renfrew
Cox & Merrill Co.
CPRI
Crane Canada Ltd.
Allan Crawford Associates Ltd.
Crane Chemicals Ltd.
Crane Systems Canada Inc.
Davies & Associate Architects
Crawford Smith & Swallow
Credit Union Central of Ontario
Credit Valley Hospital
Crestbrook Forest Industries Ltd.
Crestline Technologies Inc.
Crestwood Secondary School
Critchley Delean Trussler & Evans Architects
Crown Cork & Seal Canada Inc.
Crown Life Insurance Co.
Crowne Business Centres Inc.
CSSDC
CSIC
CST Carp Systems International Inc.
CT Windows Ltd.
Cumis Life Insurance Co.
C.G. Cunningham & Associates
Curtis Products
Custom Orthotics of London Inc.
Custom Pharmaceuticals
Cyaramid Canada Inc.
Cyberworks Inc.
Cyprus Semiconductors
Cyro Canada Inc.
D.G. Schools
D'Angela Sorrenti Canale & Palombo
Da Vinci Computing Ltd.
Daedalian Systems Group
Daily Planet Bookstores Ltd.
Daily Transportation
Dalhousie University
Dalsa Inc.
Dames and Moore Canada Ltd.
Dana Farber Cancer Institute
Damping
Dataforsys Inc.
Davidson Instrument Panel-Textron
Davidson Yuen Simpson
Davis & Henderson Intercheque
Day Specialties Corp.
Dayco Products Canada Ltd.
De Haviland
Deerhurst Inn
Deer Valley Hospital
Deitche Technology Inc.
Dennis Slape Lazeon Corp.
Dentolocial Software Inc.
Depco Metal Products Ltd.
Der Tours
Design Team Plus Ltd.
Desrochers Dance Theatre
Di Cocco Contractors Ltd.
Di Lajoio Physiotherapy and Sports Injury Clinic
Dialectic Computer Services
Dico Sino Ltd.
Dingman Data Services Inc.
Digital Equipment of Canada Ltd.
Digital Media Networks Corp.
Digital Specialty Chemicals Ltd.
Digital Video Systems Ltd.
M.M. Dillon Ltd.
Dipix Technologies Inc.
Diversicare Corp.
Diversified Research Laboratories
Dixon Gordon & Co.
DMR Group Inc.
Doane Raymond Pannell
Dolfin Developments
Dominion of Canada Group Insurance Co.
Domtar Construction Materials Ltd.
Donwood Institute
Door Heritage Crossroads
Dorval Cinema-Famous Players
Dow Canada
Downs/Ambachault
Drew Chemical Co. Ltd.
Duffy Allain & Rutten Chartered Accountants
Dundurn Press Ltd.
Dunlop Farrow Inc.
Dupont Canada Inc.
Dupont Merck Pharmacy
Duracell Inc.
Durham Board of Education
Durso Corp.
Durward Jones Barkwell & Co.
Gerald Duthie & Co.
DY-4 Systems Inc.
E.M.I.T. Ltd.

Eagle Electronics Devices Ltd.
Eagle Precision Technologies
East Hill Esso
East Oshawa Physiotherapy Clinic
East West Plastic
East York Board of Education
Easter Seel Society
Eatons Co. of Canada
EGE Group Ltd.
Ekler Partners Ltd.
Economical Mutual Insurance Co.
C.R. Eddie Engineering Inc.
E.B. Eddie Forest Products Ltd.
Edenvale Inn
Edmonton Fringe Festival
Edmund Cachia & Co.
EDS of Canada Ltd.

Educational Relations Commission
Educational Relations Commission
Edward Roofing
Harry Eueues Associates Ltd.
EFD Computer Solutions
Eflom Foods Ltd.
EGE University
Elastochm Ltd.
Elborn College
Electrohome Ltd.
ElectroScanning Technology Co. Ltd.
Electronic Surveillance Corp.
Ell Lilly Drug Inc.
Ellis-Don Ltd.
Elmhrst Resort
Elmira Poultry Inc.
Elora Three Centuries Festival
Empix Imaging Inc.
Enen Insurance Managers Inc.
Endacan 2000 Inc.
Energy Probe
Enormosal Engineering Ltd.
Enginhouse Systems Ltd.
Engineering Interface Ltd.
Enitech
Environ Canada
Environ Corp.
Environmental Systems Research Institute
Environmental Youth Corp.
EPS Software Consultants Ltd.
Equitable Life Insurance Co. of Canada

Ernst & Young
Esmond Manufacturing Inc.
Esnagami Wilderness Lodge
Essex County Board of Education
Esso Canada
Etobicoke Board of Education
Evans Martin CA
Everest & Jennings Canada Ltd.
Exocom Systems Corp.
Exor Di Development Corp.
Extend A Family
Ezer & Associates
F. & P. Manufacturing Inc.
Factory Mutual Engineering
FAG Bearings Ltd.
Fair Glen Outdoor Christian Education
Centre & Youth Camp
Fair Tax Commission
Fairfax Financial Holdings Ltd.
Fairlawn Market
Falconnbridge Ltd.
Family Service Association
Famme & Co. Chartered Accountants
Famous People Players
Far Out Collectibles
Farta & Zertker Chartered Accountants
Farm Business Consultants
Fashion Canada Inc.
Fawthrop & Warden Chartered Accountants
FBM Distillery Co. Ltd.
Federal Elevator Systems
Federation of Ontario Naturalists
Feinstein Rich & Lewkowitz Chartered Accountants

Ferranti-Packard Ltd.
Fermo Industrial Products Ltd.
Fiberglas Canada Inc.
Fifty Point Conservation Area
Fillet of Sole Restaurant
Financial Life Assurance Co. of Canada
Financial Models Co.
First City Developments
First Ottawa Development
Fisher Controls Co. of Canada Ltd.
Fisher Leff & Associates
Fitness World
Flamco Ltd.
Fletcher Challenge Forestry Products
Flowcare Engineering
Flour Daniel Canada Inc.
Focus Systems
Foley Broderick
Fong's Industries Co. Ltd.
Food Specialities
Footprint Software Inc.
Ford Electronics Manufacturing Corp.
Ford Motor Co. of Canada Ltd.
Fort Frances High School
Four R. Technologies
Frank Oke Secondary School
Frankie Lam & Co.
Freyssinet Hong Kong Ltd.
Frontranc Outfitters
Frontencac Sports Injury & Rehabilitation Clinic
Frontiers Foundation
The Fryett Partnership Architects
Fujima International Inc.
Fujitsu Canada Inc.
Fuller Jenks Landau
Fylle Well Driving Co. Ltd.
G.E. Plastic
Gabor & Popper Architects
Gabriel of Canada
Galeri Machan
Gallery of Fashion
ICl Canada Inc.
IG Machines & Fibres Ltd.
Igloo S.E. Asia
Ikoy Architects Ltd.
Ilco Unican Ltd.
Image Systems Solutions Inc.
Image Video Ltd.
Imara Research Corp.
IMC Canada
IMCO Industrial & Marine Coatings Ltd.
Imperial Life Assurance Co.
Imperial Oil Ltd.
Imperial Tobacco Ltd.
Inco Ltd.
Indal Technologies Inc.
Independent Order of Foresters
Indigo Software Ltd.
Industrial Disease Standards Panel
Industrial Laboratories of Canada
Information & Privacy Commissioner
Information Centre for Regional Planning & Building Construction
Infotron Canada Ltd.
Ingenious Programs
Inglio Ltd.
Innovative Architectural Systems Ltd.
Innovative Building Products Inc.
Innovative Systems & Technologies Insight
Institutet Corp.
Institute for Advanced Manufacturing
Institute for Groundwater Research
Institute for Sustainable Development
Insurance Corp. of British Columbia
Integral Consulting Inc.
Intech Video Ltd.
Inter Taylor Canada Ltd.
Inter Tydack Technologies Inc.
Interactive Image Technologies Inc.
Interfax Systems Inc.
Interpak Shaving Products Ltd.
Interplan Architecture & Planning
Interprovincial Pipe Line Inc.
Intrepid General Ltd.
Inx International Ink Co.
Iogon Corp.
Iota Engineering Inc.
Iotec Inc.
Itpaco Inc.
Iris Power Engineering
Irving Oil Ltd.
Isacove Gold and Glatt Chartered Accountants
ISG Technologies Inc.
ISM Information Systems Management Corp.
Istac Inc.
Italistrade Spa
Itchee Monkeys
ITX Technologies Inc.
JAG Computers
J.A. Turner Secondary School
J.D. Griffin Adolescent Centre
J.T. & T. Contracting Ltd.
JTS Computer Systems Ltd.
J Tech Computer
Jacquie Whittford Ltd.
Jagger Hims Ltd. Consulting Engineers
Jamesway Controls
Janna Systems Inc.
Japan Camera Centre
Jarrott & Birdsell Architects Inc.
Jet Moulding Compounds Ltd.
Jetair (UK) Ltd.
JOH Rubber
John Deere Ltd.
John Diefenbaker Secondary School
John Fraser Secondary School
R.W. Johnson Pharmaceutical Research Institute
John's Roofing & Siding
Jonmar Computer Systems Ltd.
Joy Manufacturing Co. (Canada) Ltd.
JTD Engineering
Judith Marcuse Dance Company
Juran International Ltd.
K.K. Tool & Jig Grinding Inc.
K Mart Canada Ltd.
K.W. Systems Inc.
Kao Information Canada Inc.
Karmax Heavy Stamping
Kasian-Kennedy Architects
Kaufman Consulting Services Ltd.
KBS Technology Inc.
Keall Industries
A.T. Kearney Management Consultant Ltd.
Keams Mancini Architects
Koestway Public School
Kedcher Inc.
Kellogg Canada Inc.
Kemp Elliot & Blair
Kempville College of Agricultural Technology
Kerner Collegiate and Vocational Institute
Kent County Roman Catholic School Board
Kentner Kelly & Wilson
Kidd Creek Mines
Kimberly-Clark Canada Inc.
Kimie M. Dunlop
Kindred Industries
King and Associates
Kingston Area Economic Development Corporation
Kingston Frontenac & Lennox Addington Health Unit
Kingston Goulbourn & Associates
Kingswood Properties Ltd.
Kiss Cathcart Architects
Kitchener Transit
Kitchener-Waterloo English School
Kitchener-Waterloo Hospital
Kitchener-Waterloo Multicultural Centre
Klaas Design Inc.
Kleen-Plast Tumbler Industries Ltd.
Klockner-Moeller Ltd.
Knapp Plastics Ltd.
Kochta & Lechner Architekten
Kodak Canada Inc.
Korea Advanced Institute of Science
Kooba Apiaires
Kraft General Foods Canada
Krandel & Co.
Kroetsch Partnership Architects Inc.
Kruger Inc.
Kuester Magna Cable Controls Inc.
Kuriyama Canada Inc.
Kuwabara Payne McKenna Blumberg
Kwan Wong & Fong
K. Lang Engineering Ltd.
L'Arche Daybreak
Labatt Breweries of Canada Ltd.
Labelling Technologies
Lafarge Canada Inc.
Laidlaw Environmental
Lake Simcoe Enterprises Ltd.
Lambton County Homes for the Aged
Lambton District Health Unit
Land Planning Resource Group Ltd.
Langen Electric
Larvicorp.
Larcan Communications Equipment Inc.
Laurier University
Lawson Fale Ltd.
Lawson Mardon Flexible Packaging Ltd.
Leeds-Grenville County Board of Education
Lehman and Associates Planning Consultants
Andrew C.H. Lei
Leitch Video Inc.
Lenbrook Industries Ltd.
Leonardo Da Vinci Elementary School
Left Smith Architects
Lehtin's
Jonathan K. Leung Chartered Accountant
Lever Brothers Ltd.
Lever Industrial Inc.
Lexicon Canada
Lexmark Canada
Leybourne Farms
LGS Group Inc. Consultants
Library & Gallery
Liberi Engineering
Life Fit Associates
Lighting Sciences
Limpact International Ltd.
Linamter Machine Ltd.
Link with Work
Linkage Inc.
Thomas J. Lipton Inc.
Liquor Control Board of Ontario
Lisbon Paving
Liton Systems Canada Ltd.
Livingston International
Livius Merkx Enterprises Inc.
Loblaws Companies Ltd.
Loeb Inc.
London & Middlesex Housing Authority
London Life Insurance Co.
London Regional Cancer Centre
London Rehabilitation Service
Long Manufacturing Ltd.
Long Point Bird Observatory
Longyear Canada Inc.
Lorne Park Secondary School
Lotus Development Canada Ltd.
Lower Canada College
Loyalty Management Group Canada Inc.
Lumsden Brothers Ltd.
M&T Tasi-Wood and Associates
Mackwa Motor Sport
MacGillivray Partners
Mackenzie Financial Corp.
MacLean Hunter Cable TV
MacLean Hunter Ltd.
MacSkimming Outdoor Education Centre
Madgett & Partners
The Magee Clinic
Malone given Parsons Ltd.
Management of Technology & Innovation
Manalta Coal Ltd.
Manchester Plastics Inc.
Mandel Scientific Co. Ltd.
Mandelbaum & Partners Chartered Accountants
Mangion & Mangion & Partners
Manitoba Hydro
Manitoba Theatre Centre
Mann Testing Laboratories Ltd.
Manson Insulation Inc.
Manufacturers Automation Engineering Inc.
Manulife Financial
Marcam Canada Ltd.
Marion Merrell Dow Pharmaceuticals
Markdale and District Youth Employment Services
Markel Insurance Co. of Canada
Markhamville Mall
<table>
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<td>Organizations Employing Co-operative Students</td>
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The Dana Porter Library is a landmark to students on campus.
The University Library

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

Associate Librarian, Systems
Michael Ridley, BA (Guelph), MA (New Brunswick), MLS (Toronto)

Networked Information, Research Associate
W. Oldfield, BA (Waterloo Lutheran), MLS (Western Ontario)

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)

Co-ordinator, UW Press
G. Smith, ARCT (Toronto), BA (McMaster)

Collections Division

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

Cataloguers (Cataloguing Department)
H. Calogeridis, BA, MLS (McGill)
Y. Gordon, BA (Manitoba), BLS (Toronto)
L. Hefford, BSc (York), MLS (Western Ontario)
L. Teather, BA, MLS (British Columbia)
M. Wan, BSc (Hong Kong), BMath (Waterloo), MA, MLS (Western Ontario)

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

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

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

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

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)

Reference Librarian (University Map and Design Library)
C. Stephenson, BSc (Guelph), MLS (Western Ontario)

Head, Porter Reference and Collections Development Department
M. Handley, BA (College of New Rochelle, N.Y.), MLS (Western Ontario)

Reference and Collections Development Librarians (Porter)
M. Aquan-Yuen, BA, MLS (Toronto), MA (Waterloo)
M. Block, BA (Waterloo), MLS (Western Ontario)
R. Crusz, BA (Ceylon), BLS (Toronto), MA (Waterloo)
M. Ferguson, BA, MA (Waterloo), MLS (Western Ontario)
D. Fitzpatrick, BA, MA (Windsor), MLS (Toronto)
C. Jewell, BA (C.W. Post College of Long Island University) MA, MLS (Toronto)
A. Lakos, BA (Jerusalem), MLS (British Columbia)
S. Moskal, BSc, (Wisconsin, Madison), MLS (Western Ontario)
E. Murphy, BA (St. Mary's), MLIS (Dalhousie)
S. Rahman, BA, MA (Punjab), MA (Waterloo), MLS (Indiana)
M. Sawchuk, BA, BEd, MLS (Western Ontario)

Head, Davis Reference and Collections Development Department
J. Macdonald, BSc, BEd (Dalhousie), MLS (Western Ontario)

Reference and Collections Development Librarians (Davis)
J. Cooper, BEng (Technical University of Nova Scotia), MLS (Toronto)
J. Cummings, AB, MLS (California, Berkeley)
A. Fullerton, BSc (Queen's), MSc (Dalhousie), MLS (Western Ontario)
W. Macpherson, BSc, MLS (Dalhousie)
J. Parrott, BSc (Queen's), MSc, BLS (Toronto)

Co-ordinator, Industrial and Business Information Service
F. Abrams, BA (Sir George Williams), MLS (McGill)

Co-ordinator, Machine Assisted Reference Service
D. Morton, BSc, MLS (Western Ontario)
The University Library

The Library is central to the academic programs of the University. Its function is to provide books, journals, and other library materials to support these programs. The library staff, aided by the university community, works to make the library a base for teaching, study and research. The University Library is composed of two divisional libraries, the Dana Porter Library, and the Davis Centre Library; one branch library, the University Map and Design Library; and one reading room, the Optometry Learning Resource Centre.

The ten storey Dana Porter Library is situated in the centre of the campus. The lower floors house the main public services and support services. Public services located on the first floor include a large Reserve Reading Room with seating for 100 readers, 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 1,900,000 items including books, pamphlets, theses, microforms, documents, reports, sound recordings and other material. The Library subscribes to over 6,000 serials and over 50 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 467,000 items including books, microforms, government publications, technical reports and maps. The Library subscribes to over 5,000 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 125,000 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. The system has enabled the Library to speed up the circulation process and to display a variety of information to the borrower.

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.

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 braille 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 at the information desks in both the Porter and Davis Libraries and at the telephone renewal line 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. Conrad Grebel College Library has over 30,000 items which include a special collection on Peace Studies and a large current Music collection. It is the home of a Mennonite Library Archive which consists of church records and documents of the Mennonites of Ontario. The St. Jerome's Library is located in the College's main classroom building and houses a collection of approximately 40,000 volumes which reflect the broad range of courses taught at St. Jerome's. Most items are now accessible through WATCAT. 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

Students in one of many computer labs at UW.
Computing Services on Campus

APPLIED HEALTH SCIENCES FACULTY COMPUTING

Associate Dean for Computing and Special Projects
R.P. Wells, BSc (Manchester), MEng (McMaster), PhD (Manchester)

Computing Consultant
T.O. Stewart, BA, MA (Waterloo)

The Faculty of Applied Health Sciences makes computing available to undergraduate students in a variety of ways.

A 20-station Microcomputer network provides access for undergraduate and graduate students to popular word processing, statistical analysis and graphics packages. A UNIX server (healthy) allows access to statistical and other applications by X-Windows terminals in the Computing Office and by terminals throughout B.C. Matthews Hall.

The Faculty of Applied Health Sciences Computing Office comprises a number of workstations and a staff of two consultants who supervise the Microcomputer network and UNIX system as well as provide help and advice to faculty, staff and students in the Faculty. Staff members from both the Department of Computing Services and the Statistical Consulting Service work out of the Office on a regularly scheduled basis.

Specialized computers and lab equipment are available to undergraduates for use in collecting and analysing data for their own course and research work. For example, the WatScope system converts analog measurements to digital data for time-series and other analysis; the WatSmart system collects data in three-dimensional space for use in the study of human movement.

ARTS COMPUTING OFFICE

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 a VMS system on a VAX 3100 computer, a UNIX system on a DEC 5000 computer and a network of IBM PC microcomputers (WATSTAR). The WATSTAR, UNIX and VMS system are all connected to the campus network enabling file transfer and electronic mail 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 with which they may do word processing. This account is available over and above any computer access provided by a specific course. Draft quality documents may be printed on a high speed line printer or a matrix printer which are available on a self-serve basis. Documents requiring high quality may be printed on an Postscript Laser printer available 24 hours a day.

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 available in HH 236, PAS 1009 and PAS 1077.

ENGINEERING – WATSTAR MICROCOMPUTER NETWORK

Associate Dean for Computing, Faculty of Engineering
W.J. Wilson, BE, MSc (Saskatchewan), PhD (Cambridge), PEng

The Faculty of Engineering operates an extensive network of microcomputers within Engineering called the WATSTAR network. The total network consists of 35 file servers and over 800 workstations with common access to all facilities. The Engineering WATSTAR network currently hosts over 4300 user accounts.

WATSTAR serves the general computing needs of academic courses and programs within Engineering. The system has good documentation production facilities and students are encouraged to use these resources for report writing in addition to general computing and specific course-related work. All students registered in Engineering are given an account. WATSTAR also provides a message and mail facility between individual user accounts and a broadcast capability between group and system accounts. Mail can also be sent to any other on or off-campus address.

Consulting and information is available in the Engineering Computer User Support Centre in E2 2349A, ext. 3524 or 6814.

ENGINEERING EDUCATION RESEARCH CENTRE

Associate Dean for Computing, Faculty of Engineering
W.J. Wilson, BE, MSc (Saskatchewan), PhD (Cambridge), PEng

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.

EERC staff works on projects with faculty and students, exploring innovative ways to help teaching and learning in a number of subject areas. These include: symbolic computation, system simulation, CAD/CAM, computer graphics, image processing, circuit simulation, educational software evaluation and creation, usability, user interface design, and technical documentation.

The Centre manages Project BEACON, a lab containing DEC RISC workstations with high-resolution graphics used for teaching and design projects. The EERC also runs a network of Macintosh computer systems for general use by students, and the Project LIBRA Lab, a Macintosh facility recently created for teaching and project work.
ENVIRONMENTAL STUDIES: MAPPING, ANALYSIS AND DESIGN COMPUTING

Associate Dean, Computing
D.J. Dudycha, BA (Waterloo Lutheran), MA (Waterloo), PhD (London)

Systems and Technical Services Manager
M. Dumancic, BMath (Waterloo)

Digital Image Systems Manager
J. Piwowar, BES, MA (Waterloo)

Manager, Instruction and Information Systems
P. Ocholta, BES, MA (Waterloo)

Office Manager
M. Ruehlcke

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 microcomputer networks which are used primarily for course instruction but are available for graduate and undergraduate student research. MAD also supports computer terminals for accessing central services (IBM CMS) and Faculty computers (DEC VMS and ULTRIX).


Training sessions and consulting are provided by MAD staff.

Access to the services in MAD is arranged by visiting the MAD general office in ES2 - 163B.

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 service provided to meet this mandate is general purpose time-sharing.

At the present time, MFCF operates a wide range of UNIX equipment from manufacturers such as DEC, Sun, IBM, Sequent, and Silicon Graphics. Most users access these from colour or black and white X-terminals. Software includes several text editors, electronic mail, user-controlled archiving, plotting, text formatting, typesetting, and a wide range of general and special-purpose languages.

Communication between machines is primarily implemented with Ethereums. Traffic between machines consists primarily of file transfers, electronic mail, print requests, software distribution, and remote logins. MFCF participates in the UNIX-based USENET which provides news and computer conferencing between on-campus UNIX systems and a continent-wide collection of participating sites. Electronic mail connections (direct or indirect) are provided to several global mail networks.

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 terminals. These terminals provide access to any of the on-campus computers. Terminal rooms, which contain X-window terminals and a laser printer, are also provided for the use of faculty and graduate students.

MFCF operates a number of laboratories for use in graduate and undergraduate courses. These include a real-time programming lab, a microsystems lab, a Maple instructional lab, and two Macintosh labs for first-year computer science courses.

The MFCF is located in the Mathematics and Computer Building.

SCIENCE FACULTY COMPUTING

Associate Dean for Computing
C.I. Mayfield, BSc, PhD (Liverpool)

Computer Liaison Officer
A. Fleming, BMath (Waterloo)

The Faculty of Science has a broad range of computer facilities available to undergraduates. Courses are taught using the IBM mainframes and each student in those courses is issued an account. In addition, there is a JANET or WATSTAR network in each of the four departments and the School of Optometry and 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 use by all students in the Faculty, there is a group of networked Commodore Amigas running Unix, AmigaDos and MS-DOS, and a group of Zenith (IBM PC compatible) computers equipped with word processing, graphics, statistics and general programming software. They 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 since
they are used as data acquisition and analysis systems for scientific apparatus. 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. Plans are underway to provide software support for student-owned microcomputers.

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 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. For the most part, 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.

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 and Manuals: instruction in the use of the university-supported applications software, programming languages, and DOS, MacOS, and UNIX computing systems.

The five program areas of the Applied Health Sciences Faculty.
Faculty of Applied Health Sciences

The Faculty of Applied Health Sciences consists of the Departments of Dance, Health Studies, Kinesiology, and Recreation and Leisure Studies, and the Program in Gerontology. The major theme of the Faculty is the development of knowledge and programs related to health and well-being. As such, that of the World Health Organization, embrace the mental, social, and physical dimensions of life, the activities of the Faculty address the contribution to be made to the effective understanding of these issues through an interdisciplinary approach.

The emphasis is on the interaction between biological and behavioural factors as they contribute to 1) promoting health, 2) treating disease, 3) minimizing the impact of disease and 4) fostering enhanced quality of life. This is reflected in the variety of academic perspectives provided by the research and teaching activities of the various programs within the Faculty. These include identification of the factors which place individuals at risk for developing disease, using appropriate scientific methodology to address psychological and sociocultural influences, as well as basic biological mechanisms. This knowledge is applied to the strategic development of programs which enhance the health status of populations, as well as to the identification of the principles underlying effective large scale dissemination of such programs.

The study of leisure and cultural phenomena, their related environments and historical development, contributes to the development of leisure and cultural opportunities and practices which are integral to the well-being of groups and individuals. General and specific problems associated with leisure services include their public acceptance, financing, quality, quantity, distribution and modes of delivery. Of increasing interest is the impact of new technologies on leisure and cultural practices.

The Departments of Dance Studies, Kinesiology and Recreation and Leisure Studies offer both Regular and Co-operative programs. Dance is offered through the Regular program.

Dance

The Dance program offers students an opportunity to gain the breadth of intellectual and physical skills, as well as the specific expertise, necessary for a range of careers in the world of dance. Courses comprise a balance between studio and classroom work and may be general in orientation or focused in Developmental Foundations for Teaching, Documentation or Performance. Whether students plan careers as teachers, critics, choreographers, company managers, performers or writers, they will be able to draw upon a thorough knowledge of the art. Joint Honours degrees with a number of departments offer further career options. A Dance degree may also lead to graduate work at other institutions in choreography, criticism, history, notation, education or therapy.

Gerontology

The number of older people in the population of many countries, including Canada, is growing steadily. Within twenty years, the number of Canadians 65 years of age and over will comprise about 12% of our total population. The changing age structure of Canada's population raises a number of questions whose answers require a thorough understanding of the aging process and the life circumstances of older people. The area of study that provides this understanding is gerontology.

Gerontology is a wide-ranging field that makes use of knowledge obtained from several disciplines. For example, gerontologists with a background in psychology examine age-related changes in such functions as perception, thinking and learning. Gerontologists with a background in sociology investigate relationships between the aging person and society, while gerontologists with a background in environmental studies direct their studies to the impact of the environment on aging. Gerontologists with a background in biology investigate changes that occur at the cellular, systemic and organismal level over time for the purpose of understanding the aging processes.

The Program in Gerontology seeks to provide an understanding of aging processes and to prepare students for careers in professions that deal directly or indirectly with the care 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 awareness of aging and the situation of the older person. Employment opportunities in gerontology include research and teaching, but most often students take advantage of opportunities in administrative areas, which may be at the federal, provincial or municipal level or in institutions dealing with frail elderly, or being involved with well-elderly populations.

Students interested in gerontology can proceed to the Diploma in Gerontology which is specifically designed for part-time students, particularly those who desire some training in the field but who are not necessarily seeking a degree. It is also intended for persons who already hold a degree and wish to increase their understanding of aging. Apart from the Diploma, the Gerontology program offers a Minor in Gerontology designed for students who are pursuing any type of Honours degree and who wish to gain some specialization in the field. Requirements for the Minor are the same as for the Diploma, except that a practicum is not required.

Health Studies

Students in the Health Studies program examine important health problems and their causes. Of primary interest are diseases such as lung cancer, AIDS and heart disease in which behaviour is an important contributing cause. The program emphasizes the importance of the relationship between lifestyle choices and health outcomes throughout the life span.

Opportunities for employment exist in community and government health agencies, community and school health education, and other areas where an understanding of health and health behaviour is required. Graduates also pursue further studies in medicine, 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 graduands.

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 in 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
4. Tourism 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, Public Administration, 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 most employment settings.

The diverse backgrounds of the 14 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 the Health Studies program are required to select a university-entrance level program which includes Ontario Academic Course credits for both Biology and Chemistry.

Calculus, Chemistry and one of Biology or Physics are the admission requirements for Kinesiology.

Students applying to the Applied Health Sciences program who do not have a credit in OAC Sciences from another University of Waterloo Faculty have 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.

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.

Examinations and Standings

1. Final Examinations
   a) 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 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 Affairs 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 Appeal Policy and Procedures (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 year 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 1:8 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 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:

<table>
<thead>
<tr>
<th>Program</th>
<th>Overall</th>
<th>Major Field</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kinesiology Honours</td>
<td>63</td>
<td>67</td>
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<tr>
<td>Health Studies Honours</td>
<td>63</td>
<td>67</td>
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<tr>
<td>Kinesiology General</td>
<td>53</td>
<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 at the end of that term. (The designation F takes into account all failing grades, i.e. F-, F, and F+). A student may be required to withdraw from the Faculty of Applied Health Sciences at any time under special circumstances, such as the student leaving the program without notification or failing to write examinations.

If a student clears her/his, F, INC, NMR, and DNW grades prior to the next term or session, this grade change may result in a change in the decision on her/his grade report. When an INC is given in a course, all work in that course must be completed by a date agreeable to instructor and student up to a maximum of seven months 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, correspondence, or community college study). Performance in such course work will be taken into consideration in assessing applications for readmission.

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. 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 (e.g. averaged over eight academic terms) 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 "Dean's Honours List" appear on her/his graduation diploma.

4. Submission of Course Material
In situations where a student wishes to submit a body of material to satisfy the requirement of more than one course, the student must notify the instructors of both courses of her/his intention where the courses are concurrent so that they may each decide what is appropriate for their own course.

When one of the courses has been taken in a previous term, the current course instructor must be informed by the student of her/his intention of submitting the same course material. The current instructor has the final decision on the extent to which the material is allowed.

Failure of a student to comply with the above regulations constitutes an academic offence.

Program Selection

Full-time students: Students normally take five academic term courses in all terms in which they are registered.

Part-time studies or reduced programs: Except in exceptional circumstances, an Honours program may not be taken on a completely part-time or reduced program basis.
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 Affairs 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.

Correspondence Courses

For those students who would like to study part time and/or are not able to attend classes on campus, correspondence courses are available to them. In addition, correspondence courses may, under some circumstances, be taken while on a work term. The Associate Chair for Undergraduate Affairs is the only individual who can grant permission to enrol in a correspondence 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. 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 Affairs 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 Affairs.

4. Students should note the financial implications of dropping courses or withdrawing from programs (see page 3:3).

Appeals

Appeals are governed by the UW Student Appeal Policy and Procedures, outlined briefly on page 1:10 of this calendar. Appeals cover any academic grievance by a student where it is alleged that a University policy or regulation has been violated, or applied in an unfair or erroneous fashion. Section 8 of that document states that “Students shall seek remedies for their grievances promptly; unless a student’s program requires a prolonged absence from campus (e.g., an approved study term abroad; a Co-op work term), a student must lodge a grievance within six 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.” Upon graduation, a student’s right to appeal ceases. Appeal forms may be obtained by making an appointment to speak with the Associate Dean of Undergraduate Affairs.
Petitions
Petitions cover any student request to deviate from established procedures or regulations, while not disputing these procedures and regulations. Petition forms may be obtained from the Associate Chair for Undergraduate Affairs in each department. The Associate Chair or the appropriate departmental committee will review the petition and make a decision. This decision will be forwarded to the Associate Dean and to the registrar, who shall inform the student. In the event of an unfavourable decision, the student may pursue the matter further in writing through the Associate Dean of the Faculty at the level of the Undergraduate Affairs Committee, whose decision shall then be final.

ACADEMIC PROGRAMS

Dance Department
The Dance program at the University of Waterloo enables students to pursue dance as both academic and applied study.

The program features a core of courses ensuring an appropriately balanced knowledge and technical base for all students. Additionally each student may opt to focus their elective courses around one of several areas including teaching foundations, documentation and performance. Each of these focal areas targets a number of potential career fields.

The Developmental Foundations for Teaching area examines the preparation of the dancer and artists within the context of the developmental process, particularly during the critical years of childhood and adolescence.

The Documentation area examines the issues involved in documenting dance, for practical purposes (i.e. the maintenance of professional dance repertoire) and for historical purposes (i.e. the preservation of dance heritage).

The Performance area is oriented towards the preparation of a performer who may ultimately become a choreographer or producer.

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. Those interested in this program should contact the Dance Department for further details.

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 Affairs 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.

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 of ENGL 109, 110, 140R, 141R, 219C or other 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.

Suggested Course Sequence

<table>
<thead>
<tr>
<th>Year One</th>
<th>Year Two</th>
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<tbody>
<tr>
<td>DANCE 110</td>
<td>DANCE 241 or 242</td>
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<tr>
<td>DANCE 230</td>
<td>DANCE 341 or 342</td>
</tr>
<tr>
<td>DANCE Technique</td>
<td>DANCE Technique</td>
</tr>
<tr>
<td>MUSIC 100</td>
<td>MUSIC 111</td>
</tr>
<tr>
<td>Required ENGL</td>
<td>Required ENGL</td>
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<tr>
<td>One Elective</td>
<td>One Elective</td>
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<table>
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<tr>
<th>Year Two</th>
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<tbody>
<tr>
<td>DANCE 241 or 242</td>
</tr>
<tr>
<td>DANCE Technique</td>
</tr>
<tr>
<td>Arts Elective</td>
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<tr>
<td>Two Electives</td>
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</tbody>
</table>
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, 242, 336, 341, 351, 366, 367, 409 or 410, 484, and one DANCE Elective;
   b) For Program B** (eight) DANCE 111, 241, 242, 336, 341, 367, 409, or 410, 484

2. Required Outside Courses (two):
   Two of ENGL 109, 110, 140R, 141R, 210C or other 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.

* Program A: three years at the University of Waterloo followed by two years at The National Ballet School (NBS). First-year dance students may apply for admission to Program A in January of their first year. Admission to this program is by audition at NBS only. Students must pass the Elementary Cecchetti Exam and the ISTD Elementary National Exam by the time they have completed third year at the University of Waterloo.

**Program B: three years at NBS followed by two years at the University of Waterloo. First-year students in the NBS Teacher Training Program apply for admission to Program B in January of their first year. Students apply to the Associate Chair Undergraduate Affairs in Dance. Students are admitted as Non-Degree Dance students. During the subsequent two and one-half years students will complete three correspondence 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.

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. Biologists investigate, for example, 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 University of Waterloo Program in Gerontology
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, some 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, Optometry, 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.

The Minor program is open to students pursuing an Honours degree at the University of Waterloo in any discipline who wish to obtain some specialization in Gerontology.

The Diploma program is available to those 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 who have already completed an undergraduate degree but would like to obtain a better understanding of the aging phenomena.

The program of study for the Minor and for the Diploma consists of a selection of five required and five optional courses.

Academic Requirements for the Minor
1. Students must be in an Honours program at the University of Waterloo.
2. Successful completion of five core courses, including the Multidisciplinary Seminar and, in addition, successful completion of five courses selected with the approval of the program committee from the list of optional or core courses. Students will have to take at least one of Gerontology 255 and Gerontology 402 as part of the core requirements.
3. An overall minimum average of 65% in the ten academic courses.

Core Courses (five to be completed)
GERON 255/SCI 255 The Biology of Aging
GERON 400 Multidisciplinary Seminar on Aging

GERON 402/MTHEL 402B Epidemiology of Aging
GERON 344/KIN 352/SOC 344 Sociology of Aging
PSYCH 217 Aging and Basic Psychological Processes
PSYCH 218 Aging, Dying and Death

Optional Courses
GERON 100 Introduction to Gerontology
GERON 208/ENGL 208F The Literature of Aging
GERON 401A/B Directed Studies in Special Topics
GERON 403/MTHEL 402A Topics in Mathematical Aspects of the Medical Sciences 1
ANTH 404 Human Development in a Cross-Cultural Perspective: Human Development, Aging and Death
BIOL 433 Stress Physiology and Aging in Plants
CS 316 Introduction to Statistical Problem Solving by Computer
ECON 361 Cost-Benefit Analysis and Project Evaluation
HLTH 245 Community Health
HLTH 210 Growth, Development and Aging
HLTH 472 Special Topics: Aging, Immunity and Health
ISS 350 Adult Life Crises and Events
OPTOM 449 Community Health Optometry
OPTOM 452 Special Populations
PHIL 226 Ethics and Life Sciences
PHYS 480 Radiation Biophysics
PLAN 414/416 Issues in Housing
PLAN 420 Health, Environment and Planning
REC 361 Aging and Leisure
RS 271 Personality and Religion
SIPAR 378 Aging as a Spiritual Journey
SOC 248 Health, Illness and Society
SOC 343 Sociology of Health Care
SOC 415 Social Networks
SOC WK 240R Palliative Care
SOC WK 387R Social Work with the Elderly

An approved course in Statistics

Further Information
Enquiries are encouraged and additional information can be obtained by writing or calling:

The Director (W.F. Forbes)
The University of Waterloo Program in Gerontology
PAS Building, Room 3010
Ext. 3468

or any members of the Committee (listed in Chapter 17).

Department of Health Studies

In Health Studies 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) behavioral factors that contribute to disease, and (d) ways in which health behavior 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 behavior and health behavior 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, 431/432 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 225, 258 (recommended for Year Four)
   Two of: BIOL 211, 240, 241, 437, 441, 454, 455
   HLTH 350, 407, 443**
5. Free electives:
   11 term courses selected in consultation with the student's advisor.

* KIN 317 laboratory is mandatory
**HLTH 443 is a restricted elective only for those students choosing the HLTH 431/432 sequence.

**Course Sequence**

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<thead>
<tr>
<th>Year One (Co-op and Regular)</th>
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<tbody>
<tr>
<td><strong>Fall</strong></td>
<td><strong>Winter</strong></td>
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<tr>
<td>HLTH 101</td>
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<tr>
<td>BIOL 230</td>
<td>BIOL 239</td>
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<tr>
<td>PSYCH 101</td>
<td>BIOL 273</td>
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<tr>
<td>SOC 101</td>
<td>CHEM 116</td>
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<tr>
<td>HLTH 245</td>
<td>HLTH 346</td>
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<tr>
<td>KIN 222</td>
<td>KIN 330</td>
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<td>KIN 317*</td>
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<tr>
<td></td>
<td>CS 316</td>
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<td>HLTH 442</td>
<td>HLTH 445</td>
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<td>2B (Spring)</td>
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<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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<tr>
<td>KIN 222</td>
<td>HLTH 349</td>
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<tr>
<td>KIN 317*</td>
<td>KIN 330</td>
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<td>3B (Fall)</td>
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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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<td>HLTH 344</td>
<td>HLTH 442</td>
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<tr>
<td>CS 316</td>
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<td>4A (Spring)</td>
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<tr>
<td>HLTH 431 or elective</td>
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<td>Four Electives</td>
<td>HLTH 445</td>
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<tr>
<td>Three Electives</td>
<td>Three Electives</td>
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**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, Physiics, 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 are strongly urged to 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/L, 123/L, 266/L, 267/L
   - MATH 107, 106
   - PHYS 111/L, 112/L
   - BIOL 240, 241, 402, 404, 436, 437, 441, 442, 444
   - KIN 102, 200, 201, 242, 300, 321, 340, 341
   - SOC 248, 343
   - REC 250
   - CS 102

Typical Course Sequence*

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<thead>
<tr>
<th>Year One (Fall)</th>
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<tr>
<td>HLTH 101</td>
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<td>BIOL 273</td>
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<td>CHEM 120/L</td>
<td>CHEM 123/L</td>
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<tr>
<td>SOC 101</td>
<td>PSYCH 101</td>
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<td>One Elective</td>
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<thead>
<tr>
<th>Year Two (Fall)</th>
<th>Year Two (Winter)</th>
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<tbody>
<tr>
<td>HLTH 220</td>
<td>HLTH 210</td>
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<td>HLTH 245</td>
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<tr>
<td>KIN 317</td>
<td>KIN 330</td>
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<tr>
<td>KIN 222</td>
<td>BIOL 239</td>
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<tr>
<td>PHYS 111/L</td>
<td>PHYS 112/L</td>
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<tr>
<th>Year Three (Fall)</th>
<th>Year Three (Winter)</th>
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<tr>
<td>HLTH 341</td>
<td>HLTH 340</td>
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<tr>
<td>HLTH 349</td>
<td>HLTH 344</td>
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<tr>
<td>CHEM 266/L</td>
<td>CHEM 267/L</td>
</tr>
<tr>
<td>Two Electives</td>
<td>One Elective</td>
</tr>
<tr>
<td></td>
<td>CS 316</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Year Four (Fall)</th>
<th>Year Four (Winter)</th>
</tr>
</thead>
<tbody>
<tr>
<td>HLTH 431 or 433</td>
<td>HLTH 432 or 443</td>
</tr>
<tr>
<td>HLTH 442</td>
<td>HLTH 445</td>
</tr>
<tr>
<td>Three Electives</td>
<td>Three Electives</td>
</tr>
</tbody>
</table>

* Based on typical entrance requirements for many Canadian Medical Schools. For more information contact the Health Studies Department.

Department of 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 103, 105, 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, 335, 354
2. Required Courses from other departments:
   BIOL 230, 273, CHEM 116, CS 102*, MATH 107, PHYS 103, 105, PSYCH 101, SOC 101
3. Kinesiology Electives:
   Ten elective courses in Kinesiology.
4. Electives: Of the remaining ten term courses five must be chosen from outside the Department of Kinesiology.

*SCI Division

Course Sequence
Honours and General Program

Year One
(Common to Regular and Co-operative programs)

<table>
<thead>
<tr>
<th>Fall</th>
<th>Winter</th>
</tr>
</thead>
<tbody>
<tr>
<td>KIN 102</td>
<td>KIN 255</td>
</tr>
<tr>
<td>KIN 103</td>
<td>BIOL 273</td>
</tr>
<tr>
<td>BIOL 230</td>
<td>PHYS 103</td>
</tr>
<tr>
<td>MATH 107</td>
<td>CHEM 116</td>
</tr>
<tr>
<td>PSYCH 101</td>
<td>One Elective</td>
</tr>
</tbody>
</table>

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

Year Two

<table>
<thead>
<tr>
<th>Fall</th>
<th>Winter</th>
</tr>
</thead>
<tbody>
<tr>
<td>KIN 200</td>
<td>KIN 250</td>
</tr>
<tr>
<td>KIN 222</td>
<td>KIN 321</td>
</tr>
<tr>
<td>SOC 101</td>
<td>KIN 335</td>
</tr>
<tr>
<td>PHYS 105</td>
<td>KIN 354</td>
</tr>
<tr>
<td>One Elective</td>
<td>One Elective</td>
</tr>
</tbody>
</table>

Year Three

<table>
<thead>
<tr>
<th>Fall</th>
<th>Winter</th>
</tr>
</thead>
<tbody>
<tr>
<td>KIN 300</td>
<td>KIN 330†</td>
</tr>
<tr>
<td>KIN 317</td>
<td>Four Electives</td>
</tr>
</tbody>
</table>

Year Four

<table>
<thead>
<tr>
<th>Fall</th>
<th>Winter</th>
</tr>
</thead>
<tbody>
<tr>
<td>KIN 431† or 433†</td>
<td>KIN 470†</td>
</tr>
<tr>
<td>Four Electives</td>
<td>Four Electives</td>
</tr>
</tbody>
</table>

Co-operative Program

2A Fall
KIN 200
KIN 222
SOC 101
PHYS 105
One Elective

3A Winter
KIN 250
Four Electives
Three Electives

4A Spring
KIN 431† or KIN 433†
Four Electives

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 that with Health Studies (page 8:11). 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, 357, 401, 402, 405, 407, 416, 420, 425, 426, 432, 456, 472, 491, 492, 493
4. Electives (three):
Three courses must be chosen from the following:
BIOL 240, 239, 402, 404, 436, 437, 441, 442
CHEM 267, 267L
HLTH 341, 442
HIST 209
MATH 108
OPT 105
PHYS 480
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, 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, dependent upon the number of Co-op jobs available.

2. Normally at least three of the last four work terms, including work term reports, must be ergonomics related.*

3. Forty-four term courses must be completed.
(See current list of PROGRAM COURSES)

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

* It is possible that students who are not officially admitted to the program manage to fulfill all of the requirements, including the section of the KIN 470 seminar normally reserved for Ergonomics Option students. These students may petition the Associate Chair to obtain the Degree designation prior to graduation.

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>1B Winter</th>
</tr>
</thead>
<tbody>
<tr>
<td>KIN 102</td>
<td>KIN 255</td>
</tr>
<tr>
<td>KIN 103</td>
<td>BIOL 273</td>
</tr>
<tr>
<td>BIOL 230</td>
<td>PSYCH 101</td>
</tr>
<tr>
<td>MATH 107</td>
<td>PHYS 112/112L</td>
</tr>
<tr>
<td>PHYS 111/111L</td>
<td>CHEM 116</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>2A Fall</th>
<th>2B Spring</th>
</tr>
</thead>
<tbody>
<tr>
<td>KIN 200</td>
<td>KIN 300</td>
</tr>
<tr>
<td>KIN 222</td>
<td>KIN 321</td>
</tr>
<tr>
<td>C3 102 (SCI)</td>
<td>KIN 335</td>
</tr>
<tr>
<td>M SCI 211</td>
<td>KIN 354</td>
</tr>
<tr>
<td>SOC 101</td>
<td>SY DE 142</td>
</tr>
<tr>
<td>One Elective</td>
<td>KIN 300</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>3A Winter</th>
<th>3B Fall</th>
</tr>
</thead>
<tbody>
<tr>
<td>KIN 250</td>
<td>KIN 317</td>
</tr>
<tr>
<td>KIN 425</td>
<td>KIN 356</td>
</tr>
<tr>
<td>KIN 420</td>
<td>KIN 340</td>
</tr>
<tr>
<td>KIN 401</td>
<td>HLTH 350</td>
</tr>
<tr>
<td>SY DE 442</td>
<td>SY DE 543</td>
</tr>
<tr>
<td>One Elective</td>
<td>One Elective</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>4A Spring</th>
<th>4B Winter</th>
</tr>
</thead>
<tbody>
<tr>
<td>KIN 431</td>
<td>KIN 432 Ergo</td>
</tr>
<tr>
<td>KIN 470 Ergo</td>
<td>SY DE 548</td>
</tr>
<tr>
<td>KIN 472 Ergo</td>
<td>One Elective</td>
</tr>
<tr>
<td>M SCI 261</td>
<td>One Elective</td>
</tr>
<tr>
<td>KIN 348</td>
<td>One Elective</td>
</tr>
<tr>
<td>One Elective</td>
<td>One Elective</td>
</tr>
</tbody>
</table>
Department of 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 (12):
      REC 100, 201 or 205, 209, 210, 220, 230, 250, 270, 280, 371, 470/471 or two 400 level courses.
   b) Recreation Electives (minimum of eight):
      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 (seven):
      PSYCH 101
      SOC 101
      CS 100. Students with computer knowledge may take CS 102 with approval of the Undergraduate Associate Chair.
      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) Non-Recreation Electives: (maximum of 13).

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

Course Sequence

Year One (Co-op) and Regular
Fall
REC 100, 210
SOC 101
CS 100
One Restricted Elective
Winter
REC 230, 250
PSYCH 101
Two Restricted Electives

Regular Program

Year Two
Fall
REC 209, 270, 280
One Restricted Elective
One Non-Recreation Elective
Winter
REC 201*, 220
One or Two Recreation Electives
One or two Non-Recreation Electives

Year Three
Fall
REC 205* Two Recreation Electives
Two Non-Recreation Electives
Winter
REC 371 One or two Recreation Electives
Two or three Non-Recreation Electives

Year Four
Fall
REC 470 or other 4th year course Two Recreation Electives
Two Non-Recreation Electives
Winter
REC 471 or other 4th year course One or two Recreation Electives
Two or three Non-Recreation Electives

Co-operative Program

Year Two
2A (Fall)
REC 270, 280
One Restricted Elective
One Recreation Elective
Two Non-Recreation Electives
Winter
2B (Spring)
REC 201 or 205*, 209, 220
One Recreation Elective
Two Non-Recreation Electives

Year Three
3A (Winter)
REC 201*, 371
One or two Recreation Electives
Two Non-Recreation Electives
3B (Fall)
REC 205* Two Recreation Electives
Two or three Non-Recreation Electives

Year Four
4A (Spring)
REC 470 or other 4th year course Two Recreation Electives
Two Non-Recreation Electives
4B (Winter)
REC 471 or other 4th year course Two Recreation Electives
Two Non-Recreation Electives

* Students must take one of REC 201 or 205.

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
4. Tourism 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 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 (12 term courses)
2. All non-department Restricted Electives (CS 100, 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 six 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 Undergraduate Officer and the Recreation and Leisure Studies Student Undergraduate Handbook.

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.
Sculpting in Fine Arts.
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 correspondence courses may obtain application forms from the Part-Time Studies and Continuing Education Office at the University of Waterloo.

2. Transfer Credit

Upon admission to Arts, transfer credit may be given 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.

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
- Classical Studies
- Drama
- Economics
- English
- Fine Arts
- French
- Geography
- German
- Greek
- History
- Latin
- Medieval Studies
- Music
- Philosophy
- Political Science
- Psychology
- Religious Studies
- Russian
- Social Development
- Studies
- Sociology
- Spanish
- Speech Communication

Four-year General BA programs are also available in the following disciplines:

- Anthropology
- Classical Studies
- Drama
- Economics
- English
- Fine Arts
- French
- Geography
- Philosophy
- Political Science
- Psychology
- Religious Studies
- Social Development
- Studies
- Sociology
- Spanish
- Speech Communication

There are no double majors in General programs. Minors are not allowed in three-year General programs but may be taken with four-year General programs.

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
- Drama and Theatre Arts
- Economics
- English
- Fine Arts
- French
- Geography
- German
- History
- Latin
- Medieval Studies
- Music
- Philosophy
- Political Science
- Psychology
- Religious Studies
- Russian
- Slavic Studies
- Social Development
- Studies
- Sociology
- Spanish

Almost any two Honours programs may be combined or one Arts Honours program may be combined with a number of Honours programs offered in other faculties for a Joint Honours degree. Joint Honours programs other than those already listed under each department may be arranged by consultation with the appropriate department advisors. The Undergraduate Advisors of both departments should be consulted for any Joint Honours program. Descriptions of the single Honours programs and each discipline's requirements for Joint Honours programs can be found in the 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 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
Gerontology
International Studies
Latin American Studies
Legal Studies
Liberal Science
Middle East Studies
Peace and Conflict Studies
Society, Technology and Values
Soviet and East European Studies
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.
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 program and choice of a major. Year One students in Arts are usually classified in a General 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 Co-op Chartered Accountancy Studies and Management Accountancy Studies programs 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 may be added or dropped only with the permission of the Examinations and Standings Committee acting on the recommendation of the instructor of the course and the Undergraduate Officer of the student's major department, and only if the student can support her/his case with reasons showing that such a change in program will serve her/his academic interests.
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 receive a grade and be 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).

Contact your nearest Faculty of Education for details.

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,
3. the Faculty of Arts Group A and B requirements (see below).

Students in the four-year General Non-major program may graduate upon completion of a minimum of 40 term courses with a passing mark in each, including:
1. a minimum of 25 term courses beyond the 100-level,
2. a minimum of 25 term courses in the Faculty of Arts,
3. the Faculty of Arts Group A and B requirements (see below).

Both the three-year and the four-year Non-major programs require a cumulative average of 60% for graduation with an average of 65% in Arts Faculty courses.

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). A course carrying 0.75 credit weight is counted as one term course. Two 0.75 credit courses are equivalent to two term courses. 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 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 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.

English Language Proficiency Program – Off-Campus Students
When students who are completing all their Arts degree requirements through Correspondence 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
- English, History, Philosophy
- Croatian, Chinese, Dutch, French, German, Greek, Italian, Japanese, Korean, Latin, Polish, Russian, Spanish, Ukrainian. (See Notes)
- 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 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.
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:

   A+ 95  B+ 78  C+ 68  D+ 58  F+ 46
   A  89  B  75  C  65  D  55  F  38
   A- 83  B- 72  C- 62  D- 52  F- 32

   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 three week drop 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. This is particularly important in that a student with outstanding incompletes on her/his record will be given Conditional Standing and will not be able to graduate until the INC has been replaced by a letter grade.

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. 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.

   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.

<table>
<thead>
<tr>
<th>Set A - Basic Statistics Courses</th>
</tr>
</thead>
<tbody>
<tr>
<td>ARCH 103*, BIOL 460*, ECON 221, ENV S 271*, 277*,</td>
</tr>
<tr>
<td>276, ISS 250R, KIN 222, PSCI 214, PSYCH 201*, 292,</td>
</tr>
<tr>
<td>REC 371, 371A*, SOC 202*, 280, STAT 202, 204,</td>
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<tr>
<td>210*, 211, 221, 231</td>
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</table>

<table>
<thead>
<tr>
<th>Set B - Advanced Statistics Courses</th>
</tr>
</thead>
<tbody>
<tr>
<td>BIOL 461, PSYCH 202*, 391, STAT 205*, 304, 321</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Set C - Research Methods Courses</th>
</tr>
</thead>
<tbody>
<tr>
<td>ISS 251R, KIN 330, PSCI 315, PSYCH 291, REC 270,</td>
</tr>
<tr>
<td>270A*, SOC 281*, 321</td>
</tr>
</tbody>
</table>

   *No longer offered

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.

Note

Petitions to drop a sixth course will not be given favourable consideration.

Correspondence Courses

Because of the different start dates and the different final exam periods for correspondence and on-campus courses, students enrolled in full-time on-campus courses must have the permission of their Undergraduate Advisor to register for a correspondence 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 correspondence. A number of programs are available by correspondence (see the University of Waterloo Correspondence Calendar). There is no distinction between part-time and full-time students as to admission requirements, grading practices, or promotion policies.
Standing
1. 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.

2. 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.

3. 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.

4. 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.

5. Students whose cumulative average(s) has been cleared as in (4) 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.

6. Students may withdraw before the final day of classes without penalty to their records; however, students who withdraw to avoid a number of failures will likely be ineligible for re-admission for at least two terms.

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 an Application for Formal Inquiry 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 Appeals Policy and Procedure.

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 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. There are two different ways of combining academic study and practical work experience, through either a Co-op program or an internship program, and they lead to different degrees. The differences in these programs are described below.

The Honours Accountancy Studies Co-op Programs

The School of Accountancy offers Honours Accountancy Co-op Studies in two key fields – Chartered Accountancy and Management Accountancy. The Honours Chartered Accountancy programs in the Faculty of Arts anticipate 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. Students may opt to complete only the undergraduate portion of the program, but only completion of the entire five-year program will qualify a student for the above-mentioned exemptions. The Bachelor's portion of the 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 programs in the Faculty of Arts consist of a four-year program of study and work leading to an Honours Bachelor of Arts degree. This program 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.

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. 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 a specific program until they have completed the courses in the joint portion of the program.

Admission to Honours Accountancy Studies (Regular)

Students may apply for admission into Honours Accountancy Studies (Regular) after they have completed one or two years of university studies in any field with an excellent academic record. As a general rule, qualifying students will be required to complete the required courses listed in the section entitled Degree Requirements, excluding courses for which equivalent status is granted by the School of Accountancy, and an approved internship, unless an exemption 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.

Co-op and Internship Programs

Two different types of work experience may be part of accounting studies: Co-op and internship. A Co-op program involves alternating terms of work and study in approved work settings (see page 53) for specific sequences of academic and work terms. The first Co-op work term will follow completion of the 2A academic term. Four successfully completed work terms are required for the granting of a Co-op degree. A student may, for reasons beyond her/his control, fail to satisfactorily complete the full complement of work terms. In these exceptional circumstances, three work terms will be acceptable at the discretion of the School of Accountancy and the Department of Co-operative Education and Career Services. An internship program consists of a period of work (i.e. two or three consecutive four-month work terms) between the 4A and 4B academic terms. Work-term placements are in an accounting setting in the public and private sectors.

Because of the nature of the Honours Accountancy Studies Co-op and internship programs, which require work experience, admission to these programs requires Canadian Citizenship or Permanent Residence Status in Canada.

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). (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:
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, the student will have completed the formal university courses required 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.

A schedule outlining the recommended term-by-term sequence of courses is available from the School of Accountancy office.

3. All substitutions for required courses need prior approval of the Undergraduate Officer or designate.

The Honours Chartered Accountancy program in the Faculty of Arts anticipates the student's completion of a five-year integrated and professionally accredited program of study and work, leading to both a Bachelor of Arts degree and a Master of Accounting degree. At the end of the Honours Chartered Accountancy Studies program, which constitutes the undergraduate portion of the PAS, the student will have completed most of the formal university courses required at present by the Institute of Chartered Accountants of Ontario (ICAO). The other principal requirements for qualification as a CA, as stated by the ICAO, are passing of or being exempted from the ICAO's 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.

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
Drama and Theatre Arts
English
Environment and Resource Studies
French

Geography
History
Political Science
Religious Studies
Sociology

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 9:11 and 9:12.

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 102
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* (Cs 102)
Co-op 000 AS
Proposed Major Subject and Electives (two term courses)
### Classical Studies

**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.

#### 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.

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-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.

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**Year 2A**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Name</th>
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<tbody>
<tr>
<td>HIST 253 or P SCI 260A</td>
<td>Major Subject and Electives (three or four term courses)</td>
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<tr>
<td>ECON 102</td>
<td></td>
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</tbody>
</table>

**Year 2B**

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<thead>
<tr>
<th>Course Code</th>
<th>Course Name</th>
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</thead>
<tbody>
<tr>
<td>HIST 254 or P SCI 260B; PHI 145</td>
<td>Major Subject and Electives (three or four term courses)</td>
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</table>

**Year 3A**

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<tr>
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<th>Course Name</th>
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<tbody>
<tr>
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</table>

**Year 3B**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Name</th>
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</thead>
<tbody>
<tr>
<td>One of SCI 261, 263, 265, 267 or other approved Science course</td>
<td>Major Subject and Electives (four or five term courses)</td>
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</table>

**Year 4A**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>Major Subject and Electives (five or six term courses)</td>
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</tbody>
</table>

**Year 4B**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>Major Subject and Electives (five or six term courses)</td>
<td></td>
</tr>
</tbody>
</table>

* 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.

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### Honours Programs

Eligibility for graduation in the Honours Classical Studies, Classical Studies (Language 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 (see Notes). In Classical Studies
(Languages Specialization), the 20 term courses must include: CLAS 251/252; at least 14 term courses in LAT and GRK, including one 300-level term course in both, and a 400-level term course in one; CLAS 490A/B (Senior Honours Thesis) or two equivalent term courses in Directed Study.

Honours Classical Studies

Recommended Program

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

<table>
<thead>
<tr>
<th>Year Two</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>CLAS 251/252; 265 or 266</td>
<td></td>
</tr>
<tr>
<td>One additional CLAS</td>
<td></td>
</tr>
<tr>
<td>Two 200-level term courses in LAT/GRK</td>
<td></td>
</tr>
<tr>
<td>Four additional term courses</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Year Three</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>One 300-level term course in LAT/GRK</td>
<td></td>
</tr>
<tr>
<td>Two additional term courses in LAT/GRK</td>
<td></td>
</tr>
<tr>
<td>Three CLAS or Directed Study</td>
<td></td>
</tr>
<tr>
<td>Four additional term courses</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Year Four</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Two CLAS including one Senior Seminar</td>
<td></td>
</tr>
<tr>
<td>CLAS 490A/B or Directed Study</td>
<td></td>
</tr>
<tr>
<td>Six additional term courses</td>
<td></td>
</tr>
</tbody>
</table>

Honours Classical Studies (Languages Specialization)

Recommended Program

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

<table>
<thead>
<tr>
<th>Year Two</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Two LAT, two GRK</td>
<td></td>
</tr>
<tr>
<td>CLAS 251/252</td>
<td></td>
</tr>
<tr>
<td>Four additional term courses</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Year Three</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Four term courses in LAT/GRK, including one 300-level term courses in each</td>
<td></td>
</tr>
<tr>
<td>Two additional CLAS or LAT/GRK, or Directed Study</td>
<td></td>
</tr>
<tr>
<td>Four additional term courses</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Year Four</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>CLAS 490A/B or Directed Study</td>
<td></td>
</tr>
<tr>
<td>One 400-level term course in LAT/GRK</td>
<td></td>
</tr>
<tr>
<td>One additional term course in CLAS or LAT/GRK</td>
<td></td>
</tr>
<tr>
<td>Six additional term courses</td>
<td></td>
</tr>
</tbody>
</table>

Honours Latin

Recommended Program

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

<table>
<thead>
<tr>
<th>Years Two, Three, Four</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Four term courses in LAT</td>
<td></td>
</tr>
<tr>
<td>Two term courses in CLAS</td>
<td></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 9:11 and 9:12.

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

<table>
<thead>
<tr>
<th>Year Two</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>CLAS 251/252; 265 or 266</td>
<td></td>
</tr>
<tr>
<td>Two term courses in LAT/GRK</td>
<td></td>
</tr>
<tr>
<td>Seven additional term courses</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Year Three</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>One term course in LAT/GRK</td>
<td></td>
</tr>
<tr>
<td>Three CLAS (one may be Directed Study)</td>
<td></td>
</tr>
<tr>
<td>Eight additional term courses</td>
<td></td>
</tr>
</tbody>
</table>
Joint Honours Classical Studies (Languages Specialization)
Recommended Program

Year One
LAT 100A/B or LAT 203/204
GRK 100A/B
Six additional term courses

Year Two
Two LAT, two GRK
CLAS 251/252
Six additional term courses

Year Three
Three term courses in LAT/GRK
One additional term course in LAT/GRK or CLAS or Directed Study
Eight additional term courses

Year Four
CLAS 49OA/B or Directed Study
Eight additional term courses

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 49OA/B (Senior Honours Thesis). For further details consult the Department.

3. In CLAS 49OA/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. CLAS courses were formerly designated C CIV.

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. All Minor programs must be approved by the Department.

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;
      ENGL 362, 363, 190;
   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;
      ENGL 362, 363;
   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 co-requisites.

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.

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. Normally only students whose Year One cumulative overall average is at least 70% for the four-year program or 85% 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)
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 consulta-
tion with the Co-ordinator of Speech Communication.

Course Requirements
Limited enrollment in all Speech Communication Courses; 
early registration advised.

Core Speech Communication Courses
DRAMA 102 Introduction to Acting (Major only)
DRAMA 223 Public Speaking
DRAMA 224 Interpersonal Communication

Optional Speech Communication Courses
DRAMA 225 Interviewing
DRAMA 323 Speech Writing
DRAMA 324 Small Group Communication
DRAMA 326 Voice Technique

Approved Cognate Courses
ACC 432 Communicating Accounting Information for 
   Decision Makers
ACC 443 Creative Thinking, Problem Solving and Decision 
   Making for Accountants
CS 492 Social Implications of Computers
DRAMA 102 Introduction to Acting
DRAMA 221 Intermediate Acting 1
DRAMA 222 Intermediate Acting 2
DRAMA 321 Advanced Acting 1
DRAMA 322 Advanced Acting 2
ENGL 103A The Nature and Structure of the English 
    Language
ENGL 103B Varieties of English
ENGL 306A-F English Language and Linguistics
ENGL 309A Rhetoric: Principles and Practice 1
ENGL 309B Rhetoric: Principles and Practice 2
ENGL 309C Contemporary Rhetorical Theory
ENGL 309D Approaches to Style
ERS 361 International Communication System and 
   Development
FR 250A Advanced Spoken French 2
FR 300A Advanced Spoken French 3
FR 400A Advanced Spoken French 4
M SCI 211 Organizational Behaviour 1
M SCI 311 Organizational Behaviour 2
PACS 201 Roots of Conflict and Violence
PACS 202 Conflict Resolution
PACS 302A Community Conflict Resolution
PERST 200 Basic Personnel Administration
PERST 300 Concepts and Issues in Personnel 
   Administration

Arts
Drama and Speech Communication
Economics

PHIL 145 Critical Thinking
PHIL 200J Intentional Logic
PHIL 216 Rational Behaviour and Decision-Making
PHIL 243 Conflict, Contract and Choice
PHIL 245 Critical Thinking 2
PHIL 443 Critical Thinking, Problem Solving and Decision 
   Making
PHIL 463 Philosophy of Language
PHIL 464 Philosophy as Linguistic Analysis
PSCI 101A Introduction to Politics
PSCI 295 Public Sector Management
PSCI 375 The Politics of Self-Management
PSYCH 253 Social Psychology
PSYCH 254 Interpersonal Relations
PSYCH 334 Theories of Individual Counselling
PSYCH 335 Personality and Behaviour Change
PSYCH 338 Organizational Psychology
PSYCH 339 Personnel Psychology
PSYCH 344 Theories of Group Counselling
PSYCH 440A/B Group and Individual Counselling
SOC 216 Language, Society and Identity
SOC 233 Social Psychology of Beliefs and Attitudes
SOC 234 Social Psychology and Everyday Life
SOC 237 Collective Behaviour
SOC 243 Occupational Sociology
SOC 245 Interpersonal Communication
SOC 246 Mass Communication
SOC 265 Political Sociology
SOC 310 Seminar in Group Dynamics
SOC 336 Sociology of Professions
SOC 415 Social Network

Economics

It is recommended that students planning to major in 
Economics have OAC courses in Mathematics, preferably 
Algebra and Geometry, and Calculus or the equivalent. 
Students without these courses are encouraged to select 
MATH 103 and 104 in their first year of study at the 
University of Waterloo.

Three-Year General Economics
Eligibility for graduation in the General Economics program 
includes fulfillment of the following requirements:

1. Successful completion of a minimum of 30 term 
courses including Faculty of Arts Group requirements, 
and a minimum of 16 term courses beyond the 100 
level, with an overall cumulative average of at least 
60% and a cumulative major average of at least 65%.

2. At least ten term courses must be in Economics. Four 
of these ten term courses must be at the 300-level or 
above. ECON courses must include:
   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 ECON term courses must be at the 300-level or above, of which two term courses must be at the 400-level. ECON courses must include:
   a) 101, 102, 201, 202, 301, 302, 401, 402;
   b) 211 or 221.

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;
   b) Seven additional term courses at the 300-level or above. ECON 311, 421 and 422 are strongly recommended for students planning to pursue graduate work in Economics.

Recommended Program

<table>
<thead>
<tr>
<th>Year One</th>
<th>Year Two</th>
<th>Year Three</th>
<th>Year Four</th>
</tr>
</thead>
<tbody>
<tr>
<td>ECON 101 and 102</td>
<td>ECON 201, 202, 211, 221</td>
<td>ECON 301, 302, 321</td>
<td>ECON 401, 402*</td>
</tr>
<tr>
<td>Eight additional term courses</td>
<td>Two additional term courses in Economics</td>
<td>Three additional courses in Economics</td>
<td>Two additional term courses</td>
</tr>
<tr>
<td>ECON 201, 202, 211, 221</td>
<td>ECON 301, 302, 321</td>
<td>ECON 401, 402*</td>
<td>ECON 401, 402</td>
</tr>
<tr>
<td>Two additional term courses</td>
<td>Three additional courses in Economics</td>
<td>Two additional term courses</td>
<td>Six additional term courses</td>
</tr>
<tr>
<td>* ECON 401, 402, need not be taken in the order as listed.</td>
<td></td>
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</tbody>
</table>

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 9:11 and 9:12.

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;
   b) 403 or 421;
   c) Six additional ECON electives at the 300-level or above. ECON 311, 421 and 422 are strongly recommended for students planning to pursue graduate work in Economics.

3. In addition, the following courses are required:
   a) ACC 121, 122
   b) CS 100 or 102.

Recommended Program for Honours Applied Economics (Co-op)
This program consists of a minimum of 42 term courses of which 18 are in economics.

<table>
<thead>
<tr>
<th></th>
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</thead>
<tbody>
<tr>
<td>1</td>
<td>ECON 101, CS 100 or 102, Three electives</td>
<td>ECON 102, ENGL 109, Three electives</td>
<td>Registration for Honours Applied Economics in February/March</td>
</tr>
<tr>
<td>2</td>
<td>Term 2A ECON 201, 221, ACC 121, MATH 107, Two electives</td>
<td>First Work Term</td>
<td>Term 2B ECON 202, 211, 321, ACC 122, Two electives</td>
</tr>
<tr>
<td>3</td>
<td>Second Work Term</td>
<td>Term 3A ECON 301, 302, ECON course at 300-level or above, Two electives</td>
<td>Third Work Term</td>
</tr>
<tr>
<td>4</td>
<td>Term 3B* ECON 401, ECON 421, ECON course at 300-level or above, Two electives</td>
<td>Fourth Work Term</td>
<td>Term 4A ECON 402, Two ECON courses at 300-level or above, Two electives</td>
</tr>
<tr>
<td>5</td>
<td>Fifth Work Term</td>
<td>Term 4B** ECON 403, ECON course at 300-level or above, Three electives</td>
<td></td>
</tr>
</tbody>
</table>

* If ECON 421 is not selected, two ECON courses at the 300-level or above.
** If ECON 403 is not selected, two ECON courses at the 300-level or above.
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. 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, plus four 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.

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.

Economics Option
The Economics Option is open to students in Honours Earth Sciences and requires the successful completion of six term courses with a cumulative average in these courses of at least 65%. The required courses include:

1. ECON 101, 102, 201 and 355;
2. Two additional courses with no more than one from the same subject area, selected from the following groups of approved courses:
   - ECON 341 or 361
   - BUS 111 or 121*
   - M SCI 211
   - ECON 220 or another course on entrepreneurship.

* BUS 111 and 121 are offered at Wilfrid Laurier University.

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 322
      - 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, 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 430A, 430B, 451A, 451B, 460A, 460B, 460C (British Literature since 1800);
   g) two term courses from 313, 314, 315, 316, 343, 344, 345, 346, 347 (North American Literature);
   h) four other English major term courses.

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 65%.

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 2-6-6-6 among the four years. English courses must include:
   a) two term courses from 102A, 102B, 103A, 103B, 105A, 105B, 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 430A, 430B, 451A, 451B, 460A, 460B, 460C (British Literature since 1800);
   g) two term courses from 313, 314, 315, 316, 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, 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 (two term courses): one of 210E or 210F;

4. Discipline Core (six term courses): all of 292, 306A, 309A, 309C, 409 (1.0);

5. RPW Electives (four term courses): choose from among the 305 courses, other 306 courses, other 309 courses, 335, 336, 392A, 392B, 470A, 470B, 481/482/492 senior seminars, 495A/B when devoted to projects in linguistics, rhetoric, professional writing, or communication (clear RPW elective choices with English advisor).

Non-English Requirements (20 courses)
1. CS 100 or equivalent;
2. Two courses in a language other than English (Arts Group Aii – culture courses may not be used to fulfill this requirement);
3. Four courses in social sciences (Arts Group B);
4. Five courses in an intensive study concentration;
5. Eight courses in open electives.

Note to RPW students
Because most students who choose RPW also choose the Co-op program, the pattern of RPW course selection is set up to accommodate their needs. Co-op RPW students are strongly advised to follow a fully-alternating schedule of academic and work terms. (For the details of this alternating schedule, see 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.

Notes

1. 200A/B; 251A/B; one course among the North American sequences; one course among the 310, 330, 350, 362/363, 410, 430, 452, 460 sequences;

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 9:11 and 9:12.

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, 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);
   d) two term courses from each of:
      iii) 430A, 430B, 451A, 451B, 460A, 460B, 460C (British Literature since 1800);
      iv) 313, 314, 315, 316, 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, 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, 452, 460 sequences;
3. 200-level Writing (one term course): one of 210E or 210F;

4. Discipline Core (five term courses): one 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.

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

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%.

Honours Fine Arts
To graduate with an Honours degree in Fine Arts, it is necessary to complete two of: FINE 472, 473, 490, 491. Admission is by portfolio, Art History or Film Studies presentation in March of the preceding year, submitted after
Successfully completing all required third-year subjects, and maintaining an average of 75% in the major. This is to ensure that students are capable of carrying out their proposed course of study.

All other fourth-year courses are open to students who have completed their third-year courses or are otherwise qualified.

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, 252, 225, 319;
   b) five additional term courses in Fine Arts, four of which must be in Art History;
   c) Four term studio courses on the third-year level* chosen from: FINE 320, 321, 322, 323, 324, 325, 326;
   d) one of: FINE 472, 490;
   e) one of: FINE 473, 491.

   These courses must be taken in sequence with 473 or 491 being the final courses for the Honours degree.

   *Certain courses require prerequisites.

   **Art History Specialization:**
   a) FINE 110, 111, 120, 121, 210, 211, 212, 213, 219, 319;
   b) two additional Studio term courses;
   c) six additional term Art History 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, 255R, 258W, 271W, 359, 380Z, 381Z;
   e) 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 Honours requirements listed above but differ in important details. Please see the Faculty Advisor.

   **Minor in Fine Arts (Studio, Art History or Film Studies Specialization)**
   Eligibility for graduation with a Fine Arts Minor (Studio, Art History or Film Studies Specialization) includes fulfillment of the following requirements:

   1. Successful completion of a minimum of ten Fine Arts term courses with a cumulative average in these Fine Arts courses of 65%.

   2. For the different Specializations, the required Fine Arts courses are:

      **Studio or Art History Specialization:**
      FINE 110/111, 120/121

      **Film Studies Specialization:**

   **Fine Arts Abroad**
   In the Spring, FINE 394 is offered abroad, usually in France, England or Mexico. Information about current offerings can be obtained from the Department.
French

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 six term courses must be at the 300- or 400-level. At least one term course must be taken in each of the following areas: 17th-, 18th-, 19th-, 20th-century literature, French-Canadian literature, and linguistics. The student must complete five term credits in French language including FR 351, 352 and one course in French or French-Canadian civilization.

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

1. Successful completion of a minimum of 40 term courses including Faculty of Arts Group requirements with an overall cumulative average of at least 60% and a cumulative major average of at least 65%.

2. At least 16 term courses must be in French of which eight must be at the 300- or 400-level. Students must complete six courses in French language including FR 351, 352 and 400 and one course in French or French-Canadian Civilization. At least one term course must be taken in each of the following areas: 17th-, 18th-, 19th-, 20th-century literature, French-Canadian literature, and linguistics.

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

1. Successful completion of a minimum of 40 term courses including Faculty of Arts Group requirements with an overall cumulative average of at least 60% and a cumulative major average of at least 75%.

2. At least 20 term courses must be in French of which at least ten term courses must be at the 300- or 400-level. At least six term courses must be taken in literature in six of the following areas: Medieval, Renaissance, 17th-, 18th-, 19th-, 20th-century French literature or French-Canadian literature. The student must complete one course in linguistics, at least six term credits in language including FR 351, 352 and 400 and two courses in French or French-Canadian civilization.

Recommended Program

Year One
FR 195A and 196A – prerequisite for upper level literature courses
FR 192A and 192B – recommended
Six additional term courses

Year Two
FR 251 and 252
At least four additional term courses in French in accordance with requirements

Additional elective courses

Year Three
FR 351 and 352
At least four additional French courses in accordance with requirements

Additional elective courses

Year Four
FR 400
At least four additional French courses in accordance with requirements

Additional elective courses

Honours French (Applied Studies Co-op)
Students may combine an Honours French program with Applied Studies Co-op. The requirements in French are identical to the Joint Honours requirements listed below. The Applied Studies requirements are listed on pages 9:11 and 9:12.

French Teaching Specialization
There are currently two entry points for the program:

1. Department of French Co-op French Teaching Specialization Program, which the student enters after a regular first year in Arts, and which has 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 of which at least ten term courses must be at the 300- or 400-level. At least six term courses must be taken in literature in six of the following areas: Medieval, Renaissance, 17th-, 18th-, 19th-, 20th-century French literature or French-Canadian literature; two courses in linguistics (from FR 203, 303, 403 and 409); at least six term credits in language including FR 351/352 and 400; and three courses in civilization (FR 195A, 196A, plus one of FR 263 or 273). Students must select either a course in Quebec civilization (FR 273) plus two terms at a French university, or a course in French civilization (FR 263) plus two terms at a Quebec university. 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 will be required to take PSYCH 212 (Educational Psychology) for which PSYCH 101 is a prerequisite.
Students graduate with an Honours BA degree from University of Waterloo, a Bachelor of Education degree awarded by Brock University, and receive certification from the Ministry to teach French and a second subject at a secondary level.

**Recommended Program: Dept. of French Co-op F.T.S. Program**

**Year One**
- FR 195A and 196A (or 192A/B)
- PSYCH 101
- Two term courses in a proposed second teaching subject
- Five elective term courses

**Year Two**
- FR 251 and 252
- FR 203, 275, 232
- One of FR 263, 273, HIST 203X or another French course as advised
- 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, 303, 354, 363, plus two term courses in the second teaching subject or two elective term courses. The courses chosen should be approved by the Department of French and by other departments in whose discipline courses are taken.

**Year Four**
- FR 400
- FR 342, 403, one of 409, 410, 421, 422
- One further term course in French
- Two term courses in the second teaching subject
- Two elective term courses
- Two term course tutorials in teaching techniques

2. **Applied Studies Co-op French Teaching Specialization Program.** 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, 102; 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.

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 to teach French and a second subject at the secondary level.
Religious Studies  Sociology  
Russian  Spanish  
Social Development Studies

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 eight must be at the 300- or 400-level. Students must take at least six term credits in language including FR 351, 352 and 400 and six term credits in literature, including at least one each from six of the following areas: Medieval, Renaissance, 17th-, 18th-, 19th-, 20th-century French literature or French-Canadian literature, as well as one term credit in linguistics.

Recommended Program

Year One
FR 195A and 196A
Eight additional term courses

Year Two
In language, a minimum of FR 251 and 252
A minimum of four additional term courses in French literature or linguistics
Additional courses

Year Three
In language, a minimum of FR 351 and 352
A minimum of two additional term courses in French literature or linguistics
Additional courses

Year Four
In language, a minimum of FR 400
A minimum of two additional term courses in French literature or linguistics
Additional courses

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.

Study in France or Quebec
The Department offers students in an honours program the possibility of studying for a year at the University of Nantes in France under a special third-year program. As well, students may study at the University of Quebec at Chicoutimi or at the University of Paris. More information may be obtained from Department.

Geography

Admission to the Geography programs in the Faculty of Arts is gained in second year. Those interested should take the appropriate Geography courses in first year.

Three-Year General Geography
Eligibility for graduation in the Three-Year General Geography program includes fulfillment of the following requirements:

1. Successful completion of a minimum of 30 term courses including Faculty of Arts Group requirements with an overall cumulative average of at least 60% and a cumulative Geography average of at least 65%.

2. A minimum of any 12 term courses in Geography which may include ENV S 178, 195, 200, 278.

Four-Year General Geography
Eligibility for graduation in the Four-Year General Geography 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 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. Eligible courses are those listed under the heading Regional Geography (page 11:19).

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. Eligible courses are those listed under the heading Regional Geography (page 11:19).
**Required Four-Year Program - General or Honours**

**Year One**

- GEOG 101 Introduction to Human Geography
- GEOG 102 Introduction to Physical Geography
- 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 (Honours only)
- ENV S 178 Introduction to Environmental Research or equivalent basic statistics course (page 97)
- Two of:
  - GEOG 204 Soviet Union
  - GEOG 205 Africa
  - GEOG 206 The World Region and World Issues
  - GEOG 221 U.S.A.
  - 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 390 Honours Thesis Proposal (Honours Only)

**Electives**

**Year Four**

- One of:
  - GEOG 490A/B Honours Thesis (Honours Only)
  - GEOG 491A/B Senior Research Paper (Honours Only)

**Geography Joint Honours**

(See page 11:17).

**Minor Program in Geography**

A total of ten term courses must be completed in Geography among which may be included ENV S 195 and ENV S 200.

**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 or 210 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
- Grade 12 standing in German or equivalent

**Stream B**

- Students with at least Grade 12 standing in German
- GER 101/102
- GER 121/122 and/or GER 251/252
- GER 201/202
- GER 291/292
- GER 351/352

**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:

- GER 101/102
- GER 121/122 and/or GER 251/252
- GER 201/202
- GER 291/292
- GER 351/352
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.

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 German Studies term courses will normally be as follows:

Stream A
- GER 101/102
- GER 201/202
- GER 251/252
- GER 351/352
- GER 272
- Six electives from GER 281/282, 300, 381

Stream B
- GER 251/252
- GER 272, 292
- GER 281/282, 300, 381
- Six electives from GER 281/282, 300, 381

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

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

Honours German (Applied Studies Co-op)
Eligibility for graduation in the Honours German (Applied Studies Co-op) program includes fulfillment of the following requirements:
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 251/252
(or challenge for language competence by passing a departmental language examination at the level of GER 252. 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 272, 292
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.

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

Basic requirements for all German Studies programs in the Department (Honours, Joint Honours, General and Minor)
1. German language competence;
2. Knowledge of the major periods of German literature, particularly modern German literature;
3. Knowledge of the essentials of German history and culture.

List of Elective German Studies Courses from other Departments
ECON 365 Economic Development of Modern Europe 1780-1973
GEOG 227 Regional Problems of Europe
GEOG 421A Western Europe 1
GEOG 423 Central and Eastern Europe
HIST 218 German History 1740-1945
HIST 263 Europe 1789-1945
HIST 340 1789-1914
HIST 358 The History of Modern Germany: From the Weimar Republic to Reconstruction
PSCI 255 The Politics of Western Industrial Nations
PSCI 256 The Politics of Western Industrial Nations 2
PSCI 321 Marxist Theory

Waterloo in Germany Program
The Department offers a yearly program of studies at the University of Mannheim on the Rhine. The program is normally open to students entering third-year courses. In exceptional cases second-year students will also be considered. Students of all disciplines may apply, provided they have an adequate knowledge of German. The application deadline for students who wish to begin studies in Mannheim in the Winter Semester (October 15 to February 15) is April 1. The application deadline for those who wish to begin their studies in the Summer Session (April 15 to July 15) is February 1. Applications should be submitted to "Waterloo in Germany", Department of Germanic and Slavic Languages and Literatures, University of Waterloo, Waterloo, Ontario N2L 3G1.

Notes For All Programs
1. First-year students who wish to major in German are strongly advised to consult the Undergraduate Advisor of the Department.
2. Before graduation all students majoring in German must complete GER 291/292, normally in Year Two.
3. 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.

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 at least two above the 250-level and no more than two at the 100-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 two at the 300-level, and no more than two at the 100-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 12 term courses and four senior seminars (4.0 course credits) must be in History. At least one senior seminar (1.0) must be a research seminar (with a B suffix). No more than two term courses may be at the 100-level. History courses must include:
   a) 250 or 300*
   b) One of 260, 261, 262, 263
   c) One of 253, 254, 273, 274
   d) One of 255, 256, 257, 258

3. The 20 term courses in History are usually divided 2-5-5-8 among the four years.
   * 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 ten (10) term courses and four senior seminars (4.0 course credits). The Applied Studies requirements are listed on pages 9:11 and 9:12.

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
- German
- Philosophy
- Political Science
- Psychology
- Religious Studies
- Russian
- Spanish
- Sociology

Eligibility for graduation in the Joint Honours History 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 ten term courses and two senior seminars must be in History.

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, 191, 192, 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 15:8 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 pursuit 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.

3. Successful completion of at least six term courses (not all of which need be medieval in content) in one of the 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 20 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 9:11 and 9:12.

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.

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, 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.

In addition, students must demonstrate competence on one instrument (or voice) equal to Grade Ten standing at the Royal Conservatory of Music of Toronto. Normally this is attained through taking Music Studio Courses — MUSIC 226, 227, 326, 327.

Honours Music (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 9:11 and 9:12.

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>Discipline</th>
<th>/music/</th>
</tr>
</thead>
<tbody>
<tr>
<td>Drama</td>
<td>Mathematics</td>
</tr>
<tr>
<td>English</td>
<td>Philosophy</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>
</tbody>
</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.

In addition, students must demonstrate competence on one instrument (or voice) equal to Grade Ten standing at the Royal Conservatory of Music of Toronto. Normally this is attained through taking Music Studio Courses -- MUSIC 226, 227, 326, 327.

Minor Program
Eligibility for graduation with a Minor in Music includes fulfillment of the following requirements:

1. At least ten term courses in Music, including MUSIC:
   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, 243, 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 216, 241, 242, 243, or 440A/B;
   b) 218J or 221;
   c) 322;
   d) any four of 380 - 387 or 378;
   e) 499A and either 499B or 499J.

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 9:11 and 9:12.

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 14 term courses must be in Philosophy, including PHIL:
   a) one of 216, 241, 242, 243, 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, 243, or 440A/B;
   b) 218J or 221;
   c) 322;
   d) any four of 380 - 387 or 378;
   e) 499A and either 499B or 499J.

College students are also expected to take 450J.

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:

<table>
<thead>
<tr>
<th>Economics</th>
<th>Political Science</th>
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<tbody>
<tr>
<td>English</td>
<td>Psychology</td>
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<tr>
<td>French</td>
<td>Religious Studies</td>
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<tr>
<td>German</td>
<td>Russian</td>
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<tr>
<td>History</td>
<td>Social Development</td>
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<tr>
<td>Latin</td>
<td>Studies</td>
</tr>
<tr>
<td>Mathematics</td>
<td>Sociology</td>
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</tbody>
</table>
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, 243, 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 9:34).

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 9:34) | Four other term courses |
| Year Three | Six term courses in Political Science (see Note page 9:34) | 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 9:34) | 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 78% 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 9:11 and 9:12. 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>French</th>
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<tbody>
<tr>
<td>Drama</td>
<td>Geography</td>
</tr>
<tr>
<td>Economics</td>
<td>History</td>
</tr>
<tr>
<td>English</td>
<td>Mathematics</td>
</tr>
<tr>
<td>Environment and Resource Studies</td>
<td>Philosophy</td>
</tr>
<tr>
<td>Sociology</td>
<td></td>
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</tbody>
</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>
<th>Year Two</th>
</tr>
</thead>
<tbody>
<tr>
<td>PSCI 101/102</td>
<td>Four term courses in Political Science (see Note page 9:34)</td>
</tr>
<tr>
<td>Two introductory term courses in the other discipline</td>
<td>Four term courses in the other discipline</td>
</tr>
<tr>
<td>Six other term courses</td>
<td>Four other term courses</td>
</tr>
</tbody>
</table>
Year Three
Four term courses in Political Science (see Note page 9:34)
Four term courses in the other discipline
Four other term courses

Year Four
Four term courses in Political Science, at least two of
which must be at the 400-level (see Note page 9:34)
Four term courses in the other discipline
Four other term courses

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 fol-
lowing 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 pro-
gram includes fulfillment of the following requirements:
1. Successful completion of a minimum of 30 term
courses including the Faculty of Arts Group require-
ments with a cumulative overall average of at least
60%.
2. At least ten term courses must be in Psychology,
including PSYCH:
   a) 101;
   b) 200;
   c) at least one of 203, 206, 207, 261, 271;
   d) at least one of 211, 253, 355, 357;
   e) at least one of 212, 213, 333, 334, 335, 338, 339,
      341;
   f) five electives in PSYCH.
A minimum cumulative Psychology average of at least
65% is required.

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% aver-
age requirement for Honours Psychology, to receive
recognition for a fourth year of study.

Students in Honours Psychology who have completed
12 term courses in Psychology, have met Honours require-
ments a-f, 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 are advised that the Four-Year General
program is not equivalent to the Honours Degree-Thesis
Program which is normally expected for admission to grad-
uate programs in Psychology. Also, students may not com-
bine this program with: Honours; Minor in other than an
Arts discipline; Co-op or Applied Studies; or with certain
Options.

Eligibility for graduation in the Four-Year General
Psychology program includes the fulfillment of the fol-
lowing requirements:
1. Successful completion of a minimum of 40 term
courses including the Faculty of Arts Group require-
ments 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 PSYCH:
   a) 101;
   b) 291, 292, 391 (check overlapping courses on page
      9.7 and with the undergraduate secretary);
   c) at least two of 203, 206, 207, 261, 271;
   d) at least two of 211, 253, 355, 357;
   e) at least one of 392, 394, 396, 398;
   f) at least one of 392, 393, 395, 397;
   g) six PSYCH electives.

Students may not use PSYCH 392 to satisfy both e and f.

Honours Psychology (Thesis Program/Coursework
Program)
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 perfor-
mance in at least ten term courses in Year One, including
PSYCH 101 and preferably one additional term course in
Psychology. 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 guaran-
tee 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.

Students in Honours Psychology may select either the
Thesis Program or the Coursework Program. However,
students selecting the Coursework Program are advised
that a thesis in Psychology is typically required for
admission to graduate studies in Psychology.
Thesis Program
Eligibility for graduation in the Honours Psychology-Thesis 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 18 term courses must be in Psychology, including PSYCH:
   a) 101;
   b) 291, 292, 391; (check overlapping courses on page 9:7 and with the undergraduate secretary)
   c) at least two Natural Science Courses from 203, 206, 207, 261, 271;
   d) at least two Social Science Courses from 211, 253, 355, 357;
   e) one Natural Science Research Course from 392, 394, 396, 398;
   f) one Social Science Research Course from 392, 393, 395, 397;
   g) two Honours Seminars in PSYCH;
   h) three PSYCH electives;
   i) 499A/B/C.

Students may not use PSYCH 392 to satisfy both e and f. Students should consider prerequisites for third year courses when selecting their second year courses. PSYCH 291, 292, 391, and two research courses should be completed prior to the beginning of the fourth year of the program.

Recommended Program

<table>
<thead>
<tr>
<th>Year One</th>
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</thead>
<tbody>
<tr>
<td>PSYCH 101 and one PSYCH elective</td>
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<tr>
<td>Eight additional term courses</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Year Two</th>
</tr>
</thead>
<tbody>
<tr>
<td>PSYCH 291/292</td>
</tr>
<tr>
<td>One Natural Science Course</td>
</tr>
<tr>
<td>One Social Science Course</td>
</tr>
<tr>
<td>Six additional term courses</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Year Three</th>
</tr>
</thead>
<tbody>
<tr>
<td>PSYCH 391</td>
</tr>
<tr>
<td>One Natural Science Research Course</td>
</tr>
<tr>
<td>One Social Science Research Course</td>
</tr>
<tr>
<td>One Natural Science Course</td>
</tr>
<tr>
<td>One Social Science Course</td>
</tr>
<tr>
<td>One Honours Seminar in PSYCH</td>
</tr>
<tr>
<td>Four additional term courses</td>
</tr>
</tbody>
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<thead>
<tr>
<th>Year Four</th>
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<tbody>
<tr>
<td>PSYCH 499A/B/C</td>
</tr>
<tr>
<td>One Honours Seminar in PSYCH</td>
</tr>
<tr>
<td>Two PSYCH electives</td>
</tr>
<tr>
<td>Four additional term courses</td>
</tr>
</tbody>
</table>

Coursework Program
Students in the Coursework Program will substitute requirements h) and i) of the Honours Psychology-Thesis Program with four PSYCH electives and two advanced courses in Psychology (those with prerequisites beyond PSYCH 101 that have not been used to fulfill other Psychology requirements).

Honours Psychology (Applied Studies Co-op)
A student may combine an Honours Psychology-Thesis Program or Coursework Program with Applied Studies Co-op.

Students choosing the Thesis Program will substitute requirement h) of the Honours Psychology-Thesis Program with one PSYCH elective. Students choosing the Coursework Program will substitute requirements h) and i) of the Honours Psychology-Thesis Program with two PSYCH electives and two advanced courses in Psychology (those with prerequisites beyond PSYCH 101 that have not been used to fulfill other Psychology requirements). Students selecting the Coursework Program are advised that a thesis in Psychology is typically required for admission to graduate studies in Psychology.

Please refer to the Honours Psychology section for application information. Admission will be based on the Psychology and overall averages, with a minimal admission requirement being 75% in Psychology and 70% overall. Admission is limited and will be based on space availability. The Applied Studies requirements are listed on pages 9:11 and 9:12.

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.

Generally, students are placed as research or program assistants in such work settings as government and private research organizations, personnel departments, management training programs, correctional institutions, and other educational and/or treatment institutions.

Co-op seminars are conducted during the on-campus terms; these seminars assist students in defining their career objectives, in assessing their interests, strengths, and aptitudes, and in selecting appropriate elective courses and job placements.

Psychology Joint Honours Programs
Joint Honours programs exist with the following departments:

- Anthropology
- Classical Studies
- Dance
- Drama
- Kinesiology
- Mathematics
- Music
- Philosophy
Please refer to the Honours Psychology section for application information.

Students in Joint Honours with Psychology may select either the Thesis Program or the Coursework Program. Students who do not plan to do a Psychology thesis must follow the Psychology Coursework Program requirements. Students are advised that a thesis in Psychology is typically required for admission to graduate studies in Psychology.

Eligibility for graduation in the Joint Honours Psychology program requires successful completion of a minimum of 44 term courses including 16 term courses in PSYCH and the Faculty of Arts Group requirements. A cumulative overall average of at least 60% and a minimum cumulative Psychology average of at least 75% is required for graduation. In addition, 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.

Students choosing the Thesis Program will substitute requirement h) of the Honours Psychology-Thesis Program with one PSYCH elective. Students choosing the Coursework program will substitute requirements h) and i) of the Honours Psychology-Thesis Program with two PSYCH electives and two advanced courses in Psychology (those with prerequisites beyond PSYCH 101 that have not been used to fulfill other Psychology requirements). If both majors require research methods and/or statistics courses, consult the list of overlapping courses, Item 7, page 97, and the undergraduate secretary. 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).

Religious Studies

Purpose of the Program In Religious Studies:
1. to expose students to the issues and problems involved in, and to the nature of the questions raised by, the study of religious phenomena and ideas;
2. to enable students to approach, in a methodical way, the study of the major religious traditions living today for the purpose of encountering and understanding the life and the expression of religion through the various religions of the world.
3. to introduce them to the distinctive features of one or more religious traditions and to the methods for their systematic study.

The course offerings of the Religious Studies Department fall into the following five areas:
1. World Religions
2. History of the Christian Tradition
3. Biblical Studies
4. Theology - Philosophy - Ethics
5. Religion, Society and Culture.

Areas of Religious Studies to which courses belong are indicated by the area number below the course description.

Three-Year General Religious Studies
Eligibility for graduation in the General Religious Studies program includes fulfillment of the following requirements:
1. Successful completion of a minimum of 30 term courses including Faculty of Arts Group requirements with an overall cumulative average of at least 60% and a cumulative major average of at least 65%.
2. At least ten term courses must be in Religious Studies including RS:
   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 16 rather than 20. The Applied Studies requirements are listed on pages 9:11 and 9:12.

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

| Anthropology | History |
| Classical Studies | Music |
| English | Philosophy |
| Environment and Resource Studies | Psychology |
| French | Studies |
| Germanic and Slavic | Sociology |

The requirements in Joint Honours programs are the same as the Honours program, except the overall number of Religious Studies courses is 14 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 65%.
2. At least 12 term courses must be in Russian.

Honours Russian
Eligibility for graduation in the Honours Russian program includes fulfillment of the following requirements:
1. Successful completion of a minimum of 40 term courses including Faculty of Arts Group requirements with an overall cumulative average of at least 60% and a cumulative major average of at least 75%.
2. At least 20 term courses must be in Russian.

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 16:79.

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.

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.

<table>
<thead>
<tr>
<th>Interdisciplinary Social Science</th>
<th>Social Work</th>
<th>Sociology</th>
<th>Psychology</th>
</tr>
</thead>
<tbody>
<tr>
<td>ISS 131R 120R 150R</td>
<td>SOCWK 120R 121R</td>
<td>SOC 120R 121R</td>
<td>PSYCH 120R 121R</td>
</tr>
<tr>
<td>ISS 220R 221R 240R 250R 251R</td>
<td>SOCWK 220R 221R</td>
<td>SOC 220R 221R</td>
<td>PSYCH 220R 221R</td>
</tr>
<tr>
<td>ISS 320R 321R 322R 326R 327R</td>
<td>SOCWK 320R 321R</td>
<td>SOC 327R 326R</td>
<td>PSYCH 322R 322R</td>
</tr>
<tr>
<td>390A/B 397R 365R 367R</td>
<td>390R 398R 399R</td>
<td>399R 399R 399R</td>
<td>399R 399R 399R</td>
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</tbody>
</table>

**Three-Year General Social Development Studies**

Eligibility for graduation in the Three-Year General Social Development Studies program includes completion of the following requirements:

1. A minimum of 30 term courses, including Faculty of Arts Group requirements, with an overall cumulative average of at least 60% and a cumulative Major average of at least 65%.

2. At least 14 term courses from the Major. These courses must be distributed over the four subject areas of the program using a maximum of six term courses from a single subject area. (Additional Social Development Studies courses may be from any of the subject areas.)

3. **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

   **Year Four**
   
   ISS 499A/B

   Two other term courses from the Major

   Six additional term courses

**Four-Year General Social Development Studies**

Eligibility for graduation in the Four-Year General Social Development Studies program includes completion of the following requirements:

1. A minimum of 40 term courses, including the Faculty of Arts Group requirements, with an overall cumulative average of at least 60% and a cumulative Major average of at least 65%.

2. Two options are available for completing the Major requirements:
   
   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.

3. **Honours Social Development Studies**

   Eligibility for graduation in the Honours Social Development Studies program includes completion of the following requirements:

   1. A minimum of 42 term courses, including Faculty of Arts Group requirements with an overall cumulative average of at least 60% and a cumulative average of at least 75% in the Major.

   2. At least 18 term courses from the Major.

   3. Eight term courses, selected in consultation with Renison's Undergraduate Officer, 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

   Four term courses from Theme Area of study

   Two additional term courses

   **Year Three**
   
   ISS 320R, SOCWK 326R

   Two other term courses from the Major

   Four 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 44 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 with an overall average of at least 75%. These courses will typically include:
   a) four introductory courses from: ISS 131R, 150R, PSYCH 120R, SOC 120R, SOCWK 120R;
   b) ISS 250R, 251R;
   c) ISS 320R;
   d) five term courses above the 100 level;
   e) ISS 499A/B (Senior Honours Essay);
4. Six term courses in subjects related to a Theme Area of Study.

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

<table>
<thead>
<tr>
<th>Arts</th>
<th>Social Development Studies</th>
</tr>
</thead>
<tbody>
<tr>
<td>Course selection for a Joint Honours program with Social Development Studies should only be made after consultation with Renison's Undergraduate Officer.</td>
<td></td>
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</tbody>
</table>

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 Renison’s Undergraduate Officer.

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 400 hours of supervised and evaluated field placement and the following courses: SOCWK 001, 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 for each of the two phases 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 the Undergraduate Officer for Social Development Studies. 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:
1. PSYCH 120R; PSYCH 121R or ISS 150R; SOC 120R; SOCWK 120R, 220R, 221R, 222R;  

2. At least one but not more than two of: SOCWK 320R, 321R, 322R;  


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, 355R; 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%.

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), 321 (sociological methods course);  
   b) 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 499A/B  
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 9:11 and 9:12.

Sociology Joint Honours Programs
Sociology has Joint Honours programs with the following:

- Anthropology
- Philosophy
- Economics
- Political Science
- English
- Psychology
- Fine Arts
- Recreation and Leisure
- French
- Studies
- Geography
- Social Development
- History
- Studies
- Mathematics
- 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 499A/B or the equivalent of nine term courses of electives in Sociology plus the equivalent of 499A/B in the related department.

Note For Joint Honours Program
In the Joint Honours program with French, SOC 280 may be replaced by an elective in Sociology.

Minor Program
Students electing a Minor program in Sociology must complete ten term courses in Sociology with a minimum 65% average for all Sociology courses.

The required courses in Sociology for the General program in Sociology are also required of students choosing the Minor program.

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Spanish
(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 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 9:11
and 9:12.

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

<table>
<thead>
<tr>
<th>Classical Studies</th>
<th>History</th>
</tr>
</thead>
<tbody>
<tr>
<td>English</td>
<td>Latin</td>
</tr>
<tr>
<td>French</td>
<td>Sociology</td>
</tr>
<tr>
<td>German</td>
<td>Psychology</td>
</tr>
</tbody>
</table>

The Applied Studies requirements are listed on pages 9:11
and 9:12.

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 out-
lined above under the Four-Year General program.

Recommended Program

Year One
SPAN 201A/B (Students with little or no Spanish will take
SPAN 101/102 in the first year and 201A/B in the
second year.)
Eight additional term courses.

Year Two
A minimum of four term courses in Spanish, including
SPAN 251A/B, (or 201A/B), and 205/206.
Six additional term courses.

Year Three
A minimum of six term courses in Spanish, including
SPAN 351A/B, (or 251A/B), 227/228 and 326 or 327.
Six additional term courses.

Year Four
A minimum of four term courses in Spanish.
Six additional term courses.

Minor Program in Spanish
Students in an Honours program interested in Spanish as
a complement to the major field of study will be expected
to complete ten term courses in Spanish. Please consult
the Undergraduate Officer in Spanish for Minor in Spanish.

Notes For All Programs
1. By agreement, students at the University of Waterloo
and Wilfrid Laurier University can be expected to take
courses in Spanish at either university. While most lan-
guage 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 per-
mission of the home department to enrol in Spanish
courses at the 100- or 200-level.

Speech Communication
See Drama and Speech Communication.
Faculty of Engineering

Engineering students enjoying Orientation.
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 the Humanities and Social Sciences.

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
- 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 8 to 11.

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 and Geological 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 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: Mathematics, Science, and English or their equivalent. The University has developed special pre-university mathematics, physics and chemistry courses which can be taken by correspondence and which are recommended for Adult Students. To discuss admissibility and appropriate qualifying studies, applicants are advised to contact the Director of Admissions for the Faculty of Engineering in the fall of the year prior to entering Year One.
Admission to Advanced Standing
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. The level of advanced admission is determined by an examination of the applicant's academic and work experience.
Credit for previous work experience can be applied only to those work terms preceding the level of admission and cannot exceed three work terms.

WHMIS Requirements
All students in the Faculty of Engineering, indeed all students taking courses offered by the Faculty of Engineering, must have appropriate instruction on issues of safety. The Workplace Hazardous Material Information System (WHMIS) training satisfies this requirement. Except for students in the 1A term and those 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 contact June Lowe, E2, Room 1318A, ext. 3888, who will 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 ensure that he/she participates in 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. Should a student who has voluntarily withdrawn wish to re-enter the program, he/she may re-apply to the program directly through application to the Admissions Committee of the Faculty.

9. A student may be **Required to Withdraw from Engineering** at any time if, in the opinion of the Faculty, the student is unlikely to benefit from further participation in the program or if the student leaves the program without notification and fails to write examinations.
10. Courses taken by students during work terms will not be included in the average for any term. The grades for courses taken at the University of Waterloo or at another university on Letter of Permission, however, will be reported on the student's transcript. Normally, such courses are considered as enrichment to the student's program; when the material of such a course is deemed to cover a subsequent course in the program, the student may receive permission to replace the subsequent course by a free elective (technical or non-technical) approved by the Department Associate Chair. Courses taken during work terms may not be used to reduce the number of courses taken in any subsequent term. Normally, all students will be expected to register in the minimum number of courses specified in the Calendar for each term of the program.

11. Grades for courses that are in addition to the degree requirements will not be included in the term average but will be reported on the student's transcript. The Faculty of Engineering does not permit students to register in any of its courses on an audit basis.

12. Students who have successfully met all of the requirements of the program and have been recommended for the BASc degree will have First, Second, or Third Class Honours standing designated according to the cumulative 3A-4B average as follows:

- First Class Honours: Average 80-100%
- Second Class Honours: Average 70-79%
- Third Class Honours: Average 60-69%

13. Individual departments may designate additional minimum grade requirements in certain courses. Also, there are individual department rules regarding the grading and averaging of Complementary Studies elective courses.

14. All courses in the Faculty are assigned a numerical grade (between 0 and 100) by the examiners. The following exceptions are permitted:

- AEG – Aegrotat. The student was ill according to medical evidence but has satisfactory understanding of the course.
- CR – Credit granted. Performance was satisfactory.
- NCR – No credit granted. Performance was unsatisfactory.
- INC – Incomplete. The course work is incomplete and the student has permission to extend the work beyond the term. If the work is not completed within six months from the end of the term, a grade will be submitted based on the available information.
- DNW – Did not write. The student did not withdraw from the course and was not eligible for an incomplete grade. The student did not complete a sufficient proportion of the assignments, tests, and examinations for an evaluation to be made.

In cases where students take courses in a Faculty where letter grades are assigned, the letter grades will be converted for the purposes of reporting and averaging according to the following table:

<table>
<thead>
<tr>
<th>Letter Grade</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>A+</td>
<td>95</td>
</tr>
<tr>
<td>A</td>
<td>89</td>
</tr>
<tr>
<td>B+</td>
<td>78</td>
</tr>
<tr>
<td>B</td>
<td>75</td>
</tr>
<tr>
<td>C+</td>
<td>68</td>
</tr>
<tr>
<td>C</td>
<td>65</td>
</tr>
<tr>
<td>D+</td>
<td>58</td>
</tr>
<tr>
<td>D</td>
<td>55</td>
</tr>
<tr>
<td>F</td>
<td>38</td>
</tr>
</tbody>
</table>

15. Changes to the set of courses which a student is taking in a particular term may be permitted at the discretion of the student's department. Such changes must normally be arranged and approved before the end of the normal "Drop/Add" period, which is a period of two weeks at the beginning of each term. After this period, only exceptional cases will be considered.

16. Students must demonstrate consistent satisfactory performance during their work term employment. They must also submit the required number of satisfactory work term reports (see booklet entitled Regulations and Procedures for Co-operative Programs).

Appeals and Petitions
Two distinct situations in which a student may wish to 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 appeals and associated procedures is summarized on page 1:10 of this Calendar and copies of the complete Student Appeal Policy and Procedures document 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 Special Consideration (Form D) 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 it 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 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 Special Consideration 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 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 must be launched within six 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 inquiry, if warranted, and the formal inquiry may be followed by a formal appeal, 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 two weeks of receiving the response to the informal inquiry, or if there is no timely response, the student may submit an Application for Formal Inquiry (Form A) to the Associate Dean for Undergraduate Studies. The Application for Formal Inquiry 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 Form A 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 Inquiry 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 to him/her, 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 Formal Appeal. Within three weeks of receipt of the decision of the Formal Inquiry, the student shall submit an Application for a Formal Hearing before a Faculty Committee (Form B) to the Associate Dean for Undergraduate Studies. The Associate Dean shall inform the Chair of the Faculty Committee on Student Appeals who shall make the appropriate arrangements for a pre-hearing and hearing. For details regarding the pre-hearing and the hearing, the student is directed to the University Student Appeal Policy and Procedures.

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 her/his first academic term in the program.

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. Continuation in the program is then contingent upon first satisfying this requirement.

3. Students who obtain a grade of less than 60% in the ELPE must, at the first available opportunity after their unsuccessful attempt at the ELPE, either attend the Writing Clinic or take one of the approved English courses:
   - English 109 Introduction to Essay Writing
   - English 129H Introduction to Written English
   - English 210C Report Writing

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.

**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 by March 1, if a student is to be eligible for the convocation in May of the same year.

**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**

Each of the Engineering undergraduate programs consists of two course groupings:

1. 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.

2. 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 technical content of the engineering curriculum. This COMPLEMENTARY STUDIES requirement gives students some breadth of studies related to their role as educated professionals in society.

**Requirements**

The Canadian Engineering Accreditation Board (CEAB) requires that students receive instruction in complementary studies, studies that complement the technical content of the curriculum. Certain applicable courses have been pre-scheduled, as identified below, to maximize the conflict-free opportunity for students to satisfy these requirements. However, the complementary studies component of the student’s program must satisfy the following criteria:
1. It should consist of five courses which complement the engineering curriculum.

2. At least one of the courses must deal with the impact of technology on society. (See Course on Impact of Technology on Society, below.)

3. It should include courses beyond the introductory level.

4. Courses may be chosen from an approved list of elective courses for engineering students' complementary studies program below or,

5. The choice of courses is approved by the Associate Chair of the student's department.

The approved list of electives appears at the end of this section. Other courses may be approved by the department Associate Chair. Students who plan their own option package may have considerable difficulty with timetable conflicts.

Many courses are available by UW correspondence and may be taken during a student's work terms. Also, courses taken at another university during a work term may be eligible for "transfer of credit" if approved by the student's Associate Chair.

Pre-scheduled Humanities and Social Sciences Grouping

This grouping consists of a number of courses from the Humanities and Social Sciences which have been chosen to provide some understanding of the wider human and social context within which engineering is practised. There are a number of choices within the grouping, most of which are pre-scheduled so that they do not conflict with the engineering core programs.

Students are recommended to take at least two courses from the listed Humanities courses and at least two from the Social Sciences list. The total must be five courses.

Pre-scheduled courses are listed in groups, one course at the introductory level and one or more at advanced level. A student's program should include courses beyond the introductory level.

In the following,

(F) indicates Fall.

(W) indicates Winter.

(S) indicates Spring.

(I) indicates introductory level.

(P) indicates courses which will be scheduled into 11:30-12:30 MWF, 7:00-10:00 M or 7:00-10:00 T.

The choices are the following:

Social Sciences-based Courses

(P) Economics: (I) ECON 102 (F,W,S); ECON 202 (F,W,S)

(P) Management Sciences: (I) M SCI 211 (F,W,S);
M SCI 311 (F,W); M SCI 461 (F,S)

General Engineering: GEN E 452 (W)

(P) Political Science: (I) PSCI 102M (W,S); PSCI 260A (F,S); PSCI 260B (W,S)

(P) Psychology: (I) PSYCH 101 (F,W,S); plus one term course to be announced (F,W)

(P) Sociology: (I) SOC 101 (F,W)

Engineering Complementary Studies Requirements

Humanities-based Courses

(P) English: (I) ENGL 105A (F,W,S)

(P) French: (I) FR 195A (F); FR 196A (W); FR 275 (F);
FR 232 (W)

(P) History: (I) HIST 130 (W,S); HIST 253 (F); HIST 254 (W,S)

(P) Philosophy: (I) PHIL 200A (F,S); PHIL 200B (W); PHIL 300 (W); PHIL 315 (GEN E 412) (W)

General Engineering: GEN E 411 (F,S); GEN E 412 (W)
(cross-listed as PHIL 315)

Other Social Sciences and Humanities courses are permissible but will not be pre-scheduled. See below for the approved list.

Courses on Impact of Technology on Society

At least one of the complementary studies courses must be in this area. This requirement applies to students who entered in the Fall of 1991 or later. A list of courses which meet this requirement is:

ERS 231 Environmental Issues in a Global Perspective
ERS 241 Introduction to Environmental and Social Impact Assessment
GEOG 368 Conservation/Resource Management of the Built Environment
GEN E 412 (PHIL 315) Ethics and the Engineering Profession
PHIL 207 Science, Technology, and Society
SCI 263 Science and Society
SOC 232 Technology and Social Change (Prerequisite: SOC 101)
STV 100 Society, Technology and Values: Introduction
STV 202 Design and Society
STV 402 Technology and Canadian Society

Other courses may be acceptable for this requirement. Prior approval is required from your department Associate Chair.

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 receive their choice. Changes made at the beginning of a term may cause timetable conflicts and thus not be possible.

3. For descriptions of the content of courses see Chapter 16 of the UW calendar under the program prefix of the course e.g. CIV E - Civil Engineering, PHIL - Philosophy, GEN E - General Engineering, etc.
COMPLEMENTARY STUDIES ELECTIVE COURSES

Approved list of Elective courses for Engineering Students’ Complementary Studies Program.

Notes

1. This list of courses has been approved by all engineering departments. Many additional courses are possible with department approval. In particular, approved language courses are not on this list.

2. In general, all literature and civilization courses in language departments are approved. Students who wish to take linguistics and grammar courses must be assessed by the language department to determine their facility with the language and any choice must be approved by their home department Associate Chair. Linguistics courses may be very time consuming.

3. Courses approved for the English Language Proficiency requirements are not acceptable for the complementary studies program.

4. Only courses which are listed on the “Prescheduled Complementary Studies Electives” list will be guaranteed conflict-free.

5. Students are responsible for ensuring they have suitable background.

6. From time to time some courses may be restricted to students in particular programs.

7. Department course offerings may change. Courses not listed will be individually judged by the Associate Chair of the student’s department.

8. Associate Chairs may change the course category for the program of individual students who are special cases.

<table>
<thead>
<tr>
<th>Department</th>
<th>Courses Accepted</th>
</tr>
</thead>
<tbody>
<tr>
<td>Accounting (ACC)</td>
<td>131, 132 but not with Management Sciences Option</td>
</tr>
<tr>
<td>Anthropology (ANTH)</td>
<td>All</td>
</tr>
<tr>
<td>Canadian Studies (CDN ST)</td>
<td>All</td>
</tr>
<tr>
<td>Civil Engineering (CIV E)</td>
<td>491 only</td>
</tr>
<tr>
<td>Classical Studies (CLAS)</td>
<td>All</td>
</tr>
<tr>
<td>Dance (DANCE)</td>
<td>* see home department Associate Chair, but not 242, 342</td>
</tr>
<tr>
<td>Drama (DRAMA)</td>
<td>101A, 101B, 251</td>
</tr>
<tr>
<td>East Asian Studies (EASIA)</td>
<td>201R</td>
</tr>
<tr>
<td>Economics (ECON)</td>
<td>All except 211, 221, 311, 321, 404, 411, 421, 422, 471</td>
</tr>
<tr>
<td>English (ENGL)</td>
<td>All except 109, 129R, 140R, 141R, 151, 209, 240R and any others approved for the English Language Proficiency requirement</td>
</tr>
<tr>
<td>Environmental and Resource Studies (ERS)</td>
<td>241, 337, 338, 352, 385</td>
</tr>
<tr>
<td>Environmental Studies (ENV S)</td>
<td>195, 201, 500</td>
</tr>
<tr>
<td>Fine Arts (FINE)</td>
<td>* see home department Associate Chair</td>
</tr>
<tr>
<td>General Engineering (GEN E)</td>
<td>315, 411, 412, 415, 452, 411 only 4th year CHE, COMP, EE, SD students</td>
</tr>
<tr>
<td>Geography (GEOG)</td>
<td>101, 120, 202A, 206, 221, 227</td>
</tr>
<tr>
<td>Gerontology (GERON)</td>
<td>208</td>
</tr>
<tr>
<td>Health Studies (HLTH)</td>
<td>220, 348, 349</td>
</tr>
<tr>
<td>History (HIST)</td>
<td>All except 400-level courses</td>
</tr>
<tr>
<td>Kinesiology (KIN)</td>
<td>103, 255, 348, 349, 352, 354</td>
</tr>
<tr>
<td>Management Sciences (MSCI)</td>
<td>211, 311, 461</td>
</tr>
<tr>
<td>Mechanical Engineering (M E)</td>
<td>401 (Mechanical Engineering only)</td>
</tr>
<tr>
<td>Music (MUSIC)</td>
<td>(100 or 150/151), 140, 142, 231, 255, 256, 332, 356</td>
</tr>
<tr>
<td>Middle East Studies (MES)</td>
<td>All</td>
</tr>
<tr>
<td>Peace and Conflict Studies (PACS)</td>
<td>All</td>
</tr>
<tr>
<td>Personnel Studies (PERST)</td>
<td>All (cannot be taken if M SCI 211 or 311 taken)</td>
</tr>
<tr>
<td>Philosophy (PHIL)</td>
<td>All except 140 and 440A/B</td>
</tr>
<tr>
<td>Planning (PLAN)</td>
<td>156</td>
</tr>
<tr>
<td>Political Science (PSCI)</td>
<td>All except 214, 315</td>
</tr>
<tr>
<td>Psychology (PSYCH)</td>
<td>All except 200, 261, 291, 292, 391-98, 400-level courses need approval of Psychology Department</td>
</tr>
<tr>
<td>Recreation (REC)</td>
<td>100, 201, 204, 205, 230, 250, 300, 304, 425</td>
</tr>
<tr>
<td>Religious Studies (RS)</td>
<td>All</td>
</tr>
<tr>
<td>Science</td>
<td>263</td>
</tr>
<tr>
<td>Sexuality, Marriage and the Family (SMF)</td>
<td>All</td>
</tr>
<tr>
<td>Social Development Studies</td>
<td>All except 250R, 251R, 398R, 399R, 499</td>
</tr>
<tr>
<td>Interdisciplinary Social Science (ISS)</td>
<td>All</td>
</tr>
<tr>
<td>Society, Technology and Values (STV)</td>
<td>All</td>
</tr>
<tr>
<td>Sociology (SOC)</td>
<td>All except 321, 322, 382, 410</td>
</tr>
<tr>
<td>Women's Studies (WS)</td>
<td>All</td>
</tr>
</tbody>
</table>

* In general, non-studio courses are approved. Students wishing to take studio courses must obtain approval from the home department and be assessed by the department offering the studio. Studio courses may be very time consuming.
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. Greig, Systems Design</td>
</tr>
<tr>
<td>Physics</td>
<td>S.K. Chaudhuri, 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</td>
</tr>
<tr>
<td></td>
<td>Science or K. Hipel, Systems</td>
</tr>
<tr>
<td></td>
<td>Design Engineering</td>
</tr>
<tr>
<td>Water Resources</td>
<td>N. Kouwen, Civil Engineering</td>
</tr>
<tr>
<td>Management Sciences</td>
<td>N. Fraser, Management Sciences</td>
</tr>
<tr>
<td>Society, Technology</td>
<td>G.M. Bragg, Director of General Studies</td>
</tr>
<tr>
<td>and Values</td>
<td></td>
</tr>
<tr>
<td>International Studies</td>
<td>H.C. Ratz, Director of Exchange Programs</td>
</tr>
<tr>
<td>in Engineering</td>
<td>G.E. Schneider, Associate Dean of Engineering</td>
</tr>
</tbody>
</table>

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 l’Université de Technologie de Compiègne, Dnipropetrovsk Institutions, Technische Universität Braunschweig, Technische Universität Hamburg-Harburg, Universität Karlsruhe, the New South Wales Institute of Technology, New University of Ulster, University of Technology (Sydney), University of Leeds, l’Université de Nantes, Universität Gesamthochschule Paderborn, Tottori University, University of Hull (England), Pohang Institute of Science and Technology, and Ecole Polytechnique Fédérale de Lausanne. See also the International Studies in Engineering Option later in this section.

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
- AM 371C Classical Mechanics
- AM 381C/PMATH 380A Introduction to Information Theory
- AM 481C/PMATH 380B Applications of Information Theory
- PMATH 334 Introduction to Rings and Fields
- PMATH 336 Introduction to Group Theory
- PMATH 340 Elementary Number Theory
- PMATH 360 Geometry
- PMATH 367 Set Theory and General Topology
- PMATH 430A Introduction to Mathematical Logic 1
- PMATH 430B Introduction to Mathematical Logic 2
- C&O 230 Introduction to Combinatorics
- C&O 342 Graph Theory 1
- C&O 350 Linear Programming
- C&O 367 Nonlinear Programming

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
- M E 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 Coordinator.

Option in Computer Engineering
This is a Designated Faculty Option which is available to students in Electrical Engineering and Systems Design Engineering to give greater training in software and to augment digital hardware capabilities. For details of this option students are referred to the Electrical and Computer Engineering and Systems Design Engineering sections of this calendar.

Option in Statistics
The aim of the Statistics Option is to provide the student with a broad background in applied statistics, especially in the areas of multiple regression, quality control, experimental design and applied probability.

There are four required courses:
- STAT 231 Statistics (or equivalent, e.g. SY DE 214, M E 202, CH E 022, CIV E 224)
- STAT 331 Applied Linear Models (or equivalent, e.g. SY DE 334)
- STAT 333 Applied Probability or STAT 430 Experimental Design
- STAT 335 Statistical Process Control

Because of the overlap of STAT 335 with STAT 430 and SY DE 214 or ME 202, students who have taken these courses should check with the program advisors for useful alternatives.
A student must take three additional courses from those listed below:
STAT 230 Probability (or equivalent, e.g. SY DE 213)
STAT 332 Sampling
STAT 333 Applied Probability
STAT 371 Stochastic OR Models (SY DE 511 or M SCI 431 may be substituted)
STAT 430 Experimental Design
STAT 431 Applications of Linear Models
STAT 433 Stochastic Processes
STAT 443 Forecasting
CH E 037 Applied Mathematics 2
CH E 041 Introduction to Process Control
CH E 522 Advanced Process Dynamics and Control
CH E 524 Process Control Laboratory
CIV E 342 Transport Principles and Applications
CIV E 343 Traffic Engineering
CIV E 344 Urban Transport Planning
CIV E 375 Water Quality Engineering
CIV E 440 Transport Systems Analysis
CIV E 473 Contaminant Transport
CIV E 480 Water Resources Management
CIV E 486 Hydrology
M E 340 Manufacturing Processes
M E 448 Production Engineering or 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 in all engineering programs except Geological. It is intended for students interested in the issues, concepts and techniques related to managerial problems, particularly in technologically-based organizations. The option consists of:

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
The 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

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

For more information and advice in choosing possible courses, contact the Centre for Society, Technology and Values (DC 2808, UW ext. 6215) or the Option Coordinator, Professor S.C. Lerner, Environment and Resource Studies.

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

International Studies in Engineering Option
The Option in International Studies in Engineering provides an enriched educational program by focusing on the global nature of engineering. Besides providing a wider appreciation of cultural diversity, it provides a background in the engineering aspects of international trade. 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 overseas work and study. It will provide a lifelong benefit for those students who are inclined and able to seek enrichment in their education.

The Option will consist of academic requirements on the UW campus, together with study terms or work terms, or both, at overseas locations, for at least eight months.

1. Academic requirements on the UW campus: this component may involve language and cultural studies (history and literature) as part of an integrated program for the individual student. To be accepted for the option designation of International Studies in Engineering, the complete program must be approved by the Coordinator of the Option.

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.

2. Study terms, or work terms, or both, in overseas institutions and industries, are approved by the Option Coordinator. 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 (normally in advance) by the department of the student's registration.
Program

1. Enrolment in the Option requires the approval of the Option Co-ordinator, and normally will be limited to students who maintain a 70% average. The requirements of the Option are GEN E 303, and six other courses as specified in (2) and (4) 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.

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.

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

Option in Environmental Engineering

This Option is for students who wish to pursue their education with an emphasis on environmental concerns, assessment of the environmental impact of new or existing products or processes, methods for solving problems resulting from pollution in the air, in the water, on the earth, and on the management of resources in order to minimize pollution in the environment. This is a Faculty option and includes course material related to all the disciplines but applied specifically to environmental concerns.

The Option consists of a set of five required courses and a two-term project course. The project course will normally be taken in the 4A and 4B academic terms. The courses are:

ERS 241* Introduction to Environmental and Social Impact Assessment
BIOL 250 Ecology
ENV E 220 Environmental Chemistry and Ecotoxicology
ENV E 320 Environmental Resource Management
ENV E 420 Modelling of the Environment
ENV E 430 Environmental Engineering Project 1
ENV E 431 Environmental Engineering Project 2

*ERS 241 satisfies the Impact of Technology on Society requirement as part of the Complementary Studies complement of courses required of Engineering students.

Engineering

Complementary Studies Requirements
Joint Honours Programs in Engineering
Combined Bachelor's - Master's Program

Substitution of equivalent 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 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.

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 a research thesis.

5. A combined program normally functions on the Co-operative basis.

6. Recruitment into a combined Bachelor's - Master's degree program must have the flexibility to satisfy the requirements of individual students; at the same time it must have coherence — each student's program must be addressed toward a well-defined area of specialization.

ORGANIZATIONAL STRUCTURE FOR THE COMBINED BACHELOR'S - MASTER'S PROGRAM

Application and Admission

Admission to the combined Bachelor's - Master's degree program is normally restricted to students with a consistently good academic record at the end of the 3A term who would be granted "conditional admission to the MASc program." The condition to be fulfilled is "satisfactory completion of the requirements of the BASc degree with at least a B average." Students who are granted this admission would be notified at the start of the academic term preceding their 6th work term. As in any program culminating in a Master's degree, a Faculty Supervisor is appointed on admission.

Academic and Administrative Responsibility

Although the Supervisor advises students, all course selections and other academic administrative matters concerning each student are subject to the approval of the Department Associate Chair for Undergraduate and Graduate Studies.

Course Programs

The courses chosen by the student (with the advice of the Supervisor and approval of the Associate Chair) in the 4A, 4B, 5A, and 5B terms should form a coherent series which (together with the MASc project or thesis) complete the requirements of the Bachelor's and, ultimately, the Master's degree.

In each of the 4A and 4B terms one course (normally 600 level) should be chosen for credit to the MASc degree. In some departments this course may replace one of the technical electives in each of those terms. Technically, it is necessary for students to register for these courses as "extras" in order to avoid counting them towards the requirements of both degrees.

If a student is proceeding to an MASc with a research thesis, the balance of courses (two courses numbered 500 or above) will normally be taken in the 5A (Fall) term. There will be no course requirement for the 5B (Winter) term.

A student who is proceeding to 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 caliber 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.

Engineering

Combined Bachelor's - Master's Program
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 B average (73% to the end of 4B, 70% thereafter).

A student who fails to maintain this standard will be required to withdraw from the combined degree program. In such a case, all courses taken up to the end of 4B, including those originally intended to fulfill part of the Master’s degree requirements, will be counted towards the Bachelor’s degree program and marks therefrom included in the 4A and 4B averages as appropriate. Should the student have then satisfied the requirements for the BASc degree, it will be granted at the next convocation. Such a student will not be permitted to enter the regular MASc program.

If a student does maintain at least the minimum standard mentioned above, but decides to withdraw voluntarily from the combined Bachelor’s - Master’s program, the 4A and 4B results will be calculated including the courses originally intended to fulfill part of the Master’s degree requirements, and if the requirements for the Bachelor’s degree are then satisfied, the BASc will be granted at the next Convocation.

First-Year Engineering Programs
All students enrolling in First-Year Engineering are required to choose one of the following programs:

Chemical Engineering
Civil Engineering
Computer Engineering
Electrical Engineering
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>
<thead>
<tr>
<th>Term 1A</th>
<th>Course Codes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Term 1A</td>
<td>MATH 114</td>
</tr>
<tr>
<td></td>
<td>MATH 117</td>
</tr>
<tr>
<td></td>
<td>CH E 102</td>
</tr>
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<td></td>
<td>PHYS 115</td>
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<tr>
<td></td>
<td>GEN E 170 (except Chemical Engineering)</td>
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<tr>
<td></td>
<td>and one of</td>
</tr>
<tr>
<td></td>
<td>CH E 100, GEN E 163, 165, 167</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Term 1B</th>
<th>Course Codes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Term 1B</td>
<td>MATH 118</td>
</tr>
<tr>
<td></td>
<td>PHYS 125</td>
</tr>
<tr>
<td></td>
<td>GEN E 121</td>
</tr>
<tr>
<td></td>
<td>and the following according to student department:</td>
</tr>
<tr>
<td></td>
<td>Chemical Engineering CH E 101, GEN E 123, 1 CSE*</td>
</tr>
<tr>
<td></td>
<td>Civil Engineering CIV E 126, 127, GEN E 123, CIV E 291†</td>
</tr>
<tr>
<td></td>
<td>Computer Engineering E&amp;CE 100, M SCI 281</td>
</tr>
<tr>
<td></td>
<td>Electrical Engineering E&amp;CE 100, M SCI 281</td>
</tr>
<tr>
<td></td>
<td>Geological Engineering GEO E 126, CIV E 127, GEN E 123</td>
</tr>
<tr>
<td></td>
<td>Mechanical Engineering M E 126, GEN E 123, 1 CSE*</td>
</tr>
</tbody>
</table>

* CSE means Complementary Studies elective
† Stream 4 only
Chemical Engineering

Chemical Engineering is the responsible application of science to develop processes or systems for the economic production and distribution of beneficial materials through the physical, chemical, or biochemical transformation of matter.

Chemical Engineers combine a sound background in fundamental understanding of science and mathematics with highly-developed problem-solving skills to improve existing processes or methods, or to implement new ones. The principles of economic production and distribution differentiate engineering activities from those of science. Chemical engineers will be required for many exciting new developments during the next few decades.

Chemical engineers design, analyze, 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 analyze 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, analyze, 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 laboratory and other courses provide additional practice opportunities.

**COMBINED BACHELOR'S - MASTER'S PROGRAM IN CHEMICAL ENGINEERING**

Provision is made for outstanding students to pursue a combined Bachelor's - Master's Program. This program provides a quicker route to the MASc degree. Admission is normally granted to qualified students possessing a consistently good cumulative academic record at the end of the 3A term. See "Combined Bachelor's - Master's Program in Engineering", 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 control, economic and process optimization, simulation, and statistics. Dedicated computer process laboratory and state-of-the-art industrial software systems provide excellent vehicles for learning.

**Polymer Science and Engineering**
This elective theme has a wide scope, but special emphasis is placed on the physics and physical chemistry of polymers, and on the modifications of polymer structure by physical or chemical means.

**Extractive and Process Metallurgy**
This involves the application of Chemical Engineering principles 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 manufacture products such as alcoholic beverages, yeasts, antibiotics, therapeutics, vitamins and enzymes, often using genetically-engineered organisms, and with waste treatment and food processing.

**Pollution Control Engineering**
This elective package presents aspects of industrial waste treatment and pollution abatement techniques which are becoming increasingly important for the proper use of technology in a quality conscious society.

**COMPLEMENTARY STUDIES ELECTIVES (CSE's)**
Five one-term courses in non-technical areas (that is, outside the engineering, sciences and mathematics disciplines) 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 correspondence 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 and page 10:28). 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 totaling 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.
## Academic Program

### Term 1A, Fall
<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
</tr>
</thead>
<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 114</td>
<td>Algebra and Vector Geometry (matrices to vector spaces)</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>
</tr>
</tbody>
</table>

### Term 1B, Winter and Spring
<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
</tr>
</thead>
<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>ECON 101, SOC 101, PSYCH 101, ENGL 105A, FR 196, HIST 130, PHIL 200B, STV 100 or other approved elective</td>
</tr>
</tbody>
</table>

### Term 2A, Fall and Winter
<table>
<thead>
<tr>
<th>Course</th>
<th>Title</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 210</td>
<td>Advanced Calculus (gradients to integral theorems)</td>
</tr>
</tbody>
</table>

### Term 2B, Spring and Fall
<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
</tr>
</thead>
<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 216</td>
<td>Differential Equations (O.D.E.'s and Laplace transforms)</td>
</tr>
<tr>
<td>CSE XX2 (M SCI 211)</td>
<td>ENGL 210C or other approved elective</td>
</tr>
</tbody>
</table>

### Term 3A, Winter and Spring
<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
</tr>
</thead>
<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>
<tr>
<td>(M SCI 331)</td>
<td>(extra for Management Science Option, take in any term prior to 4B)</td>
</tr>
</tbody>
</table>

### Term 3B, Fall and Winter
<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
</tr>
</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 (M SCI 311)</td>
<td>Approved elective</td>
</tr>
</tbody>
</table>

### Term 4A, Spring and Fall
<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
</tr>
</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 (M SCI 461)</td>
<td>GEN E 411 or other approved elective</td>
</tr>
</tbody>
</table>

### Term 4B, Winter
<table>
<thead>
<tr>
<th>Course</th>
<th>Title</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 (M SCI 432)</td>
<td>Technical elective from another area or another department</td>
</tr>
<tr>
<td>CSE XX5</td>
<td>Approved 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 1993-94)**
4. **Polymer Science and Engineering**
   - CH E 542 Polymerization and Polymer Properties (2 course credits)
5. **Extractive and Process Metallurgy**
   - 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, solid and hazardous waste management, contaminant transport and behaviour in the environment. Support areas involving aquatic chemistry, computer modelling, simulation and laboratory experimentation as examples are also stressed.

Transportation Engineering
Deals with the planning, design, construction, traffic operation and evaluation of streets, highways, airports, and transit systems. Emphasis is placed on planning, design, operation and evaluation, particularly as related to demand.

Geotechnical Engineering
Familiarize the student with the engineering properties of soils, the fundamentals of soil mechanics, and the application of geotechnical data and fundamentals to the design of foundation elements, earth-retaining structures, excavations, earth embankments and highway pavements.

Engineering Mechanics
For students with a strong interest in a rigorous study of mechanics, applied mathematics and related fields, leading to an understanding of advanced analysis and serving as a preparation for graduate study in structural engineering, hydraulics, mechanics of solids and fluids, or properties of materials.

Water Resources Engineering
Deals with the planning, management, design and operation of water supply and distribution systems, in flood control and flood hazard mapping, in the hydrologic and hydraulic aspects of environmental issues, and in the application of remotely-sensed data to hydrologic and environmental problems.

Experimental Mechanics
Intended for students with an interest in experimental investigations of the static and dynamic response of structures and machines, and in the development of improved techniques to obtain and analyse experimental data.

Materials
Courses in this area are intended to provide the student interested in structural engineering, mechanics or properties of materials with a background in materials science.

Additional Areas of Study
Alternatively, the student can choose a more general pattern of study involving courses from several topic areas, or a program outside the traditional Civil Engineering field. For instance, with the approval of the Associate Chair for Undergraduate Studies, the student may augment Civil Engineering course programs with elective courses from:
- Public Administration
- Planning
- Management Science
- Business Administration
- Bioengineering
- Environmental Health, and others.

To this end, the Civil Engineering Curriculum has been designed to allow the maximum possible flexibility while still meeting the requirements for the professional degree.

The profession of Civil Engineering is principally involved with the creation, operation and maintenance of structures associated with water resources, transportation, power generation, and a wide range of industrial, commercial and institutional buildings and complexes including whole urban structures. The activities include investigation, planning design, construction and evaluation.

Vocationally a Civil Engineer may specialize in one of the following areas: biomechanics, solid mechanics, fracture mechanics, elasticity, building structures, bridges, hydrology, hydraulics, sanitation (public health), industrial wastes, water resource structures, irrigation and drainage, inland waterways, harbours, aerospace, highways (roads and streets), railroads, pipelines, geology, meteorology,
soil mechanics, foundations, tunnelling (rock mechanics), surveying and cartography, urban and regional planning and overall project planning. The list is by no means complete. For example, some of our graduates become involved in aquaculture. A Civil Engineering education may also be combined to advantage with another discipline or profession, such as Economics, Law, Medicine or Biology.

The Civil Engineer, regardless of whether he or she is a generalist or a specialist, draws heavily upon the work of the physical and social sciences, other professions and other branches of engineering. Moreover, as engineers have become involved in many interdisciplinary activities over the last decade, the job demarcation between boundaries of engineering has become much less restrictive. Certainly one of the advantages of completing a Civil Engineering program is that it allows professional registration while simultaneously providing a basis for further study and professional development in a large variety of specialized fields.

1. Core Program

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 Calculus 2
CIV E 222 Differential Equations
CIV E 224 Probability and Statistics
CIV E 253 Geology for Engineers
CIV E 265 Structure and Properties of Materials
CIV E 260 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 399 Civil Engineering Seminars
CIV E 498 Civil Engineering Seminars
CIV E 499 Civil Engineering Seminars

Civil Engineering Seminar

These seminars are designed to enrich the undergraduate program by providing guest lectures, informal lectures, mock trials and films relating to principles, methods and practice of Civil Engineering and the role of the engineer in society.

2. Electives

Each student is responsible for selecting his or her own program of electives, in keeping with the ultimate career objectives after graduation. The program must satisfy the requirements of the Department of Civil Engineering. This includes having to meet minimum requirements in:

- Mathematical Foundations
- Basic Sciences
- Engineering Sciences
- Engineering Design
- Complementary Studies

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 430 Experimental Mechanics
CIV E 440 Transport Systems Analysis
CIV E 442 Pavement Structural Design
CIV E 454 Geotechnical Engineering 3
CIV E 460 Orthopaedic-Engineering
CIV E 472 Waste Water Treatment
CIV E 473 Contaminant Transport
CIV E 483 Design of Urban Water Systems
CIV E 486 Hydrology
CIV E 493 Engineering in the Canadian North
CIV E 496 Construction Engineering

* With the exception of CIV E 313 and CIV E 413, the offering of these courses is contingent upon sufficient demand and/or available teaching resources.

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 114, 117 (formerly MATH 116), 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, 282, 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, 498; 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.

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 threes 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 10:3).

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. In addition to these faculty rules, the Department requires that if two complementary courses are taken in fourth year at least one of them must be beyond the introductory level.

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 courses (see page 10:9). The two remaining elective courses are to be chosen from the following list of technical breadth electives: MATH 212, E&CE 231, 261, 332, 362, 371. 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 requirement in fourth year is E&CE 455, three electives and six technical electives. At least four of these must be from the Electrical and Computer Engineering Department.

The 1A term is as described on page 10:16.

<table>
<thead>
<tr>
<th>Term 1B (Winter)</th>
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<td>E&amp;CE 223 Digital Circuits and Systems</td>
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<td>E&amp;CE 250 Algorithms and Data Structures</td>
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<td>E&amp;CE 222 Digital Computers</td>
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<td>E&amp;CE 241 Circuit Analysis and Design</td>
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<td>E&amp;CE 251 Programming Languages and Translators</td>
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<td>E&amp;CE 342 Signals and Systems</td>
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<tr>
<td>E&amp;CE 401 Seminar</td>
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<td>E&amp;CE 455 Software Engineering</td>
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<td>E&amp;CE 411 Data Communications Networks</td>
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<td>E&amp;CE 428 Computer Communications Networks</td>
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<td>E&amp;CE 435 Semiconductor Devices</td>
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<td>E&amp;CE 438 Digital Integrated Circuits</td>
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<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 Control Systems</td>
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<tr>
<td>E&amp;CE 481 Design of Analog and Digital Control Systems</td>
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<td>E&amp;CE 499A Project</td>
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<th>Four Technical Electives from the following:</th>
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<tr>
<td>E&amp;CE 412 Digital Communications and Devices</td>
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<tr>
<td>E&amp;CE 413 Digital Signal Processing</td>
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<td>E&amp;CE 429 Computer Structures</td>
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<tr>
<td>E&amp;CE 436 Design of Integrated Circuits and Devices</td>
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<tr>
<td>E&amp;CE 437 Integrated VLSI Systems</td>
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<td>E&amp;CE 439 Analog Integrated Circuits</td>
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<td>E&amp;CE 443 Electrical Networks</td>
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<td>E&amp;CE 456 Database Systems</td>
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<td>E&amp;CE 459 Sound, Noise and Electroacoustics</td>
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<tr>
<td>E&amp;CE 463 Power Electronics</td>
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**Engineering**

**Computer Engineering**

**Electrical Engineering**

E&CE 465 Power Systems  | 3  | 1  | -  |
E&CE 473 Microwave Engineering  | 2  | 1  | 3* |
E&CE 475 Guided Wave Engineering  | 3  | 1  | 3* |
E&CE 482 Multivariable Control Systems  | 2  | 1  | 3* |
E&CE 485 Computer Control Applications  | 2  | 1  | 3* |
E&CE 486 Robot Dynamics and Control  | 3  | -  | 3* |
E&CE 499B Project  | -  | -  | 9  |

* Indicates laboratory every second or third week, or open lab. See Course Descriptions.

**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 10:3).

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. In addition to these Faculty rules, the Department requires that if two complementary courses are taken in fourth year at least one of them must be beyond the introductory level.

**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
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. 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 courses, and six technical electives. At least four of these must be from the Department.

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 10:16.

<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>
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<td>PHYS 125 Physics for Engineering</td>
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<td>GEN E 121 Digital Computation</td>
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<tr>
<td>E&amp;CE 100 Fundamentals of Electrical Engineering</td>
<td>5</td>
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<td>M SCI 261 Managerial and Engineering Economics</td>
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<td>E&amp;CE 201 Seminar</td>
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<td>MATH 211 (E&amp;CE 205) Advanced Calculus 1 (For Electrical Engineers)</td>
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<td>Term 2B (8 Spring, 4 Fall)</td>
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<td>E&amp;CE 342 Signals and Systems</td>
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<td>E&amp;CE 370 Electromagnetic Fields</td>
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<th>Term 4B (Winter – Both streams)</th>
<th>C T L</th>
</tr>
</thead>
<tbody>
<tr>
<td>E&amp;CE 402 Seminar</td>
<td>1</td>
</tr>
<tr>
<td>Elective</td>
<td>3</td>
</tr>
<tr>
<td>Four Technical Electives from the following:</td>
<td></td>
</tr>
<tr>
<td>E&amp;CE 412 Digital Communications</td>
<td>3 1</td>
</tr>
<tr>
<td>E&amp;CE 413 Digital Signal Processing</td>
<td>3 1</td>
</tr>
<tr>
<td>E&amp;CE 427 Digital Systems Engineering</td>
<td>2 1 3*</td>
</tr>
<tr>
<td>E&amp;CE 429 Computer Structures</td>
<td>3 1</td>
</tr>
<tr>
<td>E&amp;CE 436 Design of Integrated Circuits and Devices</td>
<td>2 1 3*</td>
</tr>
<tr>
<td>E&amp;CE 437 Integrated VLSI Systems</td>
<td>2 1 3*</td>
</tr>
<tr>
<td>E&amp;CE 439 Analog Integrated Circuits</td>
<td>2 1 3*</td>
</tr>
</tbody>
</table>

**Engineering**

**Electrical Engineering**

**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.

*Indicates laboratory every second or third week, or open lab. See Course Descriptions.
Faculty Options
Complete details of designated Options available to engineering students are provided in this Calendar in the Engineering section entitled "Complementary Studies Requirements, Options and Electives". Students who satisfy the Option requirements will have the appropriate designation shown on their transcript.

Geological Engineering with an Option in Water Resources (W.R.O.)
This is a designated Engineering Faculty Option available through Civil Engineering. Students interested in the Option should see the Co-ordinator for approval and the complete list of approved courses. The Option is described earlier in this chapter within the "Complementary Studies Requirements, Options and Electives" section.

Geological Engineering with an Option in Management Sciences
This Option provides an understanding of the issues, concepts and techniques related to the management of technology. This Option consists of a sequence of seven courses. Students interested in this Option should see the Co-ordinator for approval.

Geological Engineering with an Option in Environmental Engineering
This Option is for students who wish to pursue their education with an emphasis on environmental concerns, assessment of the environmental impact of new or existing products or processes, methods for solving problems resulting from pollution in the air, in the water, or in the earth, and on the management of resources in order to minimize pollution in the environment. This is a Faculty Option and includes course material related to all of the disciplines but applied specifically to environmental concerns. The Option is described earlier in this chapter within the "Complementary Studies Requirements, Options and Electives for Engineering Students" section.

ACADEMIC PROGRAM

Term 1A (Fall)
MATH 114 Algebra and Vector Geometry (for Engineering Students)
MATH 117 Calculus 1 (for Engineering Students) (formerly MATH 118)
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 (Winter)
MATH 118 Calculus 2 (for Engineering Students) (formerly MATH 110B)
PHYS 125 Physics for Engineers
GEN E 121 Digital Computation
GEN E 123 Electrical Engineering
GEN E 126 Geological Engineering Concepts
CIV E 127 Statics

Term 2A (Fall)
EARTH 231 Mineralogy
EARTH 235 Stratigraphy
EARTH 260 Applied Geophysics 1
CIV E 204 Mechanics of Solids 1
CIV E 221 Calculus 2
CIV E 291 Survey Camp
GEO E 298 Seminar
Complementary Studies Elective

Term 2B (Spring)
CIV E 222 Differential Equations
CIV E 260 Fluid Mechanics
EARTH 221 Geochemistry 1
EARTH 232 Petrography
EARTH 238 Intro. Structural Geology
GEO E 299 Seminar
Complementary Studies Elective

Term 3A (Winter)
CIV E 300 Civil Engineering Project 1
CIV E 353 Geotechnical Engineering 1
CIV E 375 Water Quality Engineering (W.R.O.)
EARTH 333 Introductory Sedimentology
EARTH 390 Methods in Geological Mapping
EARTH 438 Engineering Geology
GEO E 398 Seminar
Complementary Studies Elective

Term 3B (Fall)
EARTH 437 Rock Mechanics
CIV E 224 Probability and Statistics
CIV E 292 Engineering Economics
CIV E 354 Geotechnical Engineering 2
GEO E 399 Seminar
Complementary Studies Elective

One technical elective from:
EARTH 331 Igneous Petrology
EARTH 342 Applied Geomorphology
CIV E 381 Hydraulics (W.R.O.)

Term 4A (Fall)
EARTH 456 Numerical Meth. in Geoscience
EARTH 458 Physical Hydrogeology
EARTH 490 Field Trip
GEO E 400 Geological Engineering Thesis 1
GEO E 498 Seminar
Complementary Studies Elective

Two technical electives from:
EARTH 421 Geochemistry 2
EARTH 440 Quaternary Geology
EARTH 470 Metallic Mineral Deposits
CIV E 472 Wastewater Treatment
CIV E 486 Hydrology (W.R.O.)
Term 4B (Winter)
CIV E 491 Engineering Law
GEO E 401 Geological Engineering Thesis 2
GEO E 499 Seminar
Complementary Studies Elective
Two technical electives from:
EARTH 427 Crustal Evolution
EARTH 433 Applied Sedimentology
EARTH 435 Advanced Structural Geology
EARTH 459 Chemical Hydrogeology (W.R.O.)
EARTH 460 Applied Geophysics 2
CIV E 422 Finite Element Analysis
CIV E 454 Geotechnical Engineering 3
CIV E 473 Contaminant Transport
CIV E 480 Water Resources Management
CIV E 493 Engineering in the Canadian North
CH E 514 Fundamentals of Petroleum Production
CH E 552 Extractive Metallurgy

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 a Faculty advisor to ensure that it (1) satisfies prescribed minimum requirements with respect to Mathematics, Science, Engineering Science, Engineering Design and Complementary Studies, and (2) satisfies prerequisite requirements.
3. Each approved program of studies must include at least three EARTH technical electives and at least two CIV E technical electives from 3B on.
4. It is recommended that EARTH 342 or 440 be taken before graduation.

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
Arrangements have been made, in terms of scheduling flexibilities (providing adequate positions for electives), for any student in the following departments to complete an Option in Management Sciences:

Chemical Engineering
Civil Engineering
Computer Engineering
Electrical 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 (F,W,S) equivalents CH E 044, CIV E 292, SY DE 231 (correspondence F,W)
  + M SCI 211 Organizational Behaviour (F,W,S) equivalent to PSYCH 338 (correspondence F,W)
  + M SCI 331 Operations Research 1 (F,W,S) equivalent to SY DE 311

Plus three 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) equivalent to M E 448
  + M SCI 311 Organizational Design and Technology (F,W) (correspondence F,W)
  M SCI 441 Management of Information Systems (W)

+ These courses can be counted as part of the Complementary Studies requirements.
* For students wishing to take a Masters of Business Administration at Wilfrid Laurier University, these courses should be taken for advanced credit toward the MBA.
A careful selection of Complementary Studies courses will ease the course load of students who wish to take the Management Sciences Option. In particular, such a student could select M SCI 211 and 311, which are acceptable as Social Science courses towards the Complementary Studies requirement; in addition, M SCI 311 is “beyond the introductory level”, as required for the Complementary Studies program. A student could also take M SCI 461, which will count as a third course for the Complementary Studies requirement. The remaining two Complementary Studies courses should be from the Humanities. The requirement for a course on the Impact of Technology on Society may be met by selecting an “Impact” course from a Humanities department (e.g. CLAS 384 or PHIL 207).

For the designation “Option in Management Sciences” to be shown on the transcript the student must achieve 50% in each course taken in the Option and an overall cumulative average of 60% in these courses.

Mechanical Engineering

The scope of Mechanical Engineering is so wide and its services so universally needed as a basic part of all kinds of engineering work that the mechanical engineer is in demand in all industries. Mechanical engineers are required in the field of power generation, where they deal with steam, diesel or other internal combustion engines, and with hydraulic or gas turbines; in the field of heating, ventilation and refrigeration; in the design, analysis, and production of machines and equipment, for example, safety equipment, material handling equipment, automobiles, locomotives, marine vessels, furnaces, boilers, pressure vessels, heat exchangers, motors, generators and machine tools. They are employed in industries whose function is concerned with manufacturing, steel production, mining, transportation, communications, oil refining, chemical manufacture, paper, sugar, textiles, aerospace, nuclear energy, natural gas production and transmission and construction. The undergraduate program in Mechanical Engineering is designed to provide the student with a firm grasp of the fundamentals of mathematics, physics and engineering as well as to provide some opportunity for specialization in the later years. The degree of 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, when a choice of elective courses arranged into six different areas of specialization is available. Non-technical (complementary studies) courses are distributed throughout the program but do not appear in all years.

Each student is responsible for selecting her/his 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
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. (See item vi) on page 10:31).
1. Core Program

a) Credit Courses
- ME 201 Advanced Calculus
- ME 202 Statistics for Engineers (equivalent to MSC 251)
- ME 203 Ordinary Differential Equations
- ME 212 Dynamics
- ME 215 Structure and Properties of Materials
- ME 219 Mechanics of Deformable Solids 1
- ME 220 Mechanics of Deformable Solids 2
- ME 250 Thermodynamics 1
- ME 262 Introduction to Microprocessors and Digital Logic
- 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
- M SCI 261 Managerial and Engineering Economics 1
- E&CE 269 Electrical Engineering 2

b) Non Credit Courses
- ME 200A/200B Seminar
- ME 300A/300B Seminar
- ME 400A/400B Seminar

2. Elective Courses

a) Complementary Studies Electives
Students entering the program will take five Complementary Studies Electives in total in non-technical subjects. The marks obtained in these courses will be included in the calculation of term averages. These courses are organized on a faculty basis and detailed in this Calendar under the section "Complementary Studies Requirements, Options and Electives for Engineering Students".

b) Technical Electives
Nine technical Elective courses are required in addition to the core courses listed above to fulfill the requirements of the Mechanical Engineering program. In the final year, a project course, 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 designated to give advice to students. A student who has an unusual career goal in mind should discuss choices with one of the designated faculty members, since it is possible to combine courses from different areas of specialization, to take courses from other departments and in some circumstances take graduate-level courses. Students who are contemplating graduate study are particularly urged to discuss their plans with the appropriate faculty member.

As a guide, typical lists of elective courses for the six areas of specialization within the Department of Mechanical Engineering are given below:

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

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
- ME 626 Fatigue and Fracture Analysis (See Graduate Calendar)

iv) Engineering Materials
- ME 432 Physical Metallurgy of Deformation and Fracture
- ME 435 Industrial Metallurgy
- ME 527 Mechanics of Deformable Solids 3
- ME 531 Physical Metallurgy of Structures and Transformations
- 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
- M E 435 Industrial Metallurgy
- M E 447 Advanced Manufacturing Technologies
- M E 448 Production Engineering and Design of Manufacturing Systems
- M E 541 Deformation Processes
- M E 542 Machine Tool Analysis
- M E 543 Metal Casting Processes
- M E 544 Welding
- M E 546 Theory of Solid Modelling
- M E 547 Robot Manipulators: Kinematics, Dynamics, Control
- M E 548 Numerical Control of Machine Tools
- M E 559 Finite Element Methods
- M E 561 Fluid Power Control Systems
- M E 568 Noise Analysis and Control
- M E 580 Basic Tribology

vi) Mechanical Engineering Core with Option in Management Sciences
The Management Sciences Option consists of the following courses in Management Sciences in addition to the core Mechanical Engineering program. For further details see the Department of Management Sciences.

<table>
<thead>
<tr>
<th>Term</th>
<th>Courses</th>
</tr>
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<tbody>
<tr>
<td>1A (F)</td>
<td>CH 102, GEN E 163</td>
</tr>
<tr>
<td>1B (W,S)</td>
<td>GEN E 121, GEN E 123</td>
</tr>
<tr>
<td>2A (W,F)</td>
<td>M E 200A, M E 201, M E 202, M E 212, M E 219</td>
</tr>
<tr>
<td>2B (S,F)</td>
<td>M E 200B, M E 203, M E 215, M E 220, M E 250, M E 262</td>
</tr>
<tr>
<td>3A (W,S)</td>
<td>M E 300A, M E 304, M E 305, M E 321, M E 330, M E 351</td>
</tr>
<tr>
<td>3B (F,W)</td>
<td>M E 300B, M E 322, M E 340, M E 353, M E 360</td>
</tr>
<tr>
<td>4A (S,F)</td>
<td>M E 400A, 4 TECH ELECT*</td>
</tr>
<tr>
<td>4B (W)</td>
<td>M E 400B, 5 TECH ELECT*</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 Association of Professional Engineers of the Province of Ontario (APEO). 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 (MA.Sc) in Systems Design is also obtained, only one year of work experience is required before application.

Each province within Canada has its own Professional Engineering Association. The Canadian Engineering Accreditation Board (CEAB) is a national organization that has representation from all of the Provincial Professional Engineering Associations. The CEAB determines what types of courses must be contained in a university engineering program in order for the program to meet the standards of Canadian engineering. The Systems Design Engineering program satisfies the strict standards of the CEAB and is therefore acknowledged as a fully qualified Engineering Program. In fact, the Department of Systems Design Engineering at the University of Waterloo is the only department of its kind in all of Canada.

The Systems Design Engineering program is specifically oriented towards developing graduates who can solve problems lying at the interface of technology and the human environment. Therefore, if you are technically oriented and also have a strong parallel interest in social and human problems, Systems Design Engineering may be the right program for you.

The Department of Systems Design Engineering also offers programs leading to MA.Sc 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 BASc Bachelor of Applied Science
2 MA.Sc 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)

1A (Fall)
SY DE 101 Tutorial
SY DE 111 Calculus 1
SY DE 121 Digital Computation
SY DE 161 Introduction to Systems Design Engineering
SY DE 181 Physics 1 (Statics)
SY DE 183 Chemistry

1B (Spring)
SY DE 102 Tutorial
SY DE 112 Calculus 2
SY DE 114 Linear Algebra
SY DE 142 Introduction to Human Systems
SY DE 182 Physics 2 (Dynamics)
SY DE 192 Digital Systems

2A (Winter)
SY DE 201 Tutorial
SY DE 211 Differential Equations
SY DE 213 Probability
SY DE 231 Engineering Economics
SY DE 281 Mechanics of Deformable Solids
SY DE 283 Physics 3 (Electricity, Magnetism, and Optics)

2B (Fall)
SY DE 202 Tutorial
SY DE 214 Statistics
SY DE 252 Linear Systems and Signals
SY DE 282 Fluid Mechanics
SY DE 292 Circuits, Instrumentation, and Measurements
1 Complementary Studies Elective

3A (Spring)
SY DE 301 Tutorial
SY DE 311 Engineering Optimization
SY DE 321 Software Engineering
SY DE 351 Systems Models 1
SY DE 361 Introduction to Design
SY DE 381 Thermodynamics

3B (Winter)
SY DE 302 Tutorial
SY DE 312 Numerical Methods
SY DE 352 Introduction to Control Systems
SY DE 362 Systems Design Workshop 1
1 Technical Elective
1 Complementary Studies Elective

4A (Fall)
SY DE 401 Tutorial
SY DE 461 Systems Design Workshop 2
2 Technical Electives
2 Complementary Studies Electives

4B (Winter)
SY DE 402 Tutorial
SY DE 462 Systems Design Workshop 3
3 Technical Electives
1 Complementary Studies Elective
Technical Electives in Systems Design Engineering

Each undergraduate student in Systems Design Engineering must choose a technical elective package by the 3B term. Additionally, the Faculty of Engineering has approved Options in the following areas:
- Computer Engineering
- Environmental Engineering
- International Studies in Engineering
- Management Sciences
- Mathematics
- Physics
- 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 correspondence during work terms.

Human Systems Engineering

The elective package in Human Systems Engineering offers students the opportunity to develop knowledge and skills applicable to the design and analysis of systems that interact closely with human beings. The Department offers a selection of courses in the areas of human factors engineering and ergonomics, occupational safety, and biomedical engineering. Courses in engineering, psychology and physiological modelling provide an overview of human characteristics, abilities, and limits. Application-oriented courses show how this information can be applied in the design of interactive systems, in biomedical and clinical systems, and in the industrial workplace. In addition, students are encouraged to select other courses which complement and strengthen their chosen field of study. These might include courses in statistics and experimental design, perception and pattern recognition, physiology and kinesiology, or psychology. The elective courses in this package are as follows:

3B (Winter)
- SY DE 342 Industrial Ergonomics
- SY DE 384 Materials Engineering

4A (Fall)
- SY DE 453 Time Domain Models for Physical Systems
- SY DE 543 Engineering Psychology and Human Performance

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
- SY DE 454 Computer Simulation of Systems
- SY DE 548 Design of Human-Machine Systems
- SY DE 574 Image Processing

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
Systems Design Engineering

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

4B (Winter)
- SY DE 422 Machine Intelligence
- SY DE 432 Numerical Optimization
- SY DE 434 Random Processes in the Environment
- SY DE 548 Design of Human-Machine Systems
- SY DE 574 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 modelling (deterministic and stochastic) and decision methodologies. Additional experience is gained by doing related workshop projects.

Interested students may wish to include the Designated Option in Environmental Engineering in their package. The Option requirements are:

2B (Fall)
- BIOL 250 Ecology

3B (Winter)
- ERS 241 Introduction to Environmental and Social Impact Assessment
- ENV E 220 Environmental Chemistry and Ecotoxicology

4A (Fall)
- ENV E 320 Environmental Resource Management
- SY DE 461 Systems Design Workshop 2 (Core, replaces ENV E 430)**

4B (Winter)
- SY DE 462 Systems Design Workshop 3 (Core, replaces ENV E 431)**
- SY DE 536 Environmental Systems Models

* ERS 241 is a Complementary Studies Elective and satisfies the Faculty's impact of technology on society requirement (page 10:8).
** The workshop topics must meet the Faculty option requirements for ENV E 430/431. Students may also wish to include a significant societal component in their topic proposals.

Students may choose the remaining electives (two technical, four complementary) according to interest, subject to approval of the Undergraduate Advisor.

Alternatively, students may elect to design their own package by selecting an appropriate combination of six technical and five complementary courses from the course calendar. Relevant course headings include Systems Design, Chemical and Civil Engineering, Environmental and Resource Studies, Geography, Sociology, Political Science, Biology, Economics, and Society, Technology and Values. Elective courses in this package include:

3B (Winter)
- SY DE 334 Applied Statistics
- SY DE 372 Introduction to Pattern Recognition

4A (Fall)
- SY DE 511 Optimization Methods for Stochastic Systems
- SY DE 533 Conflict Analysis

4B (Winter)
- SY DE 432 Numerical Optimization
- SY DE 434 Random Processes in the Environment
- SY DE 454 Computer Simulation of Systems
- SY DE 536 Environmental Systems Models
- SY DE 574 Image Processing

Systems Modelling and Analysis

The Systems Modelling and Analysis elective package offers the student a selection of elective courses that encompasses the theory, methods and mathematics of engineering systems design. In modern engineering practice, a design engineer is increasingly confronted with complex projects involving a variety of interdisciplinary sub-systems. The engineer must understand the operation of each sub-system, and be able to integrate them together to achieve an efficient and appropriate solution to the overall problem. The Systems Modelling and Analysis elective package introduces modelling and analysis of deterministic and probabilistic systems, as well as discrete and distributed parameter systems. The courses comprising the elective package emphasize analytical as well as computer based methods; the use of currently available computer aided analysis and design packages are encouraged.

The elective package structure is such that the students enrolled in this elective package can take additional courses, possibly from other departments, in order to specialize in any specific engineering discipline and at the same time obtain a strong systems modelling and design foundation. The elective courses for this package are as follows:

3B (Winter)
- SY DE 354 Systems Models 2
- SY DE 384 Materials Engineering

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
Option in Computer Engineering
The aim of this Option is to augment the core curriculum with technical elective courses from 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 350 Machine Structures
SY DE 372 Introduction to Pattern Recognition
CS 443 Functional and Logic Programming
CS 450 Computer Architecture
CS 454 Principles of Operating Systems
CS 486 Introduction to Artificial Intelligence
(Anthreq. SY DE 422)
CS 487 Introduction to Symbolic Computation
E&CE 411 Digital Communications
E&CE 412 Data Communication
E&CE 413 Digital Signal Processing
E&CE 428 Computer Communications Networks
SY DE 422 Machine Intelligence (Anthreq. CS 486)
SY DE 521 Computer Aided Design
SY DE 574 Image Processing
Faculty of Environmental Studies

Computer Graphics in the Magellan Centre.
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 Applied Environmental Studies (MAES) may be obtained in Environmental 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 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.

Admission

Degrees may be obtained in the following program areas:

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

Note

Students admitted after the Fall of 1989 will no longer be able to enrol in the four-year General Geography program.

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.
recommended, but not required, that students present at least one Ontario Academic Course credit or equivalent in Mathematics for admission to programs in Environmental 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.

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.

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.

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 during their first term of registration (normally scheduled during registration week in September). Effective August 1989, students who have attained a final grade of 60.0% 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.

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. Students who have passed fewer than ten term courses will be considered Year One students; those who have passed at least ten but fewer than 20 will be considered Year Two students; those with at least 20 but fewer than 30, Year Three; and those with 30 or more, Year Four.

Final Examinations
1. In all courses each student is required to submit (in such form and at such time as may be determined by the instructor) evidence of satisfactory participation in term work. The marks obtained from work during term are used in part in determining standing. At the discretion of the Chair of the Department or the Director of the School concerned and of the Dean, a student may be barred from the final examination if the course requirements are not completed to the satisfaction of the instructor.

2. Failure to write an examination is ordinarily considered a failure to pass (F-). A student who defaults a final examination, except for a properly certified reason, shall have no make-up examination privileges and may be required to repeat the work in class. If a student fails to write for medical reasons, a Doctor’s certificate covering the precise period of absence must be filed in the Registrar’s Office within one week of the set examination date.
3. A student will be eligible for make-up examinations only when failure to pass is attributable to extraordinary circumstances. In addition, students:
   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 an Application for Formal Inquiry 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 an Application for Formal Inquiry 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 Appeal Policy and Procedures.

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 instructor 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.

Environmental Studies
Examinations and Standings

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.

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.

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 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 condition- al 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.
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 80.0% or higher; 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 programs, 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. 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 a result of schedule change or withdrawal, the first half must be dropped.

4. 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.

5. Students in the Faculty of Environmental Studies may not register for courses on an audit basis.

6. All schedule changes at any time must be submitted to the designated Department/School office.

7. Students are encouraged not to register for more courses than their programs require unless exceptional circumstances can be demonstrated.

8. Full-time students may reduce their programs below the specified minimum only upon the recommendation of the Undergraduate Officer of the major Department/School.

9. 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. The notation ‘Voluntary Withdrawal’ with the effective date appears on the official transcript for each term for which a voluntary withdrawal has been processed. Students who voluntarily withdraw may be eligible for tuition fee and residence refunds depending on the effective date of withdrawal. (See the Academic Calendar.)

Minors
Students may concentrate study in an associated field to the extent it becomes a Minor (typically ten term courses; consult the Minor Department) 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.
Special Programs
Student exchange agreements between Waterloo and the School of Australian Environmental Studies at Griffith University, Brisbane, Queensland, the environmental studies program at Victoria College, Clayton (near Melbourne), Victoria, and the Royal Melbourne Institute of Technology, Melbourne have been established. Exchange programs have also been approved between Waterloo and the University of Michigan, USA and the University of Leeds in the UK. Under these arrangements, a small number of students from the University of Waterloo could take courses at Griffith, Victoria, RMIT, Michigan or Leeds which would be credited towards their degree at Waterloo, and vice versa. For additional information, contact the Associate Dean, Undergraduate Studies.

Certificate in Environmental Assessment
The University of Waterloo and Lakehead University jointly offer a certificate for the successful completion (C-average or better) of the following five courses:

- ENV S 195 Introduction to Environmental Studies
- ERS 241 Introduction to Environmental and Social Impact Assessment
- ERS 337 Biophysical Impact Assessment
- ERS 338 Socioeconomic Impact Assessment
- ERS 445 Impact Assessment and Policy Analysis: Practicum

The following statements outline the objectives and nature of the four programs in the Faculty of Environmental Studies.

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).

Professional Recognition
The Ontario Association of Architects accepts the degree of BArch as fulfilling the academic requirements for registration to practise. Graduates wishing to proceed to registration are required to submit their credentials to the Canadian Architectural Certification Board for assessment. For further information concerning mandatory work experience and other requirements for registration contact the Registrar, O.A.A., 111 Moatfield Drive, Don Mills, Ontario M3B 3L6. The Waterloo BArch Degree is recognized by the Commonwealth Association of Architects.

Non-Architecture Students
Students not enrolled in the School of Architecture may take any architectural course listed in the recommended core program (depending on availability of space) with the exception of courses in the theme area of Design. Prerequisites indicated in the course descriptions are primarily for Architectural students. For Non-Architectural students, prerequisite evaluation must be carried out by the respective instructors.

BACHELOR OF ENVIRONMENTAL STUDIES
(Pre-Professional Architecture Program)
The BES program provides the foundation studies in architecture, and forms the basis for the subsequent professional program. It aims to educate future architects to an understanding of the beliefs and needs of the individual and of society, and to a willingness to take an active role in creating and improving the environment; to an understanding of materials and techniques at their disposal, and of the principles of related disciplines; to a comprehension of the many forms of creative expression, and to an understanding of the present as part of an historical process.
BACHELOR OF ARCHITECTURE

The BArch program is intended to prepare students to 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 design studio: theories, methods and the practice of design.
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.

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.
## PROGRAM REQUIREMENTS FOR THE DEGREE OF BACHELOR OF ENVIRONMENTAL STUDIES
(Pre-Professional Architecture)

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<thead>
<tr>
<th>Year/Term</th>
<th>Technology Theme Area</th>
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<tbody>
<tr>
<td>1A Fall</td>
<td>ARCH 112 Mathematics</td>
<td>ARCH 124 Introduction to</td>
<td>ARCH 142 Iconography 1</td>
<td>ARCH 192 Design Studio</td>
</tr>
<tr>
<td>Sept-Dec.</td>
<td>ARCH 171 Theories and</td>
<td>Landscape Design</td>
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<td>(2 term courses)</td>
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<td></td>
<td>TIMELINES: 8 term courses</td>
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</tr>
<tr>
<td>1B Winter</td>
<td>ARCH 113 ARCH 130</td>
<td>ARCH 143 Iconography 2</td>
<td>ARCH 193 Design Studio</td>
<td>(2 term courses)</td>
</tr>
<tr>
<td>Jan.-April</td>
<td>ARCH 141 Computer Usage</td>
<td></td>
<td></td>
<td>(3 term courses)</td>
</tr>
<tr>
<td>Off-Term</td>
<td>ARCH 162 Static and Structural Analysis</td>
<td></td>
<td></td>
<td>(2 term courses)</td>
</tr>
<tr>
<td>Spring</td>
<td>ARCH 172 Building Construction 1</td>
<td></td>
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<tr>
<td>May-Aug.</td>
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</tr>
<tr>
<td>2A Fall</td>
<td>ARCH 262 Strength of Materials</td>
<td>ARCH 246 Foundations of</td>
<td>ARCH 292 Design Studio</td>
<td>(3 term courses)</td>
</tr>
<tr>
<td>Sept-Dec.</td>
<td>ARCH 266 Building Construction 2</td>
<td>EUROPE (3 term courses)</td>
<td></td>
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<tr>
<td>TOTAL 8 term courses</td>
<td></td>
<td>Building Construction 2</td>
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<tr>
<td>Co-op Work Term 1</td>
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<tr>
<td>Winter</td>
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<tr>
<td>Jan.-April</td>
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<tr>
<td>May-Aug.</td>
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<td>(2 term courses)</td>
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<tr>
<td>TOTAL 8 term courses</td>
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<tr>
<td>Co-op Work Term 2</td>
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<tr>
<td>Fall</td>
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<tr>
<td>Sept-Dec.</td>
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<tr>
<td>3A Winter</td>
<td>ARCH 362 Steel: Design, Structure and Construction</td>
<td>ARCH 392 Design Studio</td>
<td>(4 term courses)</td>
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<tr>
<td>Jan.-April</td>
<td></td>
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<td></td>
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<tr>
<td>TOTAL 7 term courses</td>
<td></td>
<td>Building Services 1</td>
<td></td>
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<tr>
<td>Co-op Work Term 3</td>
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<tr>
<td>Spring</td>
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<tr>
<td>May-Aug.</td>
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</tr>
<tr>
<td>3B Fall</td>
<td>ARCH 363 Concrete: Design, Structure and Construction</td>
<td>ARCH 393 Design Studio</td>
<td>(4 term courses)</td>
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<tr>
<td>Sept-Dec.</td>
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<td></td>
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<tr>
<td>TOTAL 7 term courses</td>
<td></td>
<td>Building Services 2</td>
<td></td>
<td></td>
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<tr>
<td>TOTAL 46 term courses</td>
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</tbody>
</table>
## 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>After the first degree program (BES) is completed, this period of eight months may serve many objectives, including the choice of travelling and assessing future goals before returning to the School for the second degree program (BArch). Students might also choose to continue the Co-op work term program and obtain experience in design research (by assisting in the development of conceptual designs and schematics, by preparing site plans and details, floor plans, elevations, cross-sections and standard details) and assisting the site architect or construction superintendent.</td>
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</tr>
<tr>
<td>4 &amp; 5 Winter and Spring</td>
<td>ARCH 348</td>
<td>ARCH 446</td>
<td>ARCH 492 (Rome)</td>
</tr>
<tr>
<td></td>
<td>Italian Renaissance</td>
<td>Italian Urban History</td>
<td>Design Studio</td>
</tr>
<tr>
<td></td>
<td>Architecture</td>
<td>ARCH 448</td>
<td>(4 term courses) or</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Rome and the Campagna</td>
<td>ARCH 492 (Waterloo)</td>
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<td></td>
<td></td>
<td></td>
<td>Design Studio</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>(4 term courses)</td>
</tr>
<tr>
<td>4A Fall</td>
<td>ARCH 451 (0.25)</td>
<td>FE (2)</td>
<td>ARCH 493</td>
</tr>
<tr>
<td>TOTAL 7 term courses</td>
<td>ARCH 452 (0.25)</td>
<td></td>
<td>(4 term courses)</td>
</tr>
<tr>
<td></td>
<td>Specifications</td>
<td></td>
<td></td>
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<tr>
<td></td>
<td>See Note 4 below</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4B Winter</td>
<td>ARCH 499</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Jan.-April</td>
<td>ARCH 453 (0.25)</td>
<td></td>
<td></td>
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<tr>
<td></td>
<td>Professional Practice</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCH 454 (0.25)</td>
<td></td>
<td></td>
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<tr>
<td></td>
<td>Acts and Codes</td>
<td></td>
<td></td>
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<tr>
<td>or Spring</td>
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<tr>
<td>May-Aug.</td>
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<tr>
<td>TOTAL 7 term courses</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Co-op Work Terms</td>
<td>This is the last Co-op term of eight months before the final year of study. On the basis of previous experience in a variety of jobs, a student is capable of handling somewhat advanced work in professional offices. Experiences might include: design research, preparation of design schematics and small project design, preparation of site plans and details, development of special details, coordination of consultant's work, assisting the site architect on small projects, and assisting the construction superintendent on large projects.</td>
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</tr>
<tr>
<td>6 &amp; 7 Winter or Spring, and Fall</td>
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</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 26 term courses</td>
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</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.

*(FE)*

Free Elective courses selected by the student without restrictions as long as the course is approved by Senate.

**Notes**

1. Department approval is mandatory for a FE.
2. Students enrolled in 4A in Waterloo are required to take three term courses, approved electives in addition to Architecture studio requirements.
3. Additional term courses obtained during the BES program may not be transferred or applied towards requirements for the BArch degree at any time.
4. ARCH 451, 452, 453, 454 are each half-term courses. All four must be completed for graduation. However, they may be taken in any order during the 4B, 5A, 5B terms. These courses are open to BArch students only. Architecture BES students may not enroll.
Additional Regulations, Examinations and Promotions

In order to proceed unconditionally from one term* to the next in the BES and BArch programs, the student must satisfy each of the following requirements:

1. Maintain a minimum cumulative overall average of C- (60.0) calculated at the end of each term of study.

2. Pass the studio course.

3. Not fail** more than one half course or equivalent (excluding studio) in any single term.

* A term of study refers to a particular four-month period of registration including the 1N Fall and Winter terms and all ‘A’ and ‘B’ terms.

** A minimum passing grade in any course is D- (50.0).

While the School reserves the right to make exceptional academic decisions for students who require exceptional consideration, the Promotions Committee will be guided by the following:

- Students who satisfy at least two of the above requirements in a given term may be permitted to continue conditionally in the program as outlined in Notes 1, 2, 3, 4 and 5.

- Promotions decisions for students who satisfy only one of these requirements in any given term will be made on an individual basis by the Promotions Committee.

- Students who satisfy one or none of the above requirements in a given term will normally receive the decision "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 requirements will receive the academic decision "May Not Proceed." At the discretion of the Promotions Committee such students must raise their cumulative average to a minimum of C- (60.0%) by repeating the term or by repeating courses which are detrimental to their average and/or by taking approved elective courses before enrolling in the next higher level core or studio courses. The minimum cumulative average must be attained within the next calendar year. Failing this, the student will be required to withdraw. Failure to maintain the minimum cumulative average of C- (60.0%) by the end of the next higher level term will result in the academic decision "Required to Withdraw."

2. Studio Courses

Students who fail a studio course (ARCH 192, 193, 292, 293, 392, 393, 492, 493, 592, 593) but who satisfy the other requirements will receive the academic decision "May Not Proceed." Such students must repeat and pass the studio course. Failure to pass the studio in question on the second attempt will result in the academic decision "Required to Withdraw." Students may not register in any higher level studio course or core courses until the failed studio course is passed. Credit will be retained for courses passed in a term in which a studio course is failed.

Students who fail the 4B Winter Studio will not be permitted to register in the 4B Spring Studio during the same calendar year.

3. Elective Courses

Students who fail more than one term elective course or equivalent in any single term (but who pass studio and maintain the minimum cumulative overall average) will receive the academic decision "Proceed on Probation." Failed elective courses or their equivalents must be repeated and passed by the end of the next term of study (which includes the higher level studio and core course(s)). 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
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.

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 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 inter-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.

The flexibility of Environment and Resource Studies sets the stage for work in a number of environmentally-related and societal areas.

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 and as community organizers. Others who have graduated from Environment and Resource Studies have gone on to post-graduate work in programs such as urban and metropolitan studies, natural resources administration, regional planning, environmental engineering, law, systems design, teacher training, adult education, and communications studies.
The Department is fortunate in having a multidisciplinary faculty whose formal education and experience range over a number of disciplines in the natural sciences, social sciences and the fine arts. 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 various 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. This employment may include involvement with community organizations, and self-generated activity, and students 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. Environment and Resource Studies started at Waterloo in 1969 and as an undergraduate degree program it is unique in Canada although similar ones have become established in the United States, Europe and Australia.

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; geography, science and mathematics courses are recommended.

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 and 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 implements it. 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.

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 before graduation with a cumulative overall average of 65.0%; a cumulative average of 70.0% must be maintained in ERS/ENV S courses. 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
- plus electives for a total of ten term courses

Year Two
- ENV S 178 Introduction to Environmental Research Methods
- 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. 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
- ERS 178 Introduction to Environmental Research Methods
- plus electives for a total of five term courses

Term 2B
- ERS 285 Greening the Campus
- ERS 390A Environmental Research Project
- plus electives for a total of five term courses

Term 3A
- ERS 390B Environmental Research Project
- plus electives for a total of five term courses

Term 3B
- ERS 395 Development of Environmental Thought
- plus electives for a total of five term courses

Terms 4A and 4B
Same as Regular program

Note
The arrangement of academic and work terms, and further information on Co-operative study generally, are given in Chapter 5 of the Calendar. Students transferring to ERS with 5.0 credits of advanced standing and considering the Co-op program should consult the ERS Admissions Officer or Undergraduate Officer.

Joint Honours Programs

Students may combine Environment and Resource Studies with another academic discipline to the extent that a Joint Honours degree can be awarded. Arrangements to do this have been approved with 13 other departments and more are being considered. Students interested in Joint Honours should consult with the Undergraduate Officer.

Minors
Consult page 11:6 of the Calendar.
Options
Consult Chapter 15 of this Calendar for information on Interdisciplinary Programs.

Department of Geography

Nature of the Program
Geography is concerned with both the natural and human environment, studying how it has been shaped according to human need, how patterns of human activities are structured over space, and how these are influenced by environmental factors. 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 11:17.

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 four-year Geography programs provide a sound foundation in the discipline, and prepare 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. In the Honours program, the fourth year includes a research project, either the Senior Honours Thesis or the Senior Research Paper.

Although the four-year programs are broad in scope, students may concentrate their courses in one or more of the major areas of specialization available in the Department (page 11:18). Students are also encouraged to consider a broadly based program without specialization.

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. 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 four-year programs. This program can also be completed by correspondence. 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 9:25).

In all programs there is emphasis on the development of both theory and methodology and on the practical application of geographical concepts to the 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 0000.

BACHELOR OF ENVIRONMENTAL STUDIES
(Geography Program)

Three-Year Program Requirements

<table>
<thead>
<tr>
<th>Year One</th>
</tr>
</thead>
<tbody>
<tr>
<td>GEOG 101 Introduction to Human Geography</td>
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<tr>
<td>GEOG 102 Introduction to Physical Geography</td>
</tr>
<tr>
<td>GEOG 160 Introduction to Cartography and Map Analysis</td>
</tr>
<tr>
<td>Electives (see notes below)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Year Two</th>
</tr>
</thead>
<tbody>
<tr>
<td>ENV S 200 Field Ecology</td>
</tr>
<tr>
<td>GEOG 201 geomorphology and Soils</td>
</tr>
<tr>
<td>GEOG 202A Location of Economic Activities</td>
</tr>
<tr>
<td>One of:</td>
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<tr>
<td>GEOG 208 Applied Climatology</td>
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<tr>
<td>GEOG 309 Physical Climatology</td>
</tr>
<tr>
<td>One of:</td>
</tr>
<tr>
<td>GEOG 204 Soviet Union</td>
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<tr>
<td>GEOG 205 Africa</td>
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<tr>
<td>GEOG 206 The World Regions and World Issues</td>
</tr>
<tr>
<td>GEOG 221 The United States</td>
</tr>
<tr>
<td>GEOG 226 Rural Resources and Development in the Third World</td>
</tr>
<tr>
<td>GEOG 227 Regional Problems of Europe</td>
</tr>
</tbody>
</table>

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
GEOG 381 The Nature of Geography
Additional courses so that a student will have completed at least 30 term courses.

Notes on Three-Year Program
1. Minimum Required Credits
Total: 30 term courses. Geography: 12 term courses. Outside of Faculty of Environmental Studies: eight term courses. All Environmental Studies courses are included in the cumulative Geography average but only four can be counted in meeting the minimum required credits of Geography courses.

2. Term Course Load
No more than five courses may be taken in a term without the approval of the Associate Chair (Undergraduate Studies). Normally, approval for a sixth course will be considered only if the cumulative Geography average is B+ or higher.

3. Average Requirements
Students must maintain an overall cumulative average of 60.0% and a Major cumulative average of 65.0%. All required courses must be passed.

4. First-Year Term Courses
For a three-year General degree, a student must have at least 17 term courses above the 100-level.

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

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

Note
Students admitted after the Fall of 1989 will no longer be able to enrol in the Four-Year General Geography program or qualify for the Four-Year General BES degree.

Year One
GEOG 101 Introduction to Human Geography
GEOG 102 Introduction to Physical Geography
GEOG 160 Introduction to Cartography and Map Analysis
ENV S 178 Introduction to Environmental Research Methods
Electives including Geography and 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
ENV S 200 Field Ecology
GEOG 201 Geomorphology and Soils
GEOG 202A Location of Economic Activities
GEOG 202B The Geography of Economic Development
(Honours students only)
GEOG 275 Introductory Air Photo Analysis and Remote Sensing
ENV S 278 Advanced Environmental Research Methods
One of:
GEOG 208 Applied Climatology
GEOG 309 Physical Climatology
One of:
GEOG 204 Soviet Union
GEOG 205 Africa
GEOG 206 The World Region and World Issues
GEOG 221 The United States
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 381 The Nature of Geography
GEOG 390 Senior Honours Thesis Proposal
GEOG 391 Field Research (not required for Co-op)

Electives (see notes below)

Year Four
Honours students take:
GEOG 490A/B Senior Honours Thesis
or GEOG 491A/B Senior Research Paper (not available for Co-op students)

All students choose:
Electives to fulfill degree requirements.
(see notes below)

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 General program must maintain an overall cumulative average of 60.0%, and a Major cumulative average of 65.0%. Students in the Honours programs must maintain an overall cumulative average of 65.0% and a Major cumulative average of 70.0%. All required courses must be passed.

4. Secondary School Teaching
Students intending to teach in Secondary Schools should take at least four term courses of Regional Geography and at least four term courses in another teachable school subject.

5. Materials and Costs
For some courses, extra fees may be required to defray heavy equipment/travel costs, e.g. GEOG 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. These can be taken in different terms or concentrated in Fall term, Year Three as part of an independent study term comprising GEOG 390, 391 and 475A, B, C. Such a program must be arranged with the Associate Chair (Undergraduate Studies) and the faculty members involved.

7. Honours Co-operative Program
Honours Geography Co-op is a five work-term program in which four work-term reports have to be written. The first work term occurs in the Winter term of the second year and a work report is required at the end of this placement. Honours Geography Co-op is a limited enrolment program. Students are admitted to the Co-op program in first year based on secondary school grades. Interested students enrolled in first year Regular Geography at the University of Waterloo may be considered for admission to any remaining Co-op positions at the end of first year based on university academic performance and work experience related to Geography. The Honours Geography Co-op program has the same academic requirements as the Honours Regular program with the exception that GEOG 391 need not be taken by Co-op students and GEOG 491A/B cannot be taken by Co-op students.

8. Four-Year General Program
After the Fall of 1989, the four-year General program will no longer be available. Students who are currently registered in this program may complete their degrees but new admissions or transfers to the four-year General program will not be permitted. Course requirements for the four-year General program are the same as for Honours except that General students substitute Geography electives for GEOG 390, 490A/B and 491A/B.

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

Environmental Studies
Geography

Co-op Course Scheduling Recommendations

Year One
GEOG 101, 102, 160
ENV S 178

Year Two
Fall Term 2A
GEOG 275
ENV S 200 and 278
One of:
  GEOG 208 Applied Climatology
  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
Spring Term 2B
GEOG 201, 202A, and one of: 204, 205, 206, 221, 226, 227
Electives
Fall Work Term 2
Year Three
Winter Term 3A
GEOG 202B, 381
Electives
Spring Work Term 3
Fall Term 3B
GEOG 390
Electives
Year Four
Winter Work Term 4
GEOG 490A
Electives
Spring Term 4A
Fall Work Term 5
Winter Term 4B
GEOG 490B

JOINT HONOURS PROGRAMS
Joint Honours programs have been arranged between Geography and other disciplines in the University. Detailed programs have been worked out with Anthropology, Biology, Earth Sciences, Economics, English, Environment and Resource Studies, French, German, History, Management Studies, Mathematics, Music, Political Science, Psychology, Recreation, Russian, and Sociology. The program "Geography with Canadian Studies" is not a Joint Honours program but an Option. These programs lead to degrees in the Faculty in which the student is registered. Admission to a Joint Honours program will occur in Year Two.

The Department of Geography is prepared to work out other programs not listed for Honours students.
Geography core requirements in Joint programs are similar to those of the Geography Honours program but equivalent courses in the home department to ENV S 178, 278 and GEOG 390 and 490A, 490B, 491A, 491B are accepted. Required courses are GEOG 101, 102, 160, 201, 202A, 202B, 208 or 309, 275, a 200-level Regional course (see page 11:19), 381 and ENV S 200. If scheduling difficulties arise in meeting required courses, contact the Associate Chair (Undergraduate Studies) in Geography for possible substitute courses.

Notes on Joint Honours Programs
1. Minimum Required Credits
   The minimum number of term courses in Geography/Environmental Studies for students registered in Joint Honours programs is 14. Outside of Faculty of Environmental Studies: Ten term courses. 4
2. 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.
3. 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 page 11:18).

AREAS OF SPECIALIZATION
Listed below are elective second-, third- and fourth-year courses in Geography and other relevant courses in the Department’s major areas of specialization. This is not a definitive list; students are encouraged to seek out other specialized courses that meet their needs.

Applied Physical Geography
GEOG 300 Geomorphology and the Southern Ontario Environment
GEOG 302 Geomorphological Processes
GEOG 303 Geographical Hydrology
GEOG 304 Field and Laboratory Techniques in Geomorphology
GEOG 305 Patterns and Processes of Biogeography
GEOG 309 Physical Climatology
GEOG 400 Climatic and Periglacial Morphology
GEOG 401 Glacial Geomorphology and Contemporary Applications
GEOG 405 Wetlands
GEOG 408 Atmospheric Resource Analysis
GEOG 409 Energy Balance Climatology
GEOG 461 Land Dereliction and Rehabilitation

Environmental Studies
Geography
ARCH 124 An Introduction to Landscape Design
BIOL 250 Ecology
CIV E 353 Geotechnical Engineering 1
CIV E 493 Engineering in the Canadian North
EARTH 260 Applied Geophysics 1
EARTH 342 Applied Geomorphology
EARTH 370 Earth Resources
EARTH 438 Engineering Geology
EARTH 440 Quaternary Geology
EARTH 441 Introductory Quaternary Ecology
EARTH 458 Physical Hydrogeology
EARTH 459 Chemical Hydrogeology
SCI 220 Chemistry of Pollution
SCI 250 Environmental Geology
SCI 453 Marine Ecosystems and the Human Impact
SCI 454 Biology of Freshwater Pollution

Canadian Geography
GEOG 207 Water Resources of Canada
GEOG 300 Geomorphology and the Southern Ontario Environment
GEOG 309 Physical Climatology
GEOG 311 Regional and Local Development
GEOG 322 Geographical Study of Canada
GEOG 340 Towns and Villages of Rural Canada
GEOG 341 Historical Geography of Canada
GEOG 359 Geography of Energy
GEOG 422 Canada

plus other Canadian content courses (page 15:4).

Environmental and Resource Management
GEOG 303 Geographical Hydrology
GEOG 323 Perspectives on International Tourism
GEOG 333 Recreation Geography
GEOG 340 Towns and Villages of Rural Canada
GEOG 356 Resources Management
GEOG 358 Water Planning and Management: Strategies and Experiences
GEOG 359 Geography of Energy
GEOG 367 Conservation in Wildland and Resource Management
GEOG 368 Conservation/Resource Management of the Built Environment
GEOG 408 Atmospheric Resource Analysis
GEOG 459 Global Energy Systems
GEOG 461 Land Dereliction and Rehabilitation
ANTH 330 Cultural Ecology
CIV E 344 Urban Transport Planning
CIV E 381 Hydraulics
CIV E 480 Water Resources Management
CIV E 486 Hydrology
EARTH 370 Earth Resources
ECON 355 Economics of Energy and Natural Resources
ECON 357 Environmental Economics
ECON 361 Cost Benefit Analysis and Project Evaluation
Environmental Studies
Geography

ENV S 201 Introduction to Environmental and Planning Law
ENV S 220 Environmental Economics
ENV S 320 Environmental Economics: An Historical Perspective
ENV S 401 Environmental Law
ENV S 417 Field Studies in Land Use History and Landscape Change
ENV S 433 People in Natural Areas
ENV S 500 Professional Development in Environmental Management
ERS 218 Introduction to Sustainable Environmental and Resource Systems
ERS 241 Introduction to Environmental and Social Impact Assessment
PLAN 402 Planning Law
REC 201 Sociology of Leisure
REC 230 Outdoor Recreation Resources Management
REC 232 Applied Methods in Outdoor Recreation
REC 280 Travel and Tourism
REC 331 Outdoor Education
REC 334 Park Management
REC 432 Visitor Management and Interpretation
REC 434 Advanced Park Planning and Management
REC 435 Recreation Resource Policy
REC 436 Marine Recreation and Conservation

SCI 250 Environmental Geology
SCI 453 Marine Ecosystems and the Human Impact
SCI 454 Biology of Freshwater Pollution
SOC 286 Environment and Behaviour
SOC 347 Sociology of Leisure

Regional Geography
GEOG 204 Soviet Union
GEOG 205 Africa
GEOG 206 The World Region and World Issues
GEOG 221 The United States
GEOG 225 Urbanization in the Third World
GEOG 226 Rural Resources and Development in the Third World
GEOG 227 Regional Problems of Europe
GEOG 320 Regional Geography
GEOG 322 Geographical Study of Canada
GEOG 323 Perspectives on International Tourism
GEOG 325 Gender Roles and Development Alternatives in the Third World
GEOG 332 Health and Disease in the Third World
GEOG 421A Western Europe 1
GEOG 421B Western Europe 2
GEOG 422 Canada
GEOG 423 Central and Eastern Europe
GEOG 424 Soviet Union
GEOG 425 Africa
GEOG 430A/B/C Field Research in Regional Geography

Students wishing to concentrate on a particular world region should choose relevant courses from history, other social sciences and the languages. Students concentrating on Canada should consider doing the Option, Geography with Canadian Studies (see page 11:18).

Methods and Techniques
GEOG 255 Data Management and Analysis using Geographic Information Systems
GEOG 304 Field and Lab Techniques in Geomorphology
GEOG 307 Social Survey Techniques
GEOG 316 Multivariate Statistics
GEOG 317 Nonparametric Statistics
GEOG 318 Spatial Analysis
GEOG 319 Economical and Social Techniques for Regional Planning
GEOG 355 Spatial Data and Spatial Data Bases
GEOG 360 Preparation of Maps and Illustrations
GEOG 375 Air Photo Interpretation
GEOG 376 Environmental Remote Sensing
GEOG 404 Advanced Techniques in Cartographic Production and Design
GEOG 455 Applications of Geographic Information Systems in Geography
GEOG 470 Applied Air Photo Interpretation
GEOG 471 Advanced Remote Sensing
ECON 321 Introduction to Econometrics
ENV S 252 Media Tools for Environmental Studies
ENV S 378 Applications of Computer Programming in Environmental Studies
ERS 241 Introduction to Environmental and Social Impact Assessment

REC 280 Travel and Tourism
SOC 256 Ethnic and Racial Relations
practice. Realizing this concept requires integration within the program of selected elements from geography, social sciences and pure and applied sciences. For this purpose, the School of Urban and Regional Planning has been located in a Faculty with an interdisciplinary approach to a wide range of environmental issues.

The program gives a well-rounded preparation for a wide variety of professional or graduate work in urban planning, regional planning and resource development. Courses on the theory, methods and philosophy of planning provide an integrating framework. The student is also given an opportunity to pursue a special interest in economic, social, and ecological issues in planning, or in planning methodology. This is done through the selection of elective courses. Students are also encouraged to select Senior Honours Essay Topics from these special fields of interest.

The integration of practical work experience into the program is considered an important part of the educational process. Students will be brought into direct contact with the profession and will be exposed to problems typical of those encountered in practice, as well as being introduced to projects and operations beyond the scope of any university laboratory.

The Co-operative program provides for alternative terms of practical work experience and academic study. Planning Co-op is a limited enrolment program. Interested students must apply to this stream of study in November of their first year of the program. An interview may be required. The first work term is in the Spring following completion of second year. Co-op students normally follow the work and study-term sequence outlined on page 11:21. 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. Students with deficiencies in these areas can elect to take equivalent or remedial courses in their first year of the program.

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

Environmental Studies
Urban and Regional Planning

Urban-Economic Geography
GEOG 311 Regional and Local Development
GEOG 349 The City as a System
GEOG 350 Regional Urban Systems
GEOG 351 Geography of Transportation
GEOG 340 Towns and Villages of Rural Canada
GEOG 359 Geography of Energy
GEOG 411 Geography of Manufacturing Firms and Industries
GEOG 450 City and Regional Systems
CIV E 342 Transport Principles and Applications
CIV E 343 Traffic Engineering
CIV E 344 Urban Transport Planning
ECON 231 Introduction to International Economics
ECON 343 Urban Economics
ECON 345 Industrial Organization
ENV S 201 Introduction to Environmental and Planning Law
PLAN 330 Urban Social Planning
PLAN 370 Land Development Planning
PLAN 402 Planning Law

GEOGRAPHY MINOR FOR HONOURS STUDENTS IN OTHER DEPARTMENTS
Any ten term courses in Geography among which c. e included ENV S 195 and ENV S 200.

UW/LU BUSINESS OPTION
A Business Option, offered jointly with Wilfrid Laurier University, is available.

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.

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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. 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 Officer's approval.

3. First-Year Term Courses
No more than 12 term courses (six credits) at the first-year level will be allowed toward the 40 required to graduate (20 credits).

4. Admission to Year Two
To enter Year Two of Urban and Regional Planning from Year One, a student must obtain a minimum cumulative overall average of 65.0% and 70.0% in Planning and Environmental Studies courses and must obtain credit standing in ten term courses. In subsequent years, a student must maintain a cumulative overall average of 65.0% and 70.0% in Planning and Environmental Studies courses, as well as obtain credit standing in an additional ten term courses each year of the program.

   It is possible for non-Planning students to apply for admission to Year Two. Advanced standing may be obtained through the transfer of credits from other programs and institutions. However, advanced standing will not be granted to transfer students beyond the Year One level (ten term course credits). All transfer students are required to complete a minimum of three full academic years in the program years Two - Four) before being eligible for graduation.

   All students admitted to the program with advanced standing must have their program for each year approved by the Undergraduate Officer.

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.

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 Office. 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.

Co-op Course Scheduling and Sequencing

<table>
<thead>
<tr>
<th>Year One</th>
<th>Year Two</th>
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<tbody>
<tr>
<td>ARTS 000 Y, PLAN 100A and B, PLAN 159, 130,</td>
<td>PLAN 256A, ENV S 200, 201, 278</td>
</tr>
<tr>
<td>ENVS 178</td>
<td>Electives</td>
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<tr>
<td>Electives</td>
<td>Year Three</td>
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<tr>
<td></td>
<td>Plan 300A, 307</td>
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<tr>
<td></td>
<td>Winter Work Term 2</td>
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<td></td>
<td>PLAN 255, 256B</td>
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<td></td>
<td>Electives</td>
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<td></td>
<td>Spring Work Term 1</td>
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<td>Year Three</td>
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<td>Plan 300A, 307</td>
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<td>Winter Work Term 2</td>
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<td>PLAN 300B, 330, 390</td>
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<td>Electives</td>
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<td>Year Four</td>
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<td>Plan 456A, 480A, 490A</td>
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<td>Electives</td>
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<td></td>
<td>Spring Work Term 4</td>
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<td>Plan 456B, 480B, 490B</td>
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<td></td>
<td>Electives</td>
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For complete listing of electives, see the School Undergraduate Program Manual.
HONOURS URBAN AND REGIONAL PLANNING PROGRAM (REGULAR AND CO-OP)

YEAR ONE

<table>
<thead>
<tr>
<th>Required Core Planning Courses</th>
<th>Required Theme Elective Courses</th>
</tr>
</thead>
<tbody>
<tr>
<td>PLAN 100A Introduction to Urban Planning Concepts and Techniques 1</td>
<td>One term course from each of the five categories in the list of Year One Theme Elective Courses. 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.</td>
</tr>
<tr>
<td>PLAN 100B Introduction to Urban Planning Concepts and Techniques 2</td>
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<tr>
<td>PLAN 130 Participatory Planning</td>
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<tr>
<td>PLAN 159 Graphics for Planning</td>
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<tr>
<td>ENV S 178 Introduction to Environmental Research Methods</td>
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</tr>
<tr>
<td>ARTS 000 Y English Language Proficiency Exam (no credit)</td>
<td></td>
</tr>
</tbody>
</table>

Year One Required Theme Elective Courses

Theme Areas
1. Biophysical
2. Economic Theme
3. Politics Theme
4. Philosophy and Arts Theme
5. General Theme

For a listing of the courses included under each Theme Area, see the current School Undergraduate Program Manual.

Note: Required core and elective courses together will total ten term courses – all courses to be at first-year level.

YEAR TWO

<table>
<thead>
<tr>
<th>Required Core Planning Courses</th>
<th>Required Theme Elective Courses</th>
<th>Other</th>
</tr>
</thead>
<tbody>
<tr>
<td>PLAN 255 Planning Surveys and Analyses</td>
<td>Two term courses from list of Second Year Required Theme Areas</td>
<td>Two term courses from University offerings (as free electives)</td>
</tr>
<tr>
<td>PLAN 258A Principles of Environmental Design 1</td>
<td></td>
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<tr>
<td>PLAN 258B Principles of Environmental Design 2</td>
<td></td>
<td></td>
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<tr>
<td>ENV S 200 Field Ecology</td>
<td>Recommended introductory Theme Courses are: PLAN 232, 259, 270</td>
<td></td>
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<tr>
<td>ENV S 201 Introduction to Environmental and Planning Law</td>
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<tr>
<td>ENV S 278 Advanced Environmental Research Methods</td>
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</tbody>
</table>

Year Two Required Theme Elective Courses

Theme Areas
1. Urban Theme
2. Regional Theme
3. Rural/Resource Theme
4. General Themes

For a listing of the courses included under each Theme Area, see the current School Undergraduate Program Manual.

Note: Required core and elective courses together will total ten term courses.
### YEAR THREE

<table>
<thead>
<tr>
<th>Required Core Planning Courses</th>
<th>Required Theme Elective Courses</th>
<th>Other</th>
</tr>
</thead>
<tbody>
<tr>
<td>PLAN 300A Seminar/Workshop</td>
<td>Three term courses from list of Third Year Required Theme Areas</td>
<td>Three term courses from University offerings (as free electives)</td>
</tr>
<tr>
<td>Project in Urban and Regional Planning 1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>PLAN 300B Seminar/Workshop</td>
<td>Recommended Major Theme courses are: PLAN 301, 330, 359, 367, 368</td>
<td></td>
</tr>
<tr>
<td>Project in Urban and Regional Planning 2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>PLAN 307 Social Research Techniques in Planning</td>
<td></td>
<td></td>
</tr>
<tr>
<td>PLAN 390 Senior Honours Essay Proposal (no credit weighting)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Year Three Required Theme Elective Courses**

**Theme Areas**
1. Urban Theme
2. Regional Theme
3. Rural/Resource Theme
4. General Themes

For a listing of the courses included under each Theme Area, see the current School Undergraduate Program Manual.

**Note:** Required core and elective courses together will total ten term courses.

### YEAR FOUR

<table>
<thead>
<tr>
<th>Required Core Planning Courses</th>
<th>Required Theme Elective Courses</th>
<th>Other</th>
</tr>
</thead>
<tbody>
<tr>
<td>PLAN 455A Political and Administrative Processes in Urban</td>
<td>Two term courses from list of Fourth Year Required Theme Areas</td>
<td>One term course from University offerings (as free elective)</td>
</tr>
<tr>
<td>and Regional Planning 1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>PLAN 455B Political and Administrative Processes in Urban and Regional Planning 2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>PLAN 480A The Philosophy and Methodology of Urban and Regional Planning 1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>PLAN 480B The Philosophy and Methodology of Urban and Regional Planning 2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>PLAN 490A/PLAN 490B Senior Honours Essay</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Year Four Required Theme Elective Courses**

**Theme Areas**
1. Urban Theme
2. Regional Theme
3. Rural/Resource Theme
4. General Themes

For a listing of the courses included under each Theme Area, see the current School Undergraduate Program Manual.

**Note:** Required core and elective courses together will total ten term courses.
Independent Studies Program

Comparing notes.
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 degree Bachelor of Independent Studies (BIS) is awarded by the University upon successful completion of the degree program described under 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-Degree Phase and the Degree Phase.

1. Pre-Degree Phase

   New students in Independent Studies (I.S.) begin by developing a study plan with the assistance of faculty members 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-degree term will meet at least five times with I.S. faculty members 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-degree 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-Degree 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-Degree 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. Degree Phase
The Bachelor of Independent Studies degree (BIS) is recommended to Senate by the Academic Board. 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 Degree Phase.

Students may make application to the Academic Board for entry into the Degree 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 degree 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 degree 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 degree candidacy is based on an assessment of (a) the applicant’s general preparedness for BIS degree level studies, that 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 to degree candidacy, 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-Degree 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-Degree 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.

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 an Application for Formal Inquiry 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 Appeals Policy and Procedures.

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 offices and the Registrar’s Office.

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.
The Mathematics and Computer building.
FACULTY OF MATHEMATICS

The Faculty of Mathematics consists of the Departments of Applied Mathematics, Combinatorics and Optimization, Computer Science, Pure Mathematics, and Statistics and Actuarial Science. The degree Bachelor of Mathematics (BMath) is awarded upon successful completion of four-year Honours and three-year General programs.

The Faculty also offers graduate programs leading to the following degrees: Master of Mathematics (MMath), Master of Philosophy (MPhil), and Doctor of Philosophy (PhD). Detailed information is contained in the University of Waterloo Graduate Studies Calendar.

ADMISSION

Admission requirements and procedures for all programs are described on pages 2:8 and 2:10 in 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 13:24 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.

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.

Mathematics
Admission
Academic Programs

DEPARTMENTAL HONOURS PROGRAMS
The Faculty offers the following Honours Programs through the five departments:

Actuarial Science
Applied Mathematics
Applied Mathematics with Engineering Electives
(Conoperative 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
(Conoperative 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
(Conoperative only)
Mathematics/Management Accountancy Program
(Conoperative only)
Mathematics/Teaching Option (Conoperative only)
Inter-Departmental Program

THREE-YEAR GENERAL PROGRAM
This program is under the jurisdiction of the Faculty Programs Committee.

COMBINATION HONOURS PROGRAMS
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 13:4) plus the joint requirements of the two departments for a minimum of 28 mathematics half-credits, and ten non-math half-credits. Joint requirements for each department can be found in the corresponding depart-


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, 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 13:20.
### 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</td>
<td>60%</td>
<td>60%</td>
</tr>
<tr>
<td>Maximum total failures allowed</td>
<td>four half-credits</td>
<td>eight half-credits</td>
</tr>
<tr>
<td>Maximum course attempts allowed</td>
<td>50 half-credits</td>
<td>40 half-credits</td>
</tr>
<tr>
<td>Minimum number of complete terms</td>
<td>four</td>
<td>none</td>
</tr>
<tr>
<td>Minimum number of full-time terms</td>
<td>eight, including the four complete terms required above</td>
<td>none</td>
</tr>
<tr>
<td>English Writing Skills</td>
<td>All BMath degree candidates must satisfy an English Writing Skills Requirement. See below.</td>
<td></td>
</tr>
</tbody>
</table>

The terms used in Table I are explained below.

**Math half-credit** – A course with one of these prefixes: ACTSC (Actuarial Science), AM (Applied Mathematics), C&O (Combinatorics and 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.

**Cumulative Average** – See Academic Standing, page 13:21.

**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.

**BMath English Writing Skill Requirement**

BMath degree candidates must satisfy the following Writing Skills Requirement:

- A grade of 80% or better in OAC English 1 OR
- A grade of 60% or better on the UW English Language Proficiency Exam (ELPE) OR
- A grade of C- or better in one of the approved English courses (currently ENGL 109, 129H, 210C, 210E, and 210F).

The entry ARTS 000 with a CR grade on a student’s grade report will indicate successful completion of this requirement.

### Table II – Required Faculty Core Courses – Honours Programs

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>MATH 135</td>
<td>Algebra</td>
</tr>
<tr>
<td>MATH 136</td>
<td>Linear Algebra 1</td>
</tr>
<tr>
<td>MATH 235</td>
<td>Linear Algebra 2</td>
</tr>
<tr>
<td>MATH 137</td>
<td>Calculus 1</td>
</tr>
<tr>
<td>MATH 138</td>
<td>Calculus 2</td>
</tr>
<tr>
<td>MATH 237</td>
<td>Calculus 3</td>
</tr>
<tr>
<td>STAT 230</td>
<td>Probability</td>
</tr>
<tr>
<td>STAT 231</td>
<td>Statistics</td>
</tr>
<tr>
<td>CS 134</td>
<td>Principles of Computer Science 1</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
Each student is responsible for being aware of all regulations pertaining to her/his program of study. When all requirements for a particular BMath degree have been met, it is the student's responsibility to submit a completed "Intention to Graduate" form to the Registrar's Office.

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 degree and have a cumulative average 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 of at least 80% are eligible to graduate "With Distinction". This notation appears on official University transcripts.

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 is at least 87%, based on all courses taken that term. Only students carrying a standard course load of five half-credits or more in the term will be eligible for the Dean's Honours List. This designation is reflected on end-of-term grade reports and official University transcripts.

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.

Departmental Honours Programs

Actuarial Science
The Department of Statistics and Actuarial Science offers courses and programs in Actuarial Science which is the application of mathematics and statistics to financial problems with particular emphasis on life insurance, casualty insurance, and employee benefit programs. The courses offered provide theoretical preparation for the courses of the Society of Actuaries and the Casualty Actuarial Society and include studies of such subject areas as Mathematics of Finance, Life Contingencies, Risk Theory, and Casualty Ratemaking.

By carefully selecting their non-math courses, students can also gain valuable background knowledge in economics, finance, administration, and law.

Honours Actuarial Science
In conjunction with the common degree requirements in Table I 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 13:4 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 335 OR Applications in Actuarial Science
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
CS 337 Introduction to Numerical Analysis
STAT 331 Applied Linear Models
Mathematics
Actuarial Science
Applied Mathematics

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

Three additional half-credits chosen from:
ACC 121, 122, 371, 372
BUS 111W, 121W
ECON 101, 201, 202, 231
M SCI 211, 311
PSYCH 101, 253, 254, 338, 339

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
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 1

The remaining courses to satisfy the overall Diploma requirements described above must be selected from the following list:
All ACTSC courses numbered 330 or higher
STAT 330, 331, 333, 431, 433, 443
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 can 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 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 13:4 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
At most one of CS 372 or 374 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 372 Introduction to Scientific Computation: Numerical Linear Algebra
- CS 374 Introduction to Scientific Computation: Numerical Approximation
- AM/PMATH 331 Real Analysis

Two additional half-credits chosen from:
- AM/PMATH 331 Real Analysis
- CS 334 Data Types and Structures
- CS 372 Introduction to Scientific Computation: Numerical Linear Algebra
- CS 374 Introduction to Scientific Computation: Numerical Approximation
- C&O 350 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

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

<table>
<thead>
<tr>
<th>Course</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>M E 219, 220</td>
<td>Four of M E 351, CIV E 303, 313, 403, 404, 405, 413, 414</td>
</tr>
</tbody>
</table>

Group B

<table>
<thead>
<tr>
<th>Course</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>SY DE 252, 281, 372, 381</td>
<td>Two of SY DE 442, 444, 452, 533, 543</td>
</tr>
</tbody>
</table>

Group C

<table>
<thead>
<tr>
<th>Course</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>M E 219, 250, 351</td>
<td>Three of M E 353, 354, 452, 456, 459, 469, 557, 563</td>
</tr>
</tbody>
</table>

Group D

<table>
<thead>
<tr>
<th>Course</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>E&amp;CE 100</td>
<td>Five of E&amp;CE 231, 241, 332, 342, 371, 380, 411, 412, 435, 436, 438, 443</td>
</tr>
</tbody>
</table>

Group E

<table>
<thead>
<tr>
<th>Course</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>E&amp;CE 100, 261, 262, 371, 380</td>
<td>One of E&amp;CE 342, 463, 481, 482</td>
</tr>
</tbody>
</table>

Group F

<table>
<thead>
<tr>
<th>Course</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>CH E 100, 101, 021, 023, 025, 026, 030, 035, 036, 041</td>
<td>Optional Courses: CH E 033, 034, 038, 044, CHEM 026, 036</td>
</tr>
</tbody>
</table>

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:

<table>
<thead>
<tr>
<th>Course</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>PHYS 252 Electricity and Magnetism 1</td>
<td></td>
</tr>
<tr>
<td>PHYS 253 Electricity and Magnetism 2</td>
<td></td>
</tr>
<tr>
<td>PHYS 256 Geometrical and Physical Optics</td>
<td></td>
</tr>
<tr>
<td>PHYS 275 Astrophysics 1 – The Solar System</td>
<td></td>
</tr>
<tr>
<td>PHYS 358 Thermodynamics</td>
<td></td>
</tr>
<tr>
<td>PHYS 359 Statistical Mechanics</td>
<td></td>
</tr>
<tr>
<td>PHYS 375 Astrophysics 2 – Stellar Astronomy</td>
<td></td>
</tr>
<tr>
<td>PHYS 380 Molecular Biophysics</td>
<td></td>
</tr>
<tr>
<td>PHYS 480 Radiation Biophysics</td>
<td></td>
</tr>
<tr>
<td>CHEM 120 Physical and Chemical Properties of Matter</td>
<td></td>
</tr>
<tr>
<td>CHEM 123 Chemical Reactions, Equilibria, Kinetics</td>
<td></td>
</tr>
</tbody>
</table>

Honours 'X' with Applied Mathematics Minor
See page 13:3 for a complete description of Minor program requirements.

All of

<table>
<thead>
<tr>
<th>Course</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>AM 231 Calculus 4</td>
<td></td>
</tr>
<tr>
<td>AM 261 Newtonian Mechanics</td>
<td></td>
</tr>
<tr>
<td>AM 343 Discrete Models in Applied Mathematics</td>
<td></td>
</tr>
<tr>
<td>AM 351 Ordinary Differential Equations</td>
<td></td>
</tr>
<tr>
<td>AM 353 Partial Differential Equations 1</td>
<td></td>
</tr>
<tr>
<td>AM 451 Introduction to Dynamical Systems</td>
<td></td>
</tr>
</tbody>
</table>

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 13:4 and the following courses:

All of

<table>
<thead>
<tr>
<th>Course</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>C&amp;O 230 Introduction to Combinatorics</td>
<td></td>
</tr>
<tr>
<td>C&amp;O 350 Linear Programming</td>
<td></td>
</tr>
</tbody>
</table>

One of

<table>
<thead>
<tr>
<th>Course</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>C&amp;O 330 Combinatorial Enumeration</td>
<td></td>
</tr>
<tr>
<td>C&amp;O 342 Introduction to Graph Theory</td>
<td></td>
</tr>
</tbody>
</table>

One of

<table>
<thead>
<tr>
<th>Course</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>C&amp;O 351 Network Flow Theory</td>
<td></td>
</tr>
<tr>
<td>C&amp;O 367 Nonlinear Optimization</td>
<td></td>
</tr>
</tbody>
</table>

Three additional half-credits chosen from:

<table>
<thead>
<tr>
<th>Course</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>C&amp;O 330 Combinatorial Enumeration</td>
<td></td>
</tr>
<tr>
<td>C&amp;O 331 Coding Theory</td>
<td></td>
</tr>
<tr>
<td>C&amp;O 342 Introduction to Graph Theory</td>
<td></td>
</tr>
<tr>
<td>C&amp;O 351 Network Flow Theory</td>
<td></td>
</tr>
<tr>
<td>C&amp;O 367 Nonlinear Optimization</td>
<td></td>
</tr>
<tr>
<td>C&amp;O 430 - 466</td>
<td></td>
</tr>
</tbody>
</table>

All of

<table>
<thead>
<tr>
<th>Course</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>PMATH 336 Introduction to Group Theory</td>
<td></td>
</tr>
</tbody>
</table>
Two of
- AM/PMATH 331 Real Analysis
- AM/PMATH 332 Complex Analysis
- PMATH 334 Introduction to Rings and Fields
  (AM/PMATH 331 may be replaced by one of CS 337, 372, 374)

Two additional 300- or 400-level math half-credits with a course prefix other than C&O

One additional 300- or 400-level math half-credit

**Joint Honours Combinatorics and Optimization**
See page 13:2 for a complete description of Joint program requirements.

All of
- C&O 230 Introduction to Combinatorics
- C&O 350 Linear Programming

Four additional half-credits chosen from:
- C&O 330 Combinatorial Enumeration
- C&O 331 Coding Theory
- C&O 342 Introduction to Graph Theory
- C&O 351 Network Flow Theory
- C&O 367 Nonlinear Optimization
- C&O 430 - 466

All of
- PMATH 336 Introduction to Group Theory

Two of
- AM/PMATH 331 Real Analysis
- AM/PMATH 332 Complex Analysis
- PMATH 334 Introduction to Rings and Fields
  (AM/PMATH 331 may be replaced by one of CS 337, 372, 374)

**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
- C&O 350 Linear Programming

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 13:4 and the following courses:

All of
- C&O 350 Linear Programming
- C&O 351 Network Flow Theory
- C&O 370 Deterministic OR Models
- CS 230 Introduction to Computers and Computer Systems
- CS 330 Management Information Systems
- CS 333 Applied Linear Models
- CS 337 Introduction to Numerical Analysis
- STAT 331 Applied Linear Models
- STAT 333 Applied Probability
- STAT 371 Stochastic OR Models

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 437 Simulation by Computer
- 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
DRAMA 223 Public Speaking

(BUS 352W is offered by Wilfrid Laurier’s School of Business and Economics. See page 13:14.)

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.

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**Computer Science**

Computer Science is centered around the study of information. It is concerned with the nature and properties of information, its structure and classification, its storage and retrieval, and the various types of processing to which it can be subjected. It is also concerned with the physical machines that perform these operations, with the elemental units of which these machines are composed, with the organization of these units into efficient information processing systems, and with the exploration of the limits of the abilities of these machines.

Computer Science is recognized as an independent discipline with an inherently mathematical nature. Its activity ranges from theoretical areas such as the theory of automata, system organization and logic design, formal languages and computability theory to applied areas such as scientific computing, programming languages, software management and computer systems.

The advent of the computer has facilitated a systems approach to solving many problems in science, business and industry. There is currently a great demand for information analysts to define how systems will perform these functions and for programmers to implement production systems on computers.

The Computer Science program at Waterloo 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.

---

**Mathematics**

**Computer Science**

**Admission to Computer Science Major Programs**

The phrase "Computer Science Major programs" includes Honours Computer Science, 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 these programs at the beginning of their second year. They should see a Computer Science advisor and select one of the Computer Science Major programs when preregistering for their first term in second year.

The possibility of late admission to a Computer Science Major program will not be completely eliminated. Students may apply for late admission by seeing a Computer Science advisor. Admission will be based on the student's academic record.

**Honours Computer Science**

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 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 13:4 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 351 Digital Design and Architecture
- CS 352 Concurrent Programming
- CS 354 Software Systems
- CS 360 Introduction to the Theory of Computing

**One of**
- CS 372 Introduction to Scientific Computation: Numerical Linear Algebra
- CS 374 Introduction to Scientific Computation: Numerical Approximation

**One of**
- CS 45 Introduction to Queueing Models: Analysis, Simulation, and Computer Applications
- CS 462 Formal Language 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 354 Software Systems
CS 360 Introduction to the Theory of Computing
CS 372 Introduction to Scientific Computation: Numerical Linear Algebra
CS 374 Introduction to Scientific Computation: Numerical Approximation

Two additional 400-level CS-half credits chosen from CS 440 - 498

One additional CS half-credit chosen from CS 351, 352, 354, 360, 372, 374, 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)
In conjunction with the common degree requirements in Table I on page 13:4, this program requires at least 28 math half-credits. A maximum of six CS half-credits at the 400-level may be included in the 40 half-credits presented for a degree. These overall requirements must include the Faculty core courses outlined in Table II on page 13:4 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 352 Concurrent Programming
CS 354 Software Systems
CS 360 Introduction to the Theory of Computing

One of
CS 372 Introduction to Scientific Computation: Numerical Linear Algebra
CS 374 Introduction to Scientific Computation: Numerical Approximation

Two of
CS 450 Computer Architecture
CS 452 Real-time Programming
CS 454 Distributed Systems
CS 457 Queueing Models: Analysis, Simulation, and Computer Applications

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

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 13:4 and the following courses:

All of
GEN E 123 Electrical Engineering
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
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 13:4 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 352 Concurrent Programming
CS 354 Software 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
STAT 333 Applied Probability
STAT 371 Stochastic OR Models

All of
ACC 121 Understanding and Using Financial Accounting Information
ACC 122 Understanding and Using Managerial Accounting Information
BUS 111W Introduction to Business Organization
BUS 121W Functional Areas of the Organization
BUS 352W Marketing I
BUS 481W Business Policy I
BUS 491W Business Policy II
ECON 101 Introduction to Micro-economics
ECON 102 Introduction to Macro-economics
M SCI 211 Organizational Behaviour
M SCI 311 Organizational Design and Technology
M SCI 432 Introduction to Production Management
MTHEL 100 Commercial and Business Law for Mathematics Students

Recommended
DRAMA 223 Public Speaking

Courses labelled BUS are offered by Wilfrid Laurier’s School of Business and Economics (see page 13:14).

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

One of
CS 230 Introduction to Computers and Computer Systems
CS 246 Software Abstraction and Specification

Six 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 13:20.

Pure Mathematics

Pure Mathematics may be studied for the satisfaction it provides, as well as for its potential to be useful. A mastery of such subjects as algebra, analysis and geometry is essential, not only to prospective algebraists, analysts and geometers, but also to those who have in mind applications to the basic sciences or technology. Thus, the programs of the Department are designed for students who relish mathematics, as well as for those who wish to get a solid foundation with a view to applying their knowledge.

Some graduates of Pure Mathematics do go out into industry. Others enter the field of education, from primary to advanced levels. A good number commit themselves to research, either in Pure Mathematics itself, or in some other scientific field. We hope to impart in our students the abilities to think clearly, and to educate themselves, so that they may succeed in their fields of endeavour.

The special interests of the Department include algebra (groups, rings, representation theory, lattices, universal algebra, linear algebra), analysis (integration theory, real and complex functions, functional analysis, operator theory, non-linear problems), geometry (algebraic topology, homotopy, differential geometry, projective geometry), number theory (primes, Diophantine approximation), functional equations (with applications to information theory, probability, engineering, science and social science), logic and foundations (model theory, consistency, recursive functions).

The Department offers several programs (see page 13.2). 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 13:4 and the following courses:

All of
PMATH 343 Abstract Algebra 1
PMATH 344 Abstract Algebra 2
PMATH 351 Real Analysis
PMATH 352 Complex Analysis
PMATH 353 Fourier Analysis
PMATH 367 Set Theory and General Topology
One of
PMATH 441 Algebraic Number Theory
PMATH 444 Non-Commutative Algebra
PMATH 446 Group Theory
PMATH 448 Commutative Algebra

One of
PMATH 451/AM 431 Measure and Integration
PMATH 452 Topics in Complex Analysis
PMATH 453/AM 432 Functional Analysis

Three additional 400-level PMATH half-credits

All of
C&O 230 Introduction to Combinatorics

Two additional 400-level math half-credits

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

All of
PMATH 343 Abstract Algebra 1
PMATH 344 Abstract Algebra 2
PMATH 351 Real Analysis
PMATH 352 Complex Analysis

One of
PMATH 353 Fourier Analysis
PMATH 367 Set Theory and General Topology

Three additional 400-level PMATH half-credits

One additional 300- or 400-level PMATH half-credit

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 PMATH half-credits.

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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 13:4 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
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
CHE 021, 023, 026, 031, 037, 041
CHEM 120/123, PHYS 121/122

Civil (transportation)
CIV E 126, 292, 340, 342, 343, 344
PHYS 121/122

Groups of courses in Fluid Mechanics and Hydrology, and Water Quality Control are also available*.

Management Sciences
M SCI 211, 261, 311, 432, 452, 461

Mechanical
M E 215, 219, 250, 321, 351 and one of 340, 348
PHYS 121/122

Groups of courses in Automation, Production, Materials, Solid Body Mechanics and Thermofluids are also available*.

Systems Design
SY DE 281, 384, 384, 432, 544, 555
PHYS 121/122

* Details are available in the Statistics Undergraduate Studies Handbook.

Note
An Option in Statistics for students in the Faculty of Engineering is described on page 10:11.

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.

FACULTY HONOURS PROGRAMS: REQUIREMENTS

Business-Related Programs

The Faculty of Mathematics, in co-operation with the School of Accountancy and the Departments of Economics and Management Sciences at Waterloo 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 13:11) combine more specialized study in the mathematical sciences with similar business-oriented courses. All of these programs provide excellent preparation for business-related careers or post-graduate studies. Special linkage programs exist with WLU's School of Business and Economics and Waterloo's Department of Management Sciences whereby graduates of business-related mathematics programs, who have sufficiently strong academic records and specified prerequisite courses, can complete a Master of Business Administration (MBA) or a Master of Applied Science (MASc) degree respectively in three terms of study.

Note
In the program requirements which follow, courses with prefix BUS are offered by WLU's School of Business and Economics. Course descriptions, and the terms in which these courses are normally available to University of Waterloo students, can be found in the "How to Get Around in Mathematical Circles" booklet, copies of which are available in the Mathematics Undergraduate Office (MC 5115).
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 13:4, 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 Personnel Management
BUS 481W Business Policy I
BUS 491W Business Policy II
ECON 101 Introduction to Micro Economics
ECON 102 Introduction to Macro Economics
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

AM 381C/PMATH 380A Introduction to Information Theory
C&O 367 Nonlinear Programming
C&O 370 Deterministic OR Models
C&O 453 Network Design
C&O 454 Scheduling

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

One of

STAT 332 Sampling
STAT 333 Applied Probability
STAT 335 Statistical Process Control
STAT 443 Forecasting

One of

C&O 367 Nonlinear Programming
C&O 370 Deterministic OR Models
C&O 453 Network Design
C&O 454 Scheduling

One of

STAT 333 Applied Probability
<table>
<thead>
<tr>
<th>Business-Related Programs</th>
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<tbody>
<tr>
<td>STAT 430 Experimental Design</td>
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<td>STAT 440 Statistical Computing</td>
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<tr>
<td>One additional 300- or 400-level math half-credit</td>
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<tr>
<td>All of</td>
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<tr>
<td>BUS 382W Marketing II</td>
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<tr>
<td>SCI 432 Introduction to Production Management</td>
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</table>

**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 |
| ACTSC 335 OR Applications in Actuarial Science (see note below) |
| 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 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) |

**Note**

ACTSC 335 is an antirequisite for both C&O 350 and C&O 370.

**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.

BMath graduates of the Mathematics/Management Accountancy program will have completed all the formal university coursework presently required to challenge the Professional Studies Entrance Examination of the Society of Management Accountants of Ontario (SMAO). Successful completion of this examination will enable students to enter the first year of the Society's two-year Professional Program.

BMath graduates of the Mathematics/Chartered Accountancy program who have sufficiently strong academic records and completed the pre-requisite courses are eligible to enrol in the School of Accountancy's Master of Accounting (MAcc) degree program in the Faculty of Arts. This eight-month Master's program follows immediately after completion of the 4B term in the BMath undergraduate program. 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. BMath graduates who do not complete the MAcc program, if they 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/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 13:4 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 131 Management 1 |
| ACC 251 Auditing 1 |
| ACC 291 Financial Accounting 1 |
| ACC 371 Managerial Finance 1 |
| ACC 372 Managerial Finance 2 |
| ACC 381 Cost Management Systems 2 |
| ACC 382 Cost Management Systems 3 |
| ACC 392 Financial Accounting 2 |
| ACC 401 Accounting Theory |
| ACC 432 Communicating Accounting Information for Decision Making |
| ACC 451 Auditing 2: Audit Strategy |
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Business-Related Programs

ACC 461 Taxation 1
ACC 462 Taxation 2
ACC 491 Financial Accounting 3
ECON 101 Introduction to Micro Economics
ECON 102 Introduction to Macro Economics
MTHEL 100 Commercial and Business Law for Mathematics Students

Three additional math or non-math ("free-choice") half-credits.

Notes

1. To graduate with a BMath/Accounting Honours 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, with this average to include all grades in these courses, whether passed, failed, or repeated.

2. At the end of each academic term, commencing with the 2A term and extending through to BMath graduation, in order 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, with this average to include all grades in those courses, whether passed, failed, or repeated.

3. Because of limited term offerings and structured prerequisites for ACC courses, there is virtually no flexibility in the Mathematics/Chartered Accountancy programs for altering the academic/work-term sequences described on page 5:4. Since deviations from these prescribed sequences can often cause a delay in graduation of as much as one calendar year, alterations should be considered only after careful consultation with the program's Faculty Advisor.

4. For the same reasons described in Note 3 above, the order in which the required non-math courses in this program are taken is very important and there is little room for flexibility. Recommended term-by-term listings of the required non-math courses are available from the program’s Faculty Advisor.

5. 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.

6. 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.

7. Students who meet all academic graduation requirements for this program but who do not meet the minimum requirements for a Co-op degree may, at the discretion of the Standings and Promotions Committee, be granted a Regular BMath/Accounting Honours degree.

Eligibility for UW's Master of Accounting (MAcc - CA Studies) Program

BMath graduates of the Mathematics/Chartered Accountancy program must satisfy the following additional requirements to be eligible for the MAcc program:

a) All of
PHIL 215 Professional and Business Ethics
PSYCH 101 Introductory Psychology
PSYCH 338 Organizational Psychology
one English writing-skills course (preferably one of ENGL 210C, 210E, 210F)
one English literature course

Normally, the English writing-skills course, PSYCH 101 or the English literature course, and PSYCH 338 from this list are taken on campus as the three "free-choice" courses listed in the degree requirements above. The remaining two courses, above and beyond the 40 courses required for the BMath degree, are then taken on campus as sixth courses during academic terms (for students with very strong academic records) or by Correspondence during Co-op work terms.

It is strongly recommended that all five of the courses listed in (a) above be completed prior to a student's entry to the MAcc program. However, it is possible to defer PHIL 215 and the English literature course and take them as "electives" during the Chartered Accountancy MAcc program (which consists of six specified ACC graduate courses and four electives, two of which can be undergraduate courses; consult page 9:9).

b) Meet all University of Waterloo Graduate School entry requirements, including a minimum cumulative overall average of 75% in their undergraduate course work.

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 13:4 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 131 Management 1
ACC 251 Auditing 1
ACC 291 Financial Accounting 1
ACC 371 Managerial Finance 1
ACC 372 Managerial Finance 2
ACC 381 Cost Management Systems 2
ACC 382 Cost Management Systems 3
ACC 392 Financial Accounting 2
ACC 401 Accounting Theory
ACC 432 Communicating Accounting Information for Decision Making
ACC 454 Comprehensive/Operational Auditing
ACC 481 Taxation 1
ACC 482 Taxation 2
BUS 352W Marketing I
ECON 101 Introduction to Micro Economics (see note 1 below)
ECON 102 Introduction to Macro Economics
M SCI 211 Organizational Behaviour
M SCI 432 Introduction to Production Management
MTHEL 100 Commercial and Business Law for Mathematics Students

One additional math or non-math ("free-choice") half-credit (see Note 2 below)

Notes
1. Notes 1 through 7 following the degree requirements for the Honours Mathematics/Chartered Accountancy program also apply to the Honours Mathematics/Management Accountancy program.

2. For the one "free-choice" course listed in the degree requirements above, and for students with very strong academic records who wish to take additional courses above and beyond the 40 courses required for the BMath degree, the following courses are recommended for consideration.

M SCI 311 Organizational Design and Technology
PHIL 215 Professional and Business Ethics
An English writing-skills course (preferably one of ENGL 210C, 210E, 210F)

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 13:4 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

One of
CS 330 Management Information Systems
CS 334 Data Types and Structures
CS 336 Distributed Computer Systems
CS 337 Introduction to Numerical Analysis
CS 338 Computer Applications in Business: Databases
CS 430 Applications Software Engineering

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
PMATH 330 Introduction to Mathematical Logic
PMATH 340 Elementary Number Theory
PMATH 360 Geometry

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 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.

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**Inter-Departmental Program**

The purpose of this program is to provide students in the Faculty of Mathematics with breadth of studies at the Honours level. Students who do not enrol in a departmental or Faculty Honours program must satisfy the requirements of the Inter-Departmental Program if they wish to graduate with a BMATH Honours degree.

Honours Mathematics: Inter-Departmental Program

In conjunction with the common degree requirements in Table I 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 13:4 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

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**Mathematics**

Inter-Departmental Program

Three-Year General Program

All of:
- CS 230 Introduction to Computers and Computer Systems
- One of:
  - CS 334 Data Types and Structures
  - CS 336 Distributed Computer Systems
  - 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:
- STAT 331 Applied Linear Models
- STAT 332 Sampling
- STAT 333 Applied Probability

Two of:
- AM 231 Calculus 4
- AM/PMATH 331 Real Analysis
- AM/PMATH 332 Complex Analysis

Two of:
- AM 435 Applications of Algebra
- C&O 330 Combinatorial Enumeration
- PMATH 334 Introduction to Rings and Fields
- PMATH 338 Introduction to Group Theory
- STAT 430 Experimental Design

Two additional 400-level math half-credits with 300-level prerequisites.

**Note**

Students in the Faculty Inter-Departmental Honours program may not pursue a Minor designation or Joint/Double Honours program within the Faculty of Mathematics. However, they are encouraged to pursue a Minor or Joint Honours program with an academic area in another faculty.

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**THREE-YEAR GENERAL PROGRAM:**

**REQUIREMENTS**

This new version of the General Program will be 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 the old 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 16 math half-credits and ten non-math half-credits. The math half-credits must include the following:

- AM 250 Modelling with Ordinary Differential Equations
- AM 343 Discrete Models in Applied Mathematics
- C&O 230 Introduction to Combinatorics
- C&O 350 Linear Programming
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 227 Introduction to Optimization Models
CS 102 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 courses, chosen from Groups A and B below, with at least three from Group A.

Group A
ACTSC 221 Mathematics of Investment
AM 250 Modelling with Ordinary Differential Equations
AM 343 Discrete Models in Applied Mathematics
C&O 220 Introductory Combinatorics
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

Group B
CS 230 Introduction to Computers and Computer Systems
CS 330 Management Information Systems
CS 334 Data Types and Structures
CS 336 Distributed Computer Systems
CS 338 Computer Applications in Business: Databases

For math course selection, students registered in the General program may enrol only in courses in groups A and B, 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 Group A courses, provided that the course was taken while registered in an Honours program.

COMBINATION HONOURS PROGRAMS LEADING TO A DEGREE WITH ANOTHER FACULTY: REQUIREMENTS

Joint Honours Programs with Mathematics
A 'Joint Honours with Mathematics' is available for Honours students 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.

Mathematics
Combination Honours Programs
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

Two of
CS 102 Introduction to Computer Programming
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

Two of
CS 102 Introduction to Computer Programming
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

All of
CS 102 Introduction to Computer Programming (or equivalent)
CS 212 Programming Principles and Practice
CS 230 Introduction to Computers and Computer Systems

Five of
CS 330 Management Information Systems
CS 334 Data Types and Structures
CS 336 Distributed Computing Systems
CS 337 Introduction to Numerical Analysis
CS 338 Computer Applications in Business: Databases
CS 430 Applications Software Engineering
CS 432 Business Systems Analysis
CS 435 Computer Applications
CS 437 Simulation by Computer

Note
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.

FACULTY POLICIES

Policies 1-4 are new and will be 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 the regulations in the 1992/93 Undergraduate Calendar (or earlier calendar, as appropriate).

1. AVERAGES
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. ACADEMIC STANDING

2.1 To remain in the Faculty of Mathematics, a student may not fail more than eight half-credit courses.

2.2 To remain in an Honours program, a student may not fail more than four half-credit courses.

2.3 A student’s standing is assessed after each term of registration. Subject to 2.1 and 2.2,

a) if CAV ≥ 60%, a student is “In Good Standing”;
b) if CAV < 60%, a student is “On Academic Probation.”

2.4 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 2.4(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. CONDITIONS FOR REMAINING IN CO-OP

3.1 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.

3.2 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.

3.3 An Honours Co-op student who is required to transfer to the General program may remain in Co-op if TAV ≥ 60%, space permitting.

4. COURSE DROP POLICY

4.1 Students may drop courses without academic penalty during the first four weeks of lectures in a term.

4.2 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.
5. EXAMINATIONS
5.1 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.

5.2 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.

5.3 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."

6. GRADES
6.1 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.

6.2 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.

6.3 In exceptional circumstances, for example, an examination missed due to illness, an instructor may assign a grade of INC (course incomplete). A grade of INC will not be assigned simply because a student is concerned that he/she will otherwise fail the course. A student has up to eight months to clear an INC grade, after which the INC is automatically converted to a DNW.

6.4 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.

6.5 Students in the Faculty of Mathematics may not register for official Audit (AUD) status in a course.

7. 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. In addition, the Mathematics Undergraduate Office (MUO) staff will show the student a copy of her/his final exam paper, if requested. Finally, the student may request to have her/his final exam re-marked by submitting a Faculty of Mathematics Grade Appeal Form to the Registrar's Office. These forms may be obtained from the Registrar's Office or the MUO. The normal deadline for initiating an appeal is six months after the completion of the course. Students should be aware that a grade may decrease as a result of a request for a re-mark. In deciding whether to request a re-mark, students should note that failing grades are automatically reviewed by the instructor. In addition, in a multi-section course, final examinations are normally marked in common by all instructors so that students in all sections are treated fairly.

If, following a grade appeal, a student has serious concerns about how her/his grade was assigned, he/she should discuss the matter with the Associate Dean for Undergraduate Studies. In such a situation, the University Student Appeals Policy permits a student to request a formal reassessment.

A copy of the official Student Appeal Policy and Procedures document may be obtained from the Associate Dean for Undergraduate Studies.

8. VOLUNTARY WITHDRAWAL FROM A TERM
Any student may voluntarily withdraw within the first four weeks of the term, in accordance with the course drop policy. A student who withdraws late will normally receive grades of DNW in all courses for that term.

A first-year student who has never been previously registered at a degree-granting post-secondary institution will normally be permitted to withdraw from all her/his courses without academic penalty as late as the last official day of lectures for her/his first term.

Such students must re-apply for admission for a subsequent term, thereby competing with new applicants for admission.

A Mathematics student who has completed at least one term of study and who has been inactive (not registered) for more than four consecutive academic terms must apply for re-admission by writing to the Assistant Registrar, Faculty of Mathematics. A resume covering the inactive period, including official transcripts from any post-secondary institutions attended in the interim, must be included. If the student is re-admitted, Faculty policies in effect at the time of re-admission will apply, unless stated otherwise by the Faculty when re-admission is approved.

9. PETITIONS AND THE STANDINGS AND PROMOTIONS (S&P) COMMITTEE
On occasion, due to illness or other circumstances beyond a student's control, it may be appropriate for a student to make a petition requesting that an exception be made to a Faculty or University regulation. All such petitions are considered by the S&P Committee, which consists of a representative from each department and each area of study, and is chaired by the Associate Dean for Undergraduate Studies. Petitions should be made on a "Form D," obtainable from the Mathematics Undergraduate Office, and should be submitted to the Registrar's Office together with supporting documents (e.g., a medical certificate). It is often useful to discuss the situation with an Academic Advisor before making a petition.
The S&P Committee may assign a course grade of WD (withdrew after the course drop deadline — counts as a course attempt, but does not affect averages). This decision is made when extenuating circumstances warrant making an exception to the course drop policy, but when it is not appropriate to permit the student to remove the course from her/his record.

10. ILLNESS

10.1 Illness During the Term
If a student becomes seriously ill during the term, it may be desirable for her/his course load to be reduced or for the student to withdraw completely from the academic term. If this occurs after the official course drop deadline, the student should submit a petition to the S&P Committee, supported by a medical certificate, requesting permission to drop one or more courses. It is essential for the student to assess the situation and take the appropriate action immediately. Petitions of this nature must be made before the end of the lecture period.

10.2 Illness During the Exam Period
i) If a student becomes ill during the exam period and as a result has to miss an exam, he/she must provide a medical certificate to the Mathematics Undergraduate Office (MUO) preferably before the exam, but no later than the end of the exam period. The MUO staff will send a copy of the certificate to the appropriate instructor(s). An instructor will normally assign a grade of INC (Incomplete) for the affected course and 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).
ii) 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.

10.3 Medical Certificates
The certificate should describe the nature of the illness, the degree of incapacity, and the precise period of absence or incapacitation.

11. POLICIES CONCERNING COURSES

11.1 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.

11.2 Adding Courses
The last day to add a course is two weeks after the official beginning of lectures.

11.3 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.

11.4 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. 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. Lists of these courses are published annually in the “How to get around in Mathematical Circles” booklet, available in the Mathematics Undergraduate Office. It is the student’s responsibility to be aware of the contents of these lists.

11.5 Correspondence Courses
A student who is registered full-time in the Faculty of Mathematics may not normally enrol in a correspondence course that term. However, correspondence 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 be taken by correspondence.

11.6 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 Stands and Promotions (S&P) Committee will not normally 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.

12 CO-OP REGULATIONS

12.1 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 54). 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.

12.2 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.

13. TRANSFER STUDENTS

13.1 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.

13.2 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.

13.3 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

Teamwork in one of UW's Science labs.
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 2200 undergraduates and 325 graduate students pursuing full-time studies, and another 1500 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 programs, and four-year Honours and three-year General non-specialized programs. In addition, an Honours BSc in Psychology is offered in co-ordination with the Department of Psychology. A small number of students may be accepted into the BSc Psychology program in Co-operative 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. 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.

Science

Admission

Program and Course Selection

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 (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.

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 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.

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.

Since 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 also applies to courses offered by various departments throughout the University which sometimes deal with similar subject matter (e.g. STAT 204 or PSYCH 200).

Correspondence Courses
Only in exceptional cases should correspondence 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 correspondence courses on a part-time basis. Only in exceptional cases can Honours students take a core-course by correspondence and they cannot take a correspondence course in order to reduce course-load in a term in which they are a full-time student.

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 their 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.

A course taken on a Letter of Permission will be given credit with no grade assigned as long as the mark obtained is 60% or better.

Audit
The Faculty of Science does not record nor recognize audits for students in Science or any other Faculty.

Enrolment In a Graduate Course
A student may obtain credit toward a graduate degree in the Faculty of Science for normally not more than 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 degree may be taken on a complete-ly part-time or reduced program basis. The Honours Science - Program One degree may be taken on a part-time or reduced program basis if permission is granted by the Examinations and Standings Committee. Normally all other Faculty of Science degrees must be completed (fourth-year) in full-time study, and either the second or third year must also be carried out in full-time study. In order to be considered in full-time study, a student must be taking a minimum of five credits in one academic year.

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.

Only in exceptional circumstances may a first-year program for a full-time student be reduced below the five lecture course minimum.

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 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 advanced 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 averages. If a passing grade is achieved more than once in the same course, it will still only count as one course passed towards the total necessary for graduation. Students in good standing will not normally repeat courses they have passed.

6. No course or its equivalent may be repeated more than once.

7. All examinations which receive a failing grade are automatically re-read.

8. Make-up examination privileges may be granted to students in good standing where failure to pass is attributable to extraordinary circumstances, especially medical or health-related problems. The student must have satisfied all term-work requirements in the course and must have the permission of the Examinations and Standings Committee.

Co-operative Program Evaluation
Students in Co-operative programs will be evaluated by the rules shown, modified where necessary to suit their special needs. In particular:

1. Evaluation in Year One will be made at the end of term 1B on the entire year's work. Students not meeting requirements of their program will be transferred to another Science program (Regular system) in good standing, if possible.

2. Assessment will be made on a term-by-term basis during Years Two and Three. Terms 4A and 4B will normally be assessed as a unit at the end of the 4B term when both terms are taken consecutively from September to April. Normally a student may take no more than two upper year terms on a part-time or reduced program basis and must have special permission from their 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 recorded on the marks report and permanent transcript but for averaging purposes a grade of 32 will be used, equivalent to the weighting factor for the F- on the common system.

Conditional Standing
A student who marginally fails to meet the required standards of any program will be placed on conditional standing for one term only. During this period the student must regain standing in that program or withdraw from it.
Conditional standing will be granted only once in any particular program.

Required to Withdraw
A student will normally be required to withdraw from the Faculty of Science after failing more than 2.0 credits in any academic year (or equivalent), or after failing to achieve an overall cumulative average of at least 55% and a cumulative average of 55% in all Science courses, or if unlikely to profit from further study, in the opinion of the Examination and Standings Committee.

Students who have been “Required to Withdraw” from the Faculty of Science may not apply for re-admission for at least two academic terms.

After two terms have elapsed, a formal application may be submitted to the Registrar’s Office. Applicants must include a typewritten statement along with their application outlining why they are now likely to succeed, and a supporting letter from, for example, an employer, religious leader, or professional person.

Re-admission is not automatic. All such applicants will be assessed in competition with new applicants and on the probability of their future success.

Re-admission when granted will be with conditional standing.

Terminology
INC (either term work, lab work, examination, etc., are incomplete). A course for which the grade designation INC has been given must be completed within two terms of taking the course or the INC automatically becomes a mark of 32. If a graduating student has an INC, it will be recorded as 32 on the transcript. Students should not 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.

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.

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 page 1:10 for more details.
### YEAR ONE SCIENCE PROGRAM SELECTIONS — Regular Programs

<table>
<thead>
<tr>
<th><strong>Major Field of Study</strong></th>
<th><strong>Required Courses in Year One</strong></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 and 120L/123L, CS 102</td>
</tr>
<tr>
<td>Biochemistry (see Notes 3 and 5)</td>
<td>BIOC 230, 239, MATH 127/128, CHEM 121/125 and 120L/123L, 129, PHYS 111/111L or 121/121L, and 112/112L</td>
</tr>
<tr>
<td>Biology and Chemistry</td>
<td>Two 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</td>
<td>Four 200-level term courses in Biology, CHEM 120/123 and 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 and 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 and 121/121L</td>
</tr>
<tr>
<td>Chemical Physics (see Note 5)</td>
<td>CHEM 121/125, 120L/123L, 129, PHYS 121/122, 121L/122L, 123, MATH 127/128, 125 or 136</td>
</tr>
<tr>
<td>Environmental Chemistry</td>
<td>CHEM 121/125 and 120L/123L, 129, PHYS 121/112 and 122L/112L, MATH 127/128, ENV S 195, two 200-level term courses in Biology</td>
</tr>
<tr>
<td>Earth Sciences (Geology Option) (see Note 3)</td>
<td>EARTH 121/122 and 121L/122L, CHEM 120/123 and 120L/123L, PHYS 121/122 and 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 and 121L/122L, CHEM 120/123 and 120L/123L, GEOG 101/102, CS 102. Either PHYS 111/112 and 111L/112L or BIOL 111/112 or equivalent elective</td>
</tr>
<tr>
<td>Environmental Science Program 1 (see Notes 3 and 5)</td>
<td>BIOC 211, 240, 250, CHEM 120/123, 120L/123L, 129, MATH 107/108 or 127/128, EARTH 121/121L</td>
</tr>
<tr>
<td>Environmental Science Program 2 (see Notes 3 and 5)</td>
<td>BIOC 240, 250, CHEM 120/123, 120L/123L, 129, PHYS 121/122, 121L/122L, MATH 127/128, ERS 241, EARTH 126</td>
</tr>
<tr>
<td>Optometry (consult page 14:30 for full list of prerequisites for admission to Optometry) (see Note 5)</td>
<td>BIOC 230, 231, CHEM 120/123 and 120L/123L, PHYS 121/122 and 121L/122L, MATH 107/108, PSYCH 101</td>
</tr>
<tr>
<td>Physics (see Notes 1 and 5)</td>
<td>PHYS 121/122, 121L/122L, 123, MATH 125/126, 127/128, CHEM 120/123, 120L/123L</td>
</tr>
<tr>
<td>Psychology</td>
<td>Two 200-level term courses in Biology, CHEM 120/123 and 120L/123L, PHYS 111/112, 111L/112L or 121/122 and 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, BUS 121W, CS 102</td>
</tr>
<tr>
<td>General Science, Honours Science non-major</td>
<td>2.0 Science lecture credits from the courses offered to Year One students in Biology</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 and 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 and 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)</td>
<td>EARTH 123/126, CHEM 120/123 and 120L/123L, PHYS 121/122 and 121L/122L, MATH 107/108, CS 102</td>
</tr>
<tr>
<td>Applied Earth Sciences (Geology Option)</td>
<td>EARTH 121/122 and 121L/122L, CHEM 120/123 and 120L/123L, PHYS 121/122 and 121L/122L, CS 102, MATH 107/108</td>
</tr>
<tr>
<td>Applied Earth Sciences (Geophysics Option)</td>
<td>EARTH 121/122 and 121L/122L, MATH 127/128, PHYS 121/122 and 121L/122L, CHEM 120/123 and 120L/123L, CS 102, MATH 114 or 125</td>
</tr>
<tr>
<td>Applied Physics (see Notes 1, 2 and 5)</td>
<td>PHYS 121/122, 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.

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
   - Biochemistry (Ribochemistry Option): (This program begins in Year Three.) BIOL 240 in Year One
   - Biology and Environment and Resource Studies: (This program begins in Year Two.) one ERS course each term Chemistry (Math Option): (This program begins in Year Two.) MATH 125 in Year One and one CS elective in Year One or Year Two
   - Chemical Physics: ENGL 109, 140; PHIL 215
   - Environmental Science Program 1: BIOL 241, 273, CS 102, GEOG 102
   - Optometry: SOC 101 or one PSYCH 102A-K offering
   - Physics: Year One Chemistry may be replaced by Year One Biology or Earth Sciences courses.
   - 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 who have completed Year Two or Three of the three-year program with credit in the required courses are qualified to apply for admission to dental or medical schools in Ontario.

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.

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 MATH.

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.

In addition, normally no more than 7.0 credits can be from any one department (for example, 7.0 Biology credits, or 7.0 English credits). Students are encouraged to take at least 2.0 credits from non-science areas, such as Arts or Mathematics.

Normally, 5.0 lecture credits per year are taken.

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 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 or PHYS 121/122 plus labs.
It is recommended that the required MATH 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.

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.

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 five programs available that will lead to the degree of Bachelor of Science (Honours Science), plus an Honours Science and Business program and Environmental Science with a variety of themes. They are:
Program 1: Non-specialized (see below).
Program 2: Biology specialization (see page 14:18).
Program 3: Chemistry specialization (see page 14:27).
Program 4: Earth Sciences specialization (see page 14:31).
Honours Science and Business (see page 14:9).
Honours Environmental Science (see page 14:10).

Honours Science Program One (Non-Specialized)
Admission to, and continuance in, Honours Science Program One 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, of which 8.0 must be at or above the 200-level, and at least 4.0 of them other than any SCI credits must be at the 300- or 400-level.
2. At least 1.0 credit must be in MATH.
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. Unless permission to pursue this degree in part-time status has been granted by the Admissions Committee of the Faculty of Science, 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. Year Four of the program must be taken at the University of Waterloo.

The Admissions Committee may approve part-time status in this program for mature students if other commitments (e.g. employment) prevent full-time study. Approval will not be granted unless adequate 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 or PHYS 121/122 plus labs.

† First year Chemistry, Physics, and Earth labs cannot be used for credit towards an Honours Science Program One degree.

Liberal Science Option
Students in any UW program may enrol in the Liberal Science Option. This Option provides an opportunity to gain some generalist education in science, and to address a number of aspects of the interaction of science and technology with society. If the requirements are fulfilled, the Option will be recorded on students' transcripts upon graduation.

Students considering the Liberal Science Option should record their proposed Option program for approval by the Liberal Science Advisor in the Science Undergraduate Office.

In order to have a Liberal Science Option recorded, the following requirement must be met: successful completion of six approved term courses with an average of 60%, including:

1. three Liberal Science core courses or approved alternatives.
2. three other term courses proposed by the student and approved.

Students will submit written statements showing how the three Liberal Science core courses and three other courses form a coherent Option related to their main program and overall educational plans. Appropriate courses may be found both in regular academic departments and in interdisciplinary programs such as Women's Studies, and Society, Technology and Values.

Liberal Science Core Courses
SCI 260, 261, 263, 265, 267, 268A-Z

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.
Honours Programs

**Science Honours Programs**

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 of which 8.0 must be at or above the 200-level, and at least 4.0 of them 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. 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. Year Four of the program must be taken at the University of Waterloo.

5. 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

   **Year Two**†
   ECON 101, 102; ACC 121, 122 (or BUS 227W and 247W instead of ACC 121, 122); CS 212; one first-year Science course*

   **Year Three**†
   M SCI 211, 331; CS 330

   **Year Four**†
   M SCI 431 or 432

   * first-year Science courses are any two 200-level 0.5 credit Biology courses
   CHEM 120/120L, 123/123L or 121/121L, 125/125L
   EARTH 121/122 and 121L/122L
   PHYS 121/121L, 122/122L or 111/111L, 112/112L, or 121/121L, 112/112L

   ** 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, M SCI 311, M SCI 461, BUS 352W, BUS 454W

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**Honours Environmental Science**

Program 1 Advisor: Professor D. Barton (Biology)
Program 2 Advisor: Professor J.J. Sloan (Chemistry)

Admission to, and continuance in, all 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, of which at least 8.0 must be at or above the 200-level, and at least 4.0 of them 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.

4. Year Four and at least one of Years Two and Three must be taken in full-time study, and Year Four must be taken at the University of Waterloo.

**Program 1**: Fundamental science and current environmental concerns. The emphasis is on knowledge and skills needed to solve complex problems. This choice permits the greatest personal selection of courses to support individual student goals.

**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.

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**Environmental Science Program 1**

**Year One**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>BIOL 211</td>
<td>Introductory Vertebrate Zoology</td>
</tr>
<tr>
<td>BIOL 240</td>
<td>Fundamentals of Microbiology</td>
</tr>
<tr>
<td>BIOL 250</td>
<td>Ecology</td>
</tr>
<tr>
<td>CHEM 120</td>
<td>Physical and Chemical Properties of Matter</td>
</tr>
<tr>
<td>CHEM 120L</td>
<td>Chemical Reaction Laboratory 1</td>
</tr>
<tr>
<td>CHEM 123</td>
<td>Chemical Reactions, Equilibria and Kinetics</td>
</tr>
<tr>
<td>CHEM 123L</td>
<td>Chemical Reaction Laboratory 2</td>
</tr>
<tr>
<td>CHEM 129</td>
<td>Introductory Spectroscopy</td>
</tr>
<tr>
<td>EARTH 121</td>
<td>The Planet We Live On</td>
</tr>
<tr>
<td>EARTH 121L</td>
<td>Introduction to Earth Sciences Laboratory 1</td>
</tr>
<tr>
<td>MATH 107/108</td>
<td>Calculus 1 and 2</td>
</tr>
<tr>
<td>MATH 127/128</td>
<td>Calculus 1 and 2</td>
</tr>
<tr>
<td>BUS 352W</td>
<td>One elective (0.5 credit)</td>
</tr>
</tbody>
</table>

**Recommended Electives**: BIOL 241, 273; CS 102; STAT 202; GEOG 102
### Year Two

- **BIOL 210** Introductory Invertebrate Zoology
- **BIOL 221** Plant Biology 2 – The Diversity of Plants
- **CHEM 223** Introductory Biochemistry
- **CHEM 266** Basic Organic Chemistry 1
- **CHEM 223** Analytical Chemistry
- **CHEM 223L** Analytical Chemistry Laboratory 1
- **ENV S 201** Introduction to Environmental and Planning Law
- **ERS 241** Introduction to Environmental and Social Impact Assessment
- **GEOG 201** Geomorphology and Soils or **EARTH 342** Applied Geomorphology

Two electives (1.0 credit)

**Recommended Elective:** BIOL 241

### Years Three and Four

- **BIOL 454** Environmental Toxicology 1
- **BIOL 457** Analysis of Communities
- **CHEM 254** Chemical Thermodynamics 1
- **CHEM 357** Physical Biochemistry
- **CIV E 376** Water Quality Engineering
- **EARTH 123** Introduction to Hydrology
- **EARTH 358** Environmental Geology for Earth Scientists

Thirteen electives (6.5 credits)

**Recommended Electives:** BIOL 447, 450, 455, 456; CIV E 472, 486; EARTH 342, 456, 458

**Note**

ENGL 210C is a strongly recommended elective in Year Two.

### Environmental Science Program 2

#### Year One

- PHYS 111/112 and 111L/112L added to Program 1

#### Year Two

- AM 250, BIOL 230, 241, CHEM 223/223L, 266; PHYS 222, 223

Two electives (1.0 credit)

**Recommended Electives:** MATH 215; PHYS 259

#### Years Three and Four

- BIOL 454; CHEM 254, 357; EARTH 123; PHYS 369; SCI 250

Fourteen electives (7.0 credits)

**Recommended Electives:** AM 251, 343; BIOL 456 or 457; CHEM 212, 303, 305, 313, 412; GEOG 102, 309; M E 351, 459, 571; PHYS 480

**Note**

ENGL 210C is a strongly recommended elective in Year Two.

### Environmental Science Program 3

#### Year One

- PHYS 111/112 and 111L/112L added to Program 1

#### Year Two

- AM 250, BIOL 230, 241; CHEM 223/223L, 266; PHYS 222, 223

Two electives (1.0 credit)

**Recommended Electives:** MATH 215; PHYS 259

#### Years Three and Four

- BIOL 454; CHEM 254, 357; EARTH 123; PHYS 369; SCI 250

Fourteen electives (7.0 credits)

**Recommended Electives:** AM 251, 343; BIOL 456 or 457; CHEM 212, 303, 305, 313, 412; GEOG 102, 309; M E 351, 459, 571; PHYS 480

**Note**

ENGL 210C is a strongly recommended elective in Year Two.

### DEPARTMENTAL PROGRAMS

#### Biology

The following programs are offered in the Biology department:

**Honours Major Programs**

**Regular:**

- Honours Biology
- Honours Biochemistry
- Honours Biochemistry (Biotechnology Option)
- Honours Biology and Chemistry
- Honours Biology/Business Economics
- Honours Biology and Environment and Resource Studies
- Honours Biology and Geography
Co-operative:
Honours Co-operative Biology
Honours Co-operative Biochemistry
Honours Co-operative Biochemistry (Biotechnology Option)
Honours Co-operative Biology and Chemistry
Honours Co-operative Biology/Business Economics
Honours Science Program Two (with specialization in Biology)
Honours Science Program Two (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. 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. Year Four of the program must be taken at the University of Waterloo.
5. 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.

Honours Biochemistry
Program Advisors: Professors L.J. Brubacher (Chemistry) and M. Globus (Biology)

This program allows specialization in either biochemistry with a chemical emphasis, or biochemistry with a physiological, molecular biological or microbiological emphasis. The program is also available in the Co-operative system of study.

Professional Standing: The program in Biochemistry fulfills the academic requirements for professional membership in the Chemical Institute of Canada.

Admission to, and continuance in, Honours Biochemistry requires a cumulative average of 60% and a cumulative average of 60% in Chemistry courses and 65% in Biology courses.

In order to graduate in the Honours Biochemistry program, the following requirements must be met:

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 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

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 14.29). 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.
1. Successful completion of 22.75 credits (including all required labs in Chemistry and Physics).

2. 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. Year Four of the program must be taken at the University of Waterloo.

3. Mandatory courses as listed below.

4. 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.

\[
\begin{align*}
\text{Year One} \\
\text{ BIOL 230, 239} \\
\text{ CHEM 121/120L and 125/123L, 129} \\
\text{ PHYS 121/121L or 111/111L, and 112/112L} \\
\text{ MATH 127/128} \\
\text{ Elective (0.5 credit)} \\
\text{ Year Two} \\
\text{ 1.5 credits from 200-level Biology courses} \\
\text{ CHEM 212, 223, 223L, 224L, 254, 264, 265, 265L} \\
\text{ STAT 202} \\
\text{ Elective (0.5 credit)} \\
\text{ Year Three} \\
\text{ BIOL 436, 437} \\
\text{ CHEM 233, 333, 334L, 357, 368, 368L} \\
\text{ Four electives* (2.0 credits) from Groups below} \\
\text{ CHEM 233 and 333 are to be taken concurrently in the Fall term.} \\
\text{ Year Four} \\
\text{ Ten electives* (5.0 credits)† from Groups below} \\
\text{ * Years Three and Four electives (7.0 credits from Groups A, B,} \\
\text{ and C, with at least 5.5 credits from Groups A and B, of which} \\
\text{ not less than 4.0 credits are from Group A.)} \\
\text{ Group A} \\
\text{ BIOL 428, 432X, 433X, 434, 438, 439, 440, 441, 442, 499A/B} \\
\text{ CHEM 432, 433, 434, 435, 492A/B†} \\
\text{ Group B} \\
\text{ BIOL 402, 403, 404, 423, 427X, 443, 444, 445, 449, 454,} \\
\text{ 455, 470, 471, 473X} \\
\text{ CHEM 312, 313, 323, 411, 412, 413, 425, 454, 465} \\
\text{ PHYS 381, 480} \\
\text{ Group C} \\
\text{ Free electives (not more than 1.5 credits)} \\
\text{ † Students electing CHEM 492A/B must earn 7.5 credits from} \\
\text{ groups A, B and C, with 5.5 credits in Year Four.} \\
\end{align*}
\]

Honours Biochemistry (Biotechnology Option)
For program information see page 14:16.

Honours Biology and Chemistry
For program information see page 14:17.

Honours Biology/Business Economics

Program Advisors: Professor M. Glouss (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 85%, 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. 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. Year Four of the program must be taken at the University of Waterloo.

7. Mandatory courses are listed below.

\[
\begin{align*}
\text{Year One} \\
2.0 Biology credits from: BIOL 210, 211, 220, 221, 230, 239, 240, 241, 250, 273 \\
\text{ CHEM 120/120L and 123/123L} \\
\text{ ECON 101 and 102} \\
\text{ ACC 123} \\
\text{ CS 102*} \\
\end{align*}
\]
Year Two
2.0 Biology credits from: BIOL 210, 211, 220, 221, 230, 239, 240, 241, 250, 273
CHEM 266/266L and 237/237L
ECON 201, 202, 211 and 221

Year Three
2.5 credits in Biology at the 400-level
ECON 231, and 355 or 344 (WLU)
ACC 231
0.5 credit from the following: ECON 301, 302, 321, 341, 344, 345, 361, 401, 402, 403, BUS 352W"
plus 0.5 credit elective (ENGL 209 is recommended)

Year Four
2.5 credits in Biology at the 400-level
2.0 credits from ECON 301, 302, 321, 341, 344, 345, 361, 401, 402, 403, BUS 352W"
plus 0.5 credit elective

* Students with no computer literacy should take CS 100 before CS 102.
** BUS 352W is recommended.

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. 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. 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)

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<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>
<td>BIOL 240</td>
<td>200-level credits</td>
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<tr>
<td>CHEM 120/120L</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>
<td>Year 2A</td>
<td>Work Term</td>
<td>Year 2B</td>
</tr>
<tr>
<td>BIOL - 1.0 200-level credit</td>
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<tr>
<td>CHEM 266†/266L</td>
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<td>CHEM 228†</td>
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<tr>
<td>CHEM 237/237L</td>
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<tr>
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<td>Year 3A</td>
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<tr>
<td>BIOL - 1.5 or 2.0 400-level credits</td>
<td>Electives - 1.0 credit</td>
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<td>Work Term</td>
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<td>BIOL - 1.5 or 2.0 400-level credits</td>
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<tr>
<td>Electives - 0.5 credit</td>
<td>(Biochemistry courses are recommended)</td>
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### Stream 4 and Stream 8
(Students who take Year 1B during Spring Term)

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<tbody>
<tr>
<td>Year 1A</td>
<td>Work Term</td>
<td>Year 1B</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>
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<tr>
<td>CHEM 120/120L</td>
<td>CHEM 123/123L</td>
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<tr>
<td>Electives - 1.0 credit</td>
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<tr>
<td>Work Term</td>
<td>Year 2A</td>
<td>Work Term</td>
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<tr>
<td>CHEM 266†/266L</td>
<td>Electives - 1.0 or 0.5 credit</td>
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<td>STAT 202</td>
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<tr>
<td>Work Term</td>
<td>Year 3A</td>
<td>Work Term</td>
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<tr>
<td>BIOL - 1.5 or 2.0 400-level credits</td>
<td>Electives - 0.5 credit</td>
<td>(CHEM 267† or CHEM 333 are recommended)</td>
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### Stream 4 and Stream 8
(Students who take Year 1B during Spring Term)

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<th>Spring</th>
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<tbody>
<tr>
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<td>Year 4B</td>
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<td>Electives - 1.0 credit</td>
<td>(Biochemistry courses are recommended)</td>
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<td>(Biochemistry courses are recommended)</td>
<td>(Biochemistry courses are recommended)</td>
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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 1427). 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, Co-operative 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.

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**Honours Co-operative Biochemistry**

Program Advisors: Professor L.J. Brubacher (Chemistry) and Professor M. Globus (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. Mandatory courses as listed below.
3. 7.0† credits from recommended Years Three and Four electives.
4. Four satisfactory work-term reports.

**Note**

Students should be aware that BIOL 239 must be taken in the Winter term, or in the Spring term of an even-numbered year. Students who elect to take BIOL 240 and 241 are advised that the preferred sequence is BIOL 240 followed by 241.
### Stream 8
(Students who take Year 1B in Winter Term)

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<td>Year 1B</td>
<td>Work Term</td>
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<td>BIOL 239</td>
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<td>CHEM 129</td>
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<td>CHEM 224L, 233</td>
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<tr>
<td>CHEM 333/334L</td>
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### Stream 4 and Stream 8
(Students who take Year 1B in Spring Term)

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<td>Year 1B</td>
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<tr>
<td>200-level credit</td>
<td>CHEM 125/123L</td>
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<td>CHEM 212</td>
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<td>PHYS 121/121L or 111/111L</td>
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<td>MATH 127</td>
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<td>CHEM 264</td>
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<th>Year 3A</th>
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<td>CHEM 254</td>
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<td>CHEM 265/265L</td>
<td>CHEM 368/368L</td>
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<tr>
<td>STAT 202</td>
<td>Electives* (0.5 credit)</td>
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<tr>
<td>BIOL 436</td>
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<tr>
<td>CHEM 357/334L</td>
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<tbody>
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<td>BIOL 457</td>
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<tr>
<td>BIOL 454</td>
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<tr>
<td>CHEM 333/334L</td>
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<tr>
<td>STAT 202</td>
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### 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 in place of the free elective, BIOL 273 in Year 1B as the BIOL elective, a free elective in Year 2A in place of the BIOL elective, and BIOL 241 in Year 2B as the BIOL elective.
Stream 4

In Years One and Two, this Option follows the same sequence of courses as in the Honours Co-operative Biochemistry program, except that students must include BIOL 240, 241, and 273 in their program. Students should take BIOL 240 in Year 1A, BIOL 273 in Year 1B, and BIOL 241 in Year 2A as the BIOL electives.

<table>
<thead>
<tr>
<th>Fall</th>
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<th>Spring</th>
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<tbody>
<tr>
<td>Year 2B</td>
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<td>BIOL 441</td>
<td>CHEM 333</td>
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<td>BIOL 273</td>
<td>CHEM 368/368L</td>
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</table>

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. 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. Year Four of the program must be taken at the University of Waterloo.
3. Mandatory courses as listed below.
4. 2.0 credits from Years Three and Four electives*.
5. 2.0 credits free electives.

Stream 4 and Stream 8

<table>
<thead>
<tr>
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<tbody>
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<tr>
<td>BIOL 432X</td>
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<tr>
<th>Fall</th>
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<tbody>
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<td>Year 3A</td>
<td>Year 3B</td>
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<td>BIOL 436</td>
<td>BIOL 440</td>
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<td>BIOL 273</td>
<td>CHEM 368/368L</td>
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<tbody>
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<td>Year IB</td>
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<td>MATH 128</td>
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<td>MATH 127</td>
<td>Elective (0.5 credit)</td>
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</table>

Students electing CHEM 492A/B must earn 5.0 credits from Groups A, B and C, with 5.5 credits in Year Four.

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.
Stream 4

Students who take Year 1B in Spring Term

<table>
<thead>
<tr>
<th>Fall</th>
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<tbody>
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<td>BIOL - 1.0</td>
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<td>CHEM 121/120L</td>
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<td>BIOL - 0.5</td>
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<th>Year 2A</th>
<th>Work Term</th>
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<td>200-level credit</td>
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<th>Year 3B</th>
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Stream 4 and Stream 8

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<tr>
<th>Year</th>
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<th>CHEM 312</th>
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* Selected from 400-level BIOL courses or CHEM 313, 323, 411, 412, 413, 425, 432, 433, 434, 435, 464, 465, 462A/B
† Students electing CHEM 492A/B must earn 2.5 credits from the electives* above.

Honours Co-operative Biology/Business Economics

Program Advisors: Professor M. Globus (Biology) and Professor E. Carvalho (Economics). See page 14:13.

HONOURS SCIENCE PROGRAM TWO

(With Specialization in Biology)

Program Advisors: Professors D. Barton, W.R. Hawthorn, M. Griffith, R. 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 21.5 credits. Of the 21.5 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. 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. Year Four of the program must be taken at the University of Waterloo.

6. 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 14-29). 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 SCIENCE PROGRAM TWO
(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 21.5 credits; of the 21.5 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. 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. Year Four of the program must be taken at the University of Waterloo.

4. Mandatory courses as listed below.

5. A minimum of 4.0 lecture credits from the recommended electives.

6. For students interested in Optometry at the University of Waterloo, consult page 14.35 for requirements.
<table>
<thead>
<tr>
<th>Year 1 (Fall)</th>
<th>Year 1 (Winter)</th>
</tr>
</thead>
<tbody>
<tr>
<td>BIOL 230</td>
<td>BIOL 241</td>
</tr>
<tr>
<td>BIOL 240</td>
<td>BIOL 273</td>
</tr>
<tr>
<td>CHEM 120/120L</td>
<td>CHEM 123/123L</td>
</tr>
<tr>
<td>PHYS 111/111L or PHYS 121/121L</td>
<td>PHYS 112/112L</td>
</tr>
<tr>
<td>0.5 credit elective</td>
<td>0.5 credit elective</td>
</tr>
</tbody>
</table>

**Recommended electives:**
HLTH 101, PSYCH 101

<table>
<thead>
<tr>
<th>Year 2 (Fall)</th>
<th>Year 2 (Winter)</th>
</tr>
</thead>
<tbody>
<tr>
<td>BIOL 201</td>
<td>BIOL 239</td>
</tr>
<tr>
<td>BIOL 470*</td>
<td>BIOL 471</td>
</tr>
<tr>
<td>CHEM 266†/266L</td>
<td>CHEM 237†/237L</td>
</tr>
<tr>
<td>STAT 202</td>
<td>CS 102</td>
</tr>
<tr>
<td>0.5 credit elective</td>
<td>0.5 credit elective</td>
</tr>
</tbody>
</table>

**Recommended electives:**
HLTH 220, SOC 248, 249

<table>
<thead>
<tr>
<th>Year 3 (Fall)</th>
<th>Year 3 (Winter)</th>
</tr>
</thead>
<tbody>
<tr>
<td>BIOL 402</td>
<td>BIOL 404</td>
</tr>
<tr>
<td>BIOL 437</td>
<td>BIOL 436</td>
</tr>
<tr>
<td>BIOL 441</td>
<td>CHEM 267†/267L</td>
</tr>
<tr>
<td>PHYS 480</td>
<td>1.0 credit elective</td>
</tr>
<tr>
<td>0.5 credit elective</td>
<td></td>
</tr>
</tbody>
</table>

**Recommended electives:**
KIN 300, HLTH 341, 349

**Recommended electives:**
HLTH 346, 348, 340
PSYCH 361, 335, 357

<table>
<thead>
<tr>
<th>Year 4 (Fall)</th>
<th>Year 4 (Winter)</th>
</tr>
</thead>
<tbody>
<tr>
<td>BIOL 403</td>
<td>BIOL 442</td>
</tr>
<tr>
<td>CHEM 333</td>
<td>BIOL 444</td>
</tr>
<tr>
<td>0.5 credit Science</td>
<td>1.0 credit elective</td>
</tr>
<tr>
<td>1.5 credit elective</td>
<td></td>
</tr>
</tbody>
</table>

**Recommended electives:**
HLTH 442
KIN 410, 416, HLTH 407, BIOL 439, PHYS 481

**Recommended electives:**
PSYCH 361, SCI 255

**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 Two (Pre-Health-Professions Option).

† Students contemplating a "Minor in Chemistry" must take Honours-level Chemistry courses (see page 1429). CHEM 266, 267 and 228 will not count towards the Minor; the appropriate acceptable courses are CHEM 264, 265 and 223223L 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 14:12)*
- Honours Biochemistry (Biotechnology Option) (joint with Biology Department, see page 14:16)*
- 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 14:15)*
- Honours Co-operative Biochemistry (Biotechnology Option) (joint with Biology Department, see page 14:16)*
- 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*  # Honours Science Program Three (with specialization in Chemistry)

Minor in Chemistry

* These programs fulfill the academic requirements for professional membership in the Chemical Institute of Canada.

Program Flexibility for Excellent Students

An excellent student in second or third year in any Honours Chemistry program, Co-operative or Regular, may propose a variation in the schedule of courses required for the degree. Proposals are entertained at the end of each term from students who have a cumulative Chemistry average of 80% and a cumulative average over all courses of 80%. Academic performance is reviewed each term by an advisory committee.

Notes to all Honours Chemistry Students

1. Honours Chemistry students (all programs) may not elect to take these courses for degree credit:
   - CHEM 218, 219, 228, 266, 267, 316, 366.
2. Courses numbered 3XX are senior courses required for some major programs and normally taken in Year Three. They may be taken as senior electives by students in other programs.
3. Courses numbered 4XX (except for CHEM 492A/B) are senior elective courses not mandatory in any program. They may be taken in either Year Three or Year Four.
4. 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

<table>
<thead>
<tr>
<th>Course No.</th>
<th>1993</th>
<th>1994</th>
<th>1995</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Fall</td>
<td>Winter</td>
<td>Spring</td>
</tr>
<tr>
<td>233</td>
<td>x</td>
<td></td>
<td>x</td>
</tr>
<tr>
<td>237</td>
<td>x</td>
<td>x</td>
<td></td>
</tr>
<tr>
<td>303</td>
<td></td>
<td>x</td>
<td></td>
</tr>
<tr>
<td>305</td>
<td>x</td>
<td></td>
<td></td>
</tr>
<tr>
<td>333</td>
<td>x</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td>407</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>411</td>
<td>x</td>
<td></td>
<td></td>
</tr>
<tr>
<td>* 412 (old 311)</td>
<td>x</td>
<td></td>
<td></td>
</tr>
<tr>
<td>** 413 A-Z</td>
<td>x</td>
<td></td>
<td></td>
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<tr>
<td>* 421</td>
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<td></td>
<td></td>
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<tr>
<td>* 422</td>
<td>x</td>
<td></td>
<td></td>
</tr>
<tr>
<td>425 A-Z</td>
<td>x</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td>432</td>
<td></td>
<td>x</td>
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<tr>
<td>433</td>
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<td>x</td>
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<tr>
<td>434</td>
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<td>435</td>
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<td>x</td>
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<tr>
<td>440</td>
<td></td>
<td>x</td>
<td></td>
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<tr>
<td>450 (old 350)</td>
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<td>x</td>
<td></td>
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<tr>
<td>451 (old 354)</td>
<td></td>
<td>x</td>
<td></td>
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<tr>
<td>* 454</td>
<td>x</td>
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<td>* 455</td>
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<td>* 456</td>
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<tr>
<td>458</td>
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<td>x</td>
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<tr>
<td>* 463 (old 363)</td>
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<tr>
<td>464</td>
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<td>x</td>
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<tr>
<td>465A-B</td>
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<td></td>
<td></td>
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<tr>
<td>* 470 (old 353)</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>* 471 (old 453)</td>
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<td></td>
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<tr>
<td>PHYS 359</td>
<td></td>
<td>x</td>
<td></td>
</tr>
<tr>
<td>† CH E 036</td>
<td>x</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td>† CH E 574</td>
<td></td>
<td>x</td>
<td></td>
</tr>
<tr>
<td>BIOL 454</td>
<td></td>
<td>x</td>
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</tr>
<tr>
<td>EARTH 221</td>
<td>x</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td>EARTH 421</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>EARTH 459</td>
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</tr>
</tbody>
</table>

### Other Recommended Electives
- **Statistics**: STAT 204, 304, MTHEL 102
- **Environment**: ERS 337
- **Management Science**: MSCI 211
- **Economics**: ECON 101, 102, 201, 202
- **Computing**: CS 212, 230, GEN E 121
- **Writing**: ENGL 210A or C
- **Law**: PSCI 291, 292, ENV S 201, ACC 231
- **Business (WLU)**: BUS 352, 362, 363
- **Accounting**: ACC 121, 122
- **Microprocessors**: E & CE 222, 223, 427, PHYS 353
- **Critical Thinking**: PHIL 145

### Notes
- * Indicates recommendation for Applied Chemistry students.
- † Indicates special permission required from the Associate Chair for Undergraduate Studies in the Chemical Engineering Department
- ** Normally one of these courses will be offered each Winter term. See Undergraduate Advisor for details.
HONOURS MAJOR PROGRAMS – REGULAR

Honours Biochemistry
(see page 14:12)

Honours Biochemistry (Biotechnology Option)
(see page 14:16)

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 a cumulative average of 60% in all Chemistry lecture courses each term.

In order to graduate with an Honours Chemistry degree, the following requirements must be met:

1. Successful completion of 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 14:23).
3. In Year Two, students must take as their Physics elective, one of PHYS 222/252L (or 252/252L), or 256/256L, or 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 to be at the discretion of the Chemistry Undergraduate Committee and in exceptional circumstances only.
6. Students must have been enrolled full-time in Year Four, and in either Year Two or Three. Year Four of the program must be taken at the University of Waterloo.

7. 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 128
One elective (0.5 credit)

Year Two
Fall
CHEM 10, 223/223L, 254, 264
MATH 215 or 216
PHYS elective (0.75 credit) (Fall or Winter, see note 3 above)

Winter
CHEM 10, 212, 224L, 255, 265/265L
Two electives (1.0 credit)

Year Three
Fall*
CHEM 10, 312/312L, 355L, 359, 362
Two electives (1.0 credit)

Winter*
CHEM 10, 313, 323, 358/358L, 366/366L
One elective (0.5 credit)

Year Four
CHEM 10, 492A/B (1.5 credits)
Eight electives (4.0 credits)

* CHEM 312L, 355L and 366L may be taken in either of the 3A or 3B terms, and may be taken with, before or after CHEM 312, 358 and 368, respectively.

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 met:

1. Successful completion of 23.5 credits including 4.5 lab credits.
2. In Year Two students must take, as their Physics elective, one of PHYS 222/252L (or 252/252L), or 256/256L, or 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 to be at the discretion of the Chemistry Undergraduate Committee and in exceptional circumstances only.

5. The student must have been enrolled full-time in Year Four, and in either Year Two or Year Three. Year Four must be taken at the University of Waterloo.

6. Mandatory courses as listed below.

<table>
<thead>
<tr>
<th>Year One</th>
<th></th>
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</tr>
</thead>
<tbody>
<tr>
<td>Fall</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CHEM 121/120L</td>
<td></td>
<td></td>
</tr>
<tr>
<td>PHYS 121/121L</td>
<td></td>
<td></td>
</tr>
<tr>
<td>MATH 127, 114 (or 136, Winter)</td>
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<td></td>
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<tr>
<td>One CS elective (0.5 credit)</td>
<td></td>
<td></td>
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<tr>
<td>Winter</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CHEM 125/123L, 129</td>
<td></td>
<td></td>
</tr>
<tr>
<td>PHYS 112/112L</td>
<td></td>
<td></td>
</tr>
<tr>
<td>MATH 128</td>
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<td></td>
</tr>
<tr>
<td>One elective (0.5 credit)</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Year Two</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Fall</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CHEM 10, 223/223L, 254, 264</td>
<td></td>
<td></td>
</tr>
<tr>
<td>MATH 216</td>
<td></td>
<td></td>
</tr>
<tr>
<td>PHYS elective (0.75 credit) (Fall or Winter, see note 2 above)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Winter</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CHEM 10, 212, 224L, 256, 265/265L</td>
<td></td>
<td></td>
</tr>
<tr>
<td>MATH 210 or 213B or AM 231</td>
<td></td>
<td></td>
</tr>
<tr>
<td>One elective (0.5 credit)</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>Fall</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CHEM 10, 312, 355L, 358</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CS 212</td>
<td></td>
<td></td>
</tr>
<tr>
<td>PHYS 354</td>
<td></td>
<td></td>
</tr>
<tr>
<td>One elective (0.5 credit)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Winter</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CHEM 10, 312L, 358L, 359</td>
<td></td>
<td></td>
</tr>
<tr>
<td>PHYS 365</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Three electives (1.5 credits)</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Year Four</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>CHEM 10, 492A/B (1.5 credits)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Three Chemistry electives (1.5 credits) mainly from 400-level courses</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Three Mathematics electives (1.5 credits) from 300- or 400-level courses</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Two other electives (1.0 credit)</td>
<td></td>
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</tbody>
</table>

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.

<table>
<thead>
<tr>
<th>Years One and Two</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>As at present in any Honours Chemistry or Biochemistry program</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Years Three and Four</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>For students enrolled in any Honours Chemistry Program at the end of Year Two: CHEM 323 and completion of core course requirements in two of three subdisciplines outside the thesis area and one of CHEM 496A-E, plus research courses, CHEM 392A/B and CHEM 495A/B. (A typical sequence of required courses for a student completing a degree in this program and specializing in, for example, organic chemistry, would be CHEM 312/313, 358/359 and 496D).</td>
<td></td>
<td></td>
</tr>
<tr>
<td>For students enrolled in any Honours Biochemistry Program at the end of Year Two: CHEM 323, 357 and completion of core course requirements in two of three subdisciplines outside the thesis area and CHEM 496B, plus research courses, CHEM 392A/B and 495A/B. (A typical sequence of required courses for a student completing a degree in this program and specializing in biochemistry would be CHEM 312/313, 362/368 and 496B).</td>
<td></td>
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</tbody>
</table>

| Student performance is assessed by an Advisory Committee at the end of each academic term. Assessment is based on research-related activities (70%) and general knowledge of Chemistry (30%), and a satisfactory performance in each category will be required. |                |                           |

Honours Chemical Physics (Joint with Physics Department)
Program Advisors: Professor W.K. Liu (Physics) and Professor J.J. Sloan (Chemistry)

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 Sloan (Chemistry), and to Mr. R.A. Pullin of the Department of Co-operative Education and Career Services.

Admission to, and continuance in, this program requires an overall cumulative average of 60%. In addition, a 60% average must be obtained in all Mathematics, Chemistry and Physics courses attempted in each term.

In order to graduate from this program, the following requirements must be met:
1. Successful completion of 21.75 credits, including 4.0 laboratory credits.

2. Full-time enrolment in Year Four and either Year Two or Year Three. Year Four must be taken at the University of Waterloo.

3. Persons 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 to be at the discretion of the Chemistry Undergraduate Committee, and in exceptional circumstances only.

4. The courses identified in the core program must be taken. Students are encouraged to select electives from the lists of recommended electives, but other choices may be made in consultation with the program advisors.

**Year One**

<table>
<thead>
<tr>
<th>Term</th>
<th>Course Code</th>
<th>Course Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fall</td>
<td>PHYS 10</td>
<td>Physics 10</td>
</tr>
<tr>
<td></td>
<td>CHEM 121/120L</td>
<td>Chemistry 121/120L</td>
</tr>
<tr>
<td></td>
<td>PHYS 121/121L, 123</td>
<td>Physics 121/121L, 123</td>
</tr>
<tr>
<td></td>
<td>MATH 127, 125 or 136</td>
<td>Mathematics 127, 125 or 136</td>
</tr>
<tr>
<td>Winter</td>
<td>CHEM 125/123L, 129</td>
<td>Chemistry 125/123L, 129</td>
</tr>
<tr>
<td></td>
<td>PHYS 122/122L</td>
<td>Physics 122/122L</td>
</tr>
<tr>
<td></td>
<td>MATH 128</td>
<td>Mathematics 128</td>
</tr>
<tr>
<td></td>
<td>One elective (0.5 credit)</td>
<td>One elective (0.5 credit)</td>
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</tbody>
</table>

**Recommended Year One electives**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>ENGL 109</td>
<td>English 109</td>
</tr>
<tr>
<td>ENGL 140</td>
<td>English 140</td>
</tr>
<tr>
<td>PHIL 215</td>
<td>Philosophy 215</td>
</tr>
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</table>

**Year Two**

<table>
<thead>
<tr>
<th>Term</th>
<th>Course Code</th>
<th>Course Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fall</td>
<td>CHEM 10 or PHYS 10</td>
<td>Chemistry 10 or Physics 10</td>
</tr>
<tr>
<td></td>
<td>CHEM 212, 254</td>
<td>Chemistry 212, 254</td>
</tr>
<tr>
<td></td>
<td>PHYS 252/252L</td>
<td>Physics 252/252L</td>
</tr>
<tr>
<td></td>
<td>MATH 216</td>
<td>Mathematics 216</td>
</tr>
<tr>
<td></td>
<td>One elective (0.5 credit)</td>
<td>One elective (0.5 credit)</td>
</tr>
<tr>
<td>Winter</td>
<td>CHEM 10 or PHYS 10</td>
<td>Chemistry 10 or Physics 10</td>
</tr>
<tr>
<td></td>
<td>CHEM 256 or PHYS 234</td>
<td>Chemistry 256 or Physics 234</td>
</tr>
<tr>
<td></td>
<td>PHYS 253/253L</td>
<td>Physics 253/253L</td>
</tr>
<tr>
<td></td>
<td>MATH 210 or 213B</td>
<td>Mathematics 210 or 213B</td>
</tr>
<tr>
<td></td>
<td>Two electives (1.0 credit)</td>
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**Recommended Year Two electives**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Name</th>
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<tbody>
<tr>
<td>AM 251</td>
<td>American Studies 251</td>
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<tr>
<td>CHEM 223/223L, 224L</td>
<td>Chemistry 223/223L, 224L</td>
</tr>
<tr>
<td>MATH 213A</td>
<td>Mathematics 213A</td>
</tr>
<tr>
<td>PHYS 256/256L, 259/259L, 263</td>
<td>Physics 256/256L, 259/259L, 263</td>
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**Year Three**

<table>
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<tr>
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<th>Course Code</th>
<th>Course Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fall</td>
<td>CHEM 10 or PHYS 10</td>
<td>Chemistry 10 or Physics 10</td>
</tr>
<tr>
<td></td>
<td>CHEM 358</td>
<td>Chemistry 358</td>
</tr>
<tr>
<td></td>
<td>CHEM 359 or PHYS 359 (Winter term)</td>
<td>Chemistry 359 or Physics 359 (Winter term)</td>
</tr>
<tr>
<td></td>
<td>PHYS 350A or 355L</td>
<td>Physics 350A or 355L</td>
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<tr>
<td></td>
<td>PHYS 364</td>
<td>Physics 364</td>
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<table>
<thead>
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<th>Course Code</th>
<th>Course Name</th>
</tr>
</thead>
<tbody>
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<td></td>
<td>Two electives (1.0 credit)</td>
<td>Two electives (1.0 credit)</td>
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<tr>
<td></td>
<td>One elective (0.5 credit) plus CHEM 358</td>
<td>One elective (0.5 credit) plus CHEM 358</td>
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**Winter**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Name</th>
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</thead>
<tbody>
<tr>
<td>CHEM 10 or PHYS 10</td>
<td>Chemistry 10 or Physics 10</td>
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<td>CHEM 313/312L, 450</td>
<td>Chemistry 313/312L, 450</td>
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<tr>
<td>PHYS 359 or CHEM 358 (Fall term)</td>
<td>Physics 359 or Chemistry 358 (Fall term)</td>
</tr>
<tr>
<td>PHYS 360B or CHEM 358L</td>
<td>Physics 360B or Chemistry 358L</td>
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<td>Three electives (1.5 credit)</td>
<td>Three electives (1.5 credit)</td>
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<td>Two electives (1.0 credit) plus PHYS 359</td>
<td>Two electives (1.0 credit) plus Physics 359</td>
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**Year Four**

<table>
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<tr>
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<th>Course Code</th>
<th>Course Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fall</td>
<td>CHEM 10 or PHYS 10</td>
<td>Chemistry 10 or Physics 10</td>
</tr>
<tr>
<td></td>
<td>CHEM 312 or PHYS 435</td>
<td>Chemistry 312 or Physics 435</td>
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<tr>
<td></td>
<td>CHEM 458 or PHYS 434</td>
<td>Chemistry 458 or Physics 434</td>
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<tr>
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<td>CHEM 492A or PHYS 437A</td>
<td>Chemistry 492A or Physics 437A</td>
</tr>
<tr>
<td></td>
<td>One elective (0.5 credit)</td>
<td>One elective (0.5 credit)</td>
</tr>
<tr>
<td>Winter</td>
<td>CHEM 10 or PHYS 10</td>
<td>Chemistry 10 or Physics 10</td>
</tr>
<tr>
<td></td>
<td>CHEM 492B or PHYS 437B</td>
<td>Chemistry 492B or Physics 437B</td>
</tr>
<tr>
<td></td>
<td>Three electives (1.5 credits)</td>
<td>Three electives (1.5 credits)</td>
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**Recommended Year Three and Year Four electives**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Name</th>
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<tbody>
<tr>
<td>AM 252</td>
<td>American Studies 252</td>
</tr>
<tr>
<td>CHEM 323, 451, 454</td>
<td>Chemistry 323, 451, 454</td>
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</tbody>
</table>

**Honours Environmental Chemistry**

**Program Advisor:** Professor J.J. Sloan

Admission to, and continuance in, Honours Environmental Chemistry requires an overall cumulative average of 60%. In addition, a 60% average must be obtained in all Chemistry lecture courses each term. A 70% average is required in all Environmental Studies courses.

In order to graduate with an Honours Environmental Chemistry degree, the following requirements must be met:

1. Successful completion of 22.75 credits including 3.75 lab credits.

2. Students are encouraged to include in their program an ethics course such as STV 100, PHIL 215, 226, SCI 263, 265.

3. Failure of more than one course in the field of specialization will result in the requirement to withdraw from the program. Students may petition for re-admission; such re-admission is to be at the discretion of the Chemistry Undergraduate Committee and in exceptional circumstances only.

4. Students must have been enrolled full-time in Year Four, and in either Year Two or Three. Year Four of the program must be taken at the University of Waterloo.

5. Mandatory courses as listed below.
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 instead of four. 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 met:

1. Successful completion of 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 14:23).
3. In Year Two, students must take as their Physics elective one of PHYS 222/252L (or 252/252L), or 256/256L, or 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 to be at the discretion of the Chemistry Undergraduate Committee and in exceptional circumstances only.

6. Successful completion of a minimum of four work terms, and submission of a minimum of four satisfactory work reports.

7. Mandatory courses as listed below.

Stream 8

<table>
<thead>
<tr>
<th>Fall</th>
<th>Winter</th>
<th>Spring</th>
</tr>
</thead>
<tbody>
<tr>
<td>Year 1A</td>
<td>Year 1B</td>
<td>Work Term</td>
</tr>
<tr>
<td>CHEM 121/120L</td>
<td>CHEM 125/123L, 129</td>
<td></td>
</tr>
<tr>
<td>MATH 127</td>
<td>MATH 128</td>
<td></td>
</tr>
<tr>
<td>PHYS 121/121L</td>
<td>PHYS 112/112L</td>
<td></td>
</tr>
<tr>
<td>Two electives</td>
<td>One elective</td>
<td></td>
</tr>
<tr>
<td>(1.0 credit)</td>
<td>(0.5 credit)</td>
<td></td>
</tr>
</tbody>
</table>

Year 2A

| CHEM 10, 212, 223/223L, 254, 264 | CHEM 224L, 256/256L, 265/265L | CHEM 224L, 256/256L, 265/265L |
| MATH 215              | PHYS elective (see note 3 above) | Two electives (1.0 credit) |

Honours Co-operative Biochemistry
(see page 14:15)

Honours Co-operative Biochemistry (Biotechnology Option)
(see page 14:16)

Honours Co-operative Biology and Chemistry
(see page 14:17)
### Stream 4

<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>CHEM 121/120L</td>
<td>CHEM 125/123L, 129</td>
<td></td>
</tr>
<tr>
<td>MATH 127</td>
<td>MATH 128</td>
<td></td>
</tr>
<tr>
<td>PHYS 121/121L</td>
<td>PHYS 112/112L</td>
<td></td>
</tr>
<tr>
<td>Two electives</td>
<td>One elective (1.0 credit)</td>
<td></td>
</tr>
<tr>
<td>(1.0 credit)</td>
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<td></td>
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</tbody>
</table>

**Work Term**

<table>
<thead>
<tr>
<th>Year 2A</th>
<th>Year 2B</th>
</tr>
</thead>
<tbody>
<tr>
<td>CHEM 10, 212,</td>
<td>CHEM 224L, 256/355L, 265/265L</td>
</tr>
<tr>
<td>223/223L</td>
<td>PHYS elective (see note 3 above)</td>
</tr>
<tr>
<td>256, 264</td>
<td>Two electives (1.0 credit)</td>
</tr>
<tr>
<td>MATH 215</td>
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</tbody>
</table>

**Both Stream 4 and Stream 8**

<table>
<thead>
<tr>
<th>Work Term</th>
<th>Year 3A*</th>
<th>Work Term</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>CHEM 10, 313, 322, 358/358L, 368/368L</td>
<td>Year 3B</td>
</tr>
<tr>
<td></td>
<td>CHEM 10, 312/312L, 359, 362</td>
<td>CHEM 10, 492A/B</td>
</tr>
<tr>
<td>Two electives (1.0 credit)</td>
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<td>Eight electives (4.0 credits)</td>
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</table>

**Year 4 (Fall and Winter)**

<table>
<thead>
<tr>
<th>CHEM 10, 492A/B</th>
<th>CHEM 10, 212, 237/237L, 303</th>
</tr>
</thead>
<tbody>
<tr>
<td>CHEM 10, 359</td>
<td>ENV S 200 or ERS 241</td>
</tr>
<tr>
<td>GEOG 208</td>
<td>One elective (0.5 credit)</td>
</tr>
<tr>
<td>STAT 204</td>
<td></td>
</tr>
<tr>
<td>Two electives (1.0 credit)</td>
<td></td>
</tr>
</tbody>
</table>

*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, respectively.

### 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. A 70% average is required in all Environmental Studies courses.

In order to graduate with an Honours Co-operative Environmental Chemistry degree, the following requirements must be met:

1. Successful completion of 22.75 credits including 3.75 lab credits.
2. Students are encouraged to include in their program an ethics course such as STV 100, PHIL 215, 226, SCI 263, 265.
3. Failure of more than one course in the field of specialization will result in the requirement to withdraw from the program. Students may petition for re-admission; such re-admission is to be at the discretion of the Chemistry Undergraduate Committee and in exceptional circumstances only.

4. Students must have been enrolled full-time in Year Four, and in either Year Two or Three. Year Four of the program must be taken at the University of Waterloo.

5. Mandatory courses as listed below.

### Stream 8

<table>
<thead>
<tr>
<th>Fall</th>
<th>Winter</th>
<th>Spring</th>
</tr>
</thead>
<tbody>
<tr>
<td>Year 1A</td>
<td>Year 1B</td>
<td>Work Term</td>
</tr>
<tr>
<td>CHEM 121/120L</td>
<td>CHEM 125/123L, 129</td>
<td></td>
</tr>
<tr>
<td>ENVS 195</td>
<td>MATH 128</td>
<td></td>
</tr>
<tr>
<td>MATH 127</td>
<td>PHYS 112/112L</td>
<td></td>
</tr>
<tr>
<td>PHYS 121/121L</td>
<td>One 200-level Biology elective (0.5 credit) (BIOL 230, 240, 250 recommended)</td>
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<tr>
<td>One 200-level Biology elective (0.5 credit)</td>
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**Work Term**

<table>
<thead>
<tr>
<th>Year 2A</th>
<th>Year 2B</th>
<th>Work Term</th>
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</thead>
<tbody>
<tr>
<td>CHEM 10, 223/223L, 254, 264</td>
<td>CHEM 10, 224L, 256, 256/256L, 265/265L</td>
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</tr>
<tr>
<td>MATH 215 or AM 250</td>
<td>ENV S 200, ENGL 210C strongly recommended</td>
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<tr>
<td>ENV S 201 or ERS 241</td>
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<td></td>
</tr>
<tr>
<td>One elective (0.5 credit)</td>
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**Year 3B**

<table>
<thead>
<tr>
<th>CHEM 10, 359</th>
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<tbody>
<tr>
<td>GEOG 208</td>
<td>WORK Term</td>
</tr>
<tr>
<td>STAT 204</td>
<td>WORK Term</td>
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<td>Two electives (1.0 credit)</td>
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**Year 4 (Fall and Winter)**

<table>
<thead>
<tr>
<th>CHEM 10, 305, 492A/B</th>
<th>WORK Term</th>
</tr>
</thead>
<tbody>
<tr>
<td>Seven electives (3.5 credits)</td>
<td></td>
</tr>
</tbody>
</table>

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) (Especially recommended are: BIOL 461; CH E 572, 574; ERS 241 or ENV S 201; M E 469, 571; PHYS 480)
- Four free electives (2.0 credits)

**HONOURS SCIENCE PROGRAM THREE**

(With Specialization in Chemistry)

Admission to, and continuance in, Honours Science Program Three requires an overall cumulative average of 60%, and a cumulative average of 60% in all Chemistry courses.

In order to graduate with an Honours Science Program Three degree, the following requirements must be met:

1. Successful completion of 23.0 credits, including at least 20.0 lecture credits and 14.0 credits in the Faculty of Science.
2. At least 0.25 lab credit and 1.0 lecture credit in each of the following areas of Chemistry: Analytical, Inorganic, Organic, Physical, plus further lab credits to make a total of 2.0 lab credits. Wherever possible, the
laboratory chosen should accompany the appropriate lecture course.

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. Students must have been enrolled full-time in Year Four, and in either Year Two or Three. Year Four of the program must be taken at the University of Waterloo.

6. Mandatory courses as listed below.

---

### Year One

PHYS 111/112 and 111L/112L or PHYS 121/112 and 121L/112L  
CHEM 120/123 or 121/125, 120L/123L, 129  
MATH 127/128  
Three electives (1.5 credits)

---

### Year Two

3.0 Chemistry lecture credits, at least 2.0 of which must be chosen from: CHEM 212, 223, 254, 256, 264, 265  
1.0 lecture credit chosen from Physics, Biology or Earth Sciences  
Two electives (1.0 credit)

CHEM 10

---

### Year Three

3.0 Chemistry lecture credits at the 300-level or higher  
1.0 lecture credit chosen from Physics, Biology or Earth Sciences  
Two electives (1.0 credit)

CHEM 10

---

### Year Four

2.0 Chemistry credits at 300-level or higher (at least 1.0 at 400-level)  
2.0 lecture credits from Biology, Chemistry, Earth Sciences or Physics  
Two electives (1.0 credit)

CHEM 10

---

**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, 120L/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.

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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<td>Math Core</td>
<td>7</td>
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<td>Arts Core</td>
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<td>Earth Sciences</td>
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<td>20</td>
<td>25</td>
<td>21</td>
<td>20</td>
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<td>200-level Mathematics, CS or Physics</td>
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<td>6</td>
<td>-</td>
<td>-</td>
<td>-</td>
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<td>Geography/ Environmental Studies</td>
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<td>-</td>
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<td>Science/ Mathematics Electives¹</td>
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<td>Unrestricted Elective</td>
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<tr>
<td>Total Term Courses</td>
<td>42</td>
<td>42</td>
<td>42</td>
<td>42</td>
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<td>42</td>
</tr>
<tr>
<td>Non-credit field courses</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>-</td>
</tr>
</tbody>
</table>

¹ Excluding SCI courses; optional Labs must be taken. Students who plan to do graduate work in Hydrogeology are advised to take MATH 213A/B or 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 121L/122L
- CHEM 120/123 and 120L/123L
- PHYS 121/122 and 121L/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 credit)

**Year Three**
- EARTH 331, 332, 333, 336, 342, 345, 355, 370, 390
- Four electives (2.0 credits)

**Year Four**
- EARTH 427, 436A/B, 490
- Five* term courses from: EARTH 421, 432, 433, 434, 435, 437, 438, 440, 456, 458, 460, 470
- 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, five term courses from one or more of the following sequences should be chosen:

- Cartography Sequence
  - GEOG 160, 360, 404
- Air Photo – Remote Sensing Sequence
  - GEOG 275, 375, 470, 471

* Upon approval from the Undergraduate Officer, a student may take four term courses from (2) above, to allow freedom to take courses in the Faculties of Mathematics, Engineering, or Science.
Resource Management Sequence
GEOG 303, 358, 357, 358, 359, 414, 461

Year One
EARTH 121/122, 121L/122L
CHEM 120/123 and 120L/123L
GEOG 101/102
CS 102
either PHYS 111/112 and 111L/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 202 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
For both of the Co-operative Applied Earth Sciences programs offered, a good academic training, as well as considerable practical experience is gained.

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 5:4 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 121L/122L
CHEM 120/123 and 120L/123L
PHYS 121/122 and 121L/122L
CS 102
MATH 107/108
One elective (0.5 credit)

Co-operative Applied Earth Sciences (Geophysics Option)

Year One
EARTH 121/122 and 121L/122L
CHEM 120/123 and 120L/123L
CS 102
MATH 127/128, 114 or 125

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

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.

Required courses in Mathematics and Physics are:
MATH 114 (or 125); 127/128; 213A/B; PHYS 121/122 and 121L/122L.

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, 114 or 125

Year Two
2A
EARTH 231, 235, 260
MATH 213A
ENGL 210C
One elective (0.5 credit) from Physics, Chemistry, Mathematics, Computer Science, Engineering or Geography Remote Sensing

2B
EARTH 221, 232, 238
MATH 213B
MATH 216 or CIV E 222
(continued on next page)
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, 460, 461, 490
Two electives (1.0 credit) from Physics, Mathematics, Computer Science or Engineering
An additional three Earth Sciences courses from 300- or 400-level courses (1.5 credits)

Recommended Electives
PHYS 246, 252, 253, 256, 259, 352, 353, 364, 365
CS 212, 230, 316
CIV E 375, 381, 472, 473, 480, 486
CH E 574
CHEM 212, 219, 254, 264, 311, 312, 313, 354
GEOG 275, 375, 376

Co-operative Applied Earth Sciences (Environmental Hydrogeology Option)
Year One
EARTH 123/124
CHEM 120/123 and 120L/123L
PHYS 121/122 and 121L/122L
MATH 107/108
CS 102
One elective2 (0.5 credit)

Year Two
2A
EARTH 231, 235, 260
CHEM 266 or BIOL 240
CIV E 221 or MATH 210 or MATH 213A/B3

2B
EARTH 221, 232, 238
CIV E 222 or MATH 216
One elective2 (0.5 credit)

Year Three
3A
EARTH 333, 358, 390
ENGL 210C
CIV E 353
Two electives2 (1.0 credit)

3B
EARTH 355, 359
CH E 0254 or CIV E 280, CIV E 465
GEOG 356
BIOL 250 or ENV S 200 or ENV S 201

Year Four
EARTH 342, 436A/B, 438, 440, 456, 458, 459, 490
Two electives2 (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 If MATH 213A and B are elected, 213B counts as a MATH/SCI elective in course groupings.
4 Or other approved Fluid Mechanics course (see program adviser).

HONOURS SCIENCE PROGRAM FOUR
(With Specialization in Earth Sciences)
Admission to, and continuation 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 1430.
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

(continued on next page)
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, 356 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.

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 the core Mathematics and Physics lecture courses in the Year One program 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 121/121L, 123
MATH 125, 127
CHEM 120/120L†
Winter
PHYS 122/122L
MATH 126, 128
CHEM 123/123L†
One elective (0.5 credit)

Year Two
Fall
PHYS 10, 252/252L, 256/256L
MATH 213A, 216 or AM 250
One elective (0.5 credit)
Winter
PHYS 10, 234, 253/253L, 263
MATH 213B
One elective (0.5 credit)

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*, 441, plus an additional 1.0 credit of Physics electives. PHYS 437A and 454 are strongly recommended for students intending to do graduate work. For those planning to do graduate work in Theoretical Physics, at least two from PHYS 444, 463, 464 and 475 are recommended.

* Students specializing in Astrophysics or Biophysics may substitute an appropriate course in one of these areas for the PHYS 435 requirement, by permission of the Undergraduate Officer.
† 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).

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 deepen their knowledge of theoretical or experimental physics, or emphasize particular aspects of the subject, for example solid state physics, astrophysics or biophysics. It is also possible (subject to timetable restrictions) for physics students to use their elective courses to gain expertise in other subjects, for example business administration, computing, electrical engineering or philosophy. The departmental Undergraduate Advisors are available to assist any student who wishes to build such a coherent elective program.

Honours Chemical Physics
(Joint with Chemistry Department)
(see 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 interest whether in some specific field in physics or in some other subject area. Some examples are given above under the heading "Elective Programs".

Through the Co-operative part of the program Applied Physics students have the opportunity of exposure to practical research and development situations in Government and industry. Work opportunities, which are available on a competitive basis, are co-ordinated to complement the student's course work and interest where possible. Many work-term experiences, especially in the upper years, provide the student with a deeper insight into the meaning and methods of research as well as an incentive to develop course work. Such experience provides a contribution to the development of a scientist 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 average of at least 65% in the core Mathematics and Physics lecture courses in the Year One program 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 121/121L, 123
MATH 125, 127
CHEM 120/120L†
1B (Winter or Spring)
PHYS 122/122L
MATH 126, 128
CHEM 123/123L†
One elective (0.5 credit)

Year Two
2A (Fall)
PHYS 10, 252/252L, 256/256L
MATH 213A, 216 or AM 250
One elective (0.5 credit)
2B (Spring)
PHYS 10, 234, 253/253L, 263
MATH 213B or AM 231
One elective (0.5 credit)

Year Three
3A (Spring)
PHYS 10, 334, 355, 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)

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*, 441, 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.

* Students specializing in Astrophysics or Biophysics may substitute an appropriate course in one of these areas for the PHYS 435 requirement, by permission of the Undergraduate Officer.
† 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).
MINOR IN PHYSICS
In order to graduate with a Minor in Physics, the following requirements must be met:
1. Successful completion of 4.5 Physics lecture credits and 1.0 Physics lab credit, with a minimum cumulative average of 60% in all Physics courses attempted.
2. Lecture credits must include: PHYS 121/122 and at least 2.5 other credits from the Physics core.
3. Lecture credits must include at least 1.5 credits from 300- or 400-level Physics courses.

Honours Psychology

The Honours BSc program in Psychology 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 will seek professional training in medicine perhaps with specialization in neurology, psychiatry or pediatrics. A strong background in the natural sciences provides excellent preparation for research or graduate work in these fields of study.

Students interested in Honours Psychology (BSc) 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.

Students in Honours Psychology may select either the Thesis Program or the Coursework Program. However, students selecting the Coursework Program are advised that a thesis in Psychology is typically required for admission to graduate studies in Psychology.

Application for admission to the Co-operative Honours program is normally made in November of the second year, with admission interviews taking place before the end of the Fall term. Owing to resource limitations, some students who meet the minimum requirements for continuing in the Honours program may not be admitted to the Co-op program. However, interested students are advised to consult with the Co-op Faculty Advisor when planning their second year programs (see page 9:34 for more details).

In order to graduate with an Honours Psychology degree, the following requirements must be met:

Successful completion of 23.0 credits including:
1. Honours Psychology requirements for the Thesis Program (see page 9:35 2a-i) or for the Coursework Program (page 9:35).
2. A total of 5.0 Science credits over Years Two, Three, and Four, including no more than 2.0 SCI credits.
3. Of the above 5.0 Science credits, at least 2.0 must be at the 300- or 400-level, exclusive of SCI credits.
4. 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. Year Four of the program must be taken at the University of Waterloo.

Recommended Program for the Thesis Program

<table>
<thead>
<tr>
<th>Year One</th>
<th></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>
<td></td>
</tr>
<tr>
<td>PHYS 111/112,111U/112L or 121/122,121U/122L</td>
<td></td>
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<tr>
<td>MATH 107/108</td>
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<tr>
<td>PSYCH 101, one PSYCH elective</td>
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</table>

<table>
<thead>
<tr>
<th>Year Two</th>
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</thead>
<tbody>
<tr>
<td>PSYCH 291/292 (see overlapping courses page 9:7)</td>
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</tr>
<tr>
<td>One Natural Science Course from PSYCH 203, 206, 207, 261, 271</td>
<td></td>
</tr>
<tr>
<td>One Social Science Course from PSYCH 211, 253, 355, 357</td>
<td></td>
</tr>
<tr>
<td>Two PSYCH Electives (1.0 credit)</td>
<td></td>
</tr>
<tr>
<td>Four Science Electives (2.0 credits)</td>
<td></td>
</tr>
<tr>
<td>Two Unspecified Electives (1.0 credit)</td>
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</table>

<table>
<thead>
<tr>
<th>Year Three</th>
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</thead>
<tbody>
<tr>
<td>PSYCH 391 (see overlapping courses, page 9:7)</td>
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<tr>
<td>One Natural Science Research Course from PSYCH 392*, 394, 396, 398</td>
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</tr>
<tr>
<td>One Social Science Research Course from PSYCH 392*, 393, 395, 397</td>
<td></td>
</tr>
<tr>
<td>One Natural Science Course from PSYCH 203, 206, 207, 261, 271</td>
<td></td>
</tr>
<tr>
<td>One Social Science Course from PSYCH 211, 253, 355, 357</td>
<td></td>
</tr>
<tr>
<td>One Honours Seminar in Psychology</td>
<td></td>
</tr>
<tr>
<td>Four Science Electives (2.0 credits)</td>
<td></td>
</tr>
<tr>
<td>Two Unspecified Electives (1.0 credit)</td>
<td></td>
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</tbody>
</table>

* Students may not use PSYCH 392 to satisfy both 2 and 3.

<table>
<thead>
<tr>
<th>Year Four</th>
<th></th>
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</thead>
<tbody>
<tr>
<td>PSYCH 499A/B/C*</td>
<td></td>
</tr>
<tr>
<td>One Honours Seminar in Psychology</td>
<td></td>
</tr>
<tr>
<td>Two Science Electives (1.0 credit)</td>
<td></td>
</tr>
<tr>
<td>Four Unspecified Electives (2.0 credits)</td>
<td></td>
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</tbody>
</table>

* Students may choose to begin PSYCH 499 in their 3B term.

Recommended Program for the Coursework Program

Students will replace PSYCH 499A/B/C in fourth year with two advanced courses in Psychology and one Psychology elective.
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 111L/112L); MATH 107/108, Calculus; PSYCH 101, Introductory Psychology. The following courses represent a second-year program of strongly recommended courses: BIOL 201, Human Anatomy; BIOL 202, Histology, Embryology; BIOL 240, Fundamentals of Microbiology; CHEM 266/266L, Organic Chemistry; CHEM 237/237L, Biochemistry; PHYS 246/246L, Physical Optics; STAT 202, Statistics. Additional suggestions: One (per term) of any of the following courses: Computer Science, Introductory Accounting, Economics, Languages. Laboratory courses must be completed where given. To complete the pre-professional program, additional courses in the behavioural sciences, social sciences and the humanities are recommended.

Optometry Admission Test (OAT)

THE OAT MUST BE WRITTEN BY ALL APPLICANTS WHO HAVE NEVER SUBMITTED OAT RESULTS TO THE UW SCHOOL OF OPTOMETRY IN PREVIOUS APPLICATION YEARS. Writing the OAT is optional only for repeat applicants who have submitted OAT scores for admission consideration to UW the previous year. Candidates are responsible to ensure that their OAT scores are sent to the UW School of Optometry. ALL inquiries regarding this test should be addressed to:

Optometry Admission Testing Program
211 East Chicago Avenue
Chicago, Illinois, U.S.A. 60611
(312) 440-2693

Only candidates applying for advanced standing in Optometry should contact the Admissions Office of the School of Optometry regarding the OAT requirements.

Selection Factors
All applicants should note that enrolment in the first professional year is limited to 60 and that in 1992 there were approximately 400 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.

The provinces of British Columbia, Alberta, Manitoba, New Brunswick, Prince Edward Island and Saskatchewan have entered into a contract with the province of Ontario and the University of Waterloo regarding admission of
applicants to the School of Optometry from those provinces. Under the terms of the agreement, the University of Waterloo, School of Optometry offers an allotted number of places in the first professional year to applicants who are residents of contract provinces when such candidates are judged to possess qualifications equal by both academic and non-academic criteria to candidates from other provinces. The breakdown of allotted places for contract province residents is as follows: British Columbia 5; Alberta 7; Saskatchewan 3; Manitoba 3; New Brunswick 1; Prince Edward Island 1 (every 3 years). In each year arrangements will be made to provide an opportunity for applicants from British Columbia, Alberta, Manitoba and Saskatchewan 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 applications 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 from Guelph, provided that this form is received 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: Personal Health Statement
Section F: 3 Confidential Assessment Forms (CAFs)
Section G: 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. Upon acceptance to the Optometry program students will be requested to submit documentation of up-to-date immunization for measles, rubella, mumps, diphtheria and tetanus (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 301A/B) must be obtained each term. In Optometry 348A/B, 418 and 448A/B 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
Students entering Year One after Fall 1991 should consult with the Undergraduate Officer about course requirements for Years Three and Four of the revised curriculum.
**Year One**

**Fall**
- OPTOM 100, 104, 105, 106, 109
- BIOL 301A

**Winter**
- OPTOM 111, 114, 115, 149
- BIOL 301B
- PHYS 246/246L

**Year Two**

**Fall**
- OPTOM 216, 241, 242, 245, 254, 264

**Winter**
- OPTOM 244, 246, 251, 252, 255

**Year Three**

**Fall**
- OPTOM 346, 347, 348A, 351, 352, 364

**Winter**
- OPTOM 342, 348B, 350, 353, 367, 368, 372, 374

**Year Four**

**Spring**
- OPTOM 418

**Fall**
- OPTOM 440, 442, 448A, 449, 468, 480
- OPTOM 441 or PSYCH 357*

**Winter**
- OPTOM 448B, 452, 459, 490, 499 (A-E)
- OPTOM 451 or one elective (0.5 credit)*

* Students with a particular interest in and aptitude for research in physiological optics may substitute OPTOM 441/451 for PSYCH 357 and the Winter term elective. A student is required to complete one or the other of these alternatives. STAT 202 or equivalent is recommended for OPTOM 441/451.
Interdisciplinary Programs

Inquiring about the Interdisciplinary Programs.
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, utilizing 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, a student in Honours Biology may decide on a Gerontology Minor, and so on.

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. (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 Inter-disciplinary 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 on the UW campus.

GENERAL AND HONOURS OPTIONS
Students in Anthropology, Economics, English, Environment 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
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, students intending to take the Option should take a French language course and CDN ST 101 or 102, and they should otherwise proceed with their Faculty's Year One program.

Having chosen a main field of study (a "home discipline") from among 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
- two term courses in the home discipline dealing specifically with Canada
- two term courses from outside the home discipline, dealing specifically with Canada and chosen from the approved course list (see page 15:4)

General degree students will graduate at the end of Year Three with a degree in their home discipline and with "Canadian Studies Option" shown on the diploma.

Year Four
- 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
Double Honours and Canadian Studies

Students may take a joint Honours program and the Canadian Studies Option by taking two term courses in each Honours discipline and the requisite core CDN ST courses. They are not required to take the courses listed outside of their Honours areas in other Departments.

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 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

• 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)

This program must be arranged through the Faculty of Arts Undergraduate Office.

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
365 Special Topics
365D Reading Course
400A/B Research Essay

PRINCIPAL CANADIAN CONTENT COURSES OFFERED BY PARTICIPATING DEPARTMENTS

The list below indicates courses tentatively scheduled for 1993-94. Refer to previous and forthcoming Undergraduate Calendars for other Canadian content courses.

Anthropology (ANTH)
102 Introduction to Social and Cultural Anthropology
222 Prehistoric Cultures in the Great Lakes Area

Economics (ECON)
101 Introduction to Microeconomics
102 Introduction to Macroeconomics
310 History of Canadian Economic Development
333 Intergovernmental Economic Studies
341 Public Finance I
343 Urban Economics
345 Industrial Organization
351 Labour Economics
355 Economics of Energy and Natural Resources
361 Cost-Benefit Analysis and Project Evaluation
365 Contemporary Canadian Problems

English (ENGL)
205R The Canadian Short Story
214 Themes in Canadian Literature
313 Canadian Literature to 1920
314 Canadian Poetry Since 1920
315 Canadian Prose Since 1920
316 Canadian Drama
317 Canadian Children's Literature
490A-Z Special Topics Seminars in Canadian and Commonwealth Literature
495A/B Senior Honours Essay Canadian Literature Option

Environment and Resource Studies (ERS)
241 Introduction to Environmental and Social Impact Assessment
338 Socio-Economic Impact Assessment
352 Current Issues in the Canadian North
385 Technology/Lifestyles for a Conserver Society
417 Field Studies in Land Use History and Landscape Change

Environmental Studies (ENV S)
195 Introduction to Environmental Studies
201 Introduction to Environmental and Planning Law
401 Environmental Law
402 Environmental Law
417 Field Studies in Land Use History and Landscape Change
433 People in Natural Areas

French (FR)
151 Basic French
152 Basic French
155 Intensive Review of French
192A/B French Language
193 French for Francophone Students I
250 Advanced French Language 2
250A Advanced Spoken French 2
273 Aspects of Québec
275 Contemporary French-Canadian Novel
293 French for Francophone Students 2
300 Advanced French Language 3
300A Advanced Spoken French 3
371 French-Canadian Poetry
372 Contemporary French-Canadian Theatre
400 Advanced French Language 4
400A Advanced Spoken French 4

Geography (GEOG)
207 Water Resources of Canada
300 Geomorphology and the Southern Ontario Environment
303 Geographical Hydrology
322 Geographical Study of Canada
340 Towns and Villages of Rural Canada
341 Historical Geography of Canada
400 Climate and Periglacial Morphology
422 Canada
451 Land Dereliction and Rehabilitation 1

History (HIST)
102C Origins of War in the 20th Century
102E Canadian History
201 Canadian Urban History
203 Modern Quebec
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
215 The Proper Sphere: Canadian Women in Historical Perspective
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
319 French Canadian History
320 The History of Modern Quebec
325 History of Canadian Indians to 1870's
326 History of Canadian Indians since 1870's
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

Political Science (PSCI)
101B Introduction to Public Policy
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 Consciencational Political Systems
363 Canadian Constitutional Law
372 Political Parties and Interest Groups
382 Politics of Canadian Foreign Policy
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
451 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
224 Law and Order
226 Juvenile Justice
227 Criminology
228 Sociology of Corrections
232 Technology and Social Change
241 Introduction to the Sociology of Work
242 Industrial Sociology
246 Mass Communication
247 Death and Society
248 Health, Illness and Society
252 Migration and Society
253 Population in Canadian Society
256 Ethnic and Racial Relations
265 Political Sociology
275 The Mennonites as a Sociological Community
286 Environment and Behaviour
333 Canadian Multiculturalism
342 Sociology of Industrial Relations
366 Urban Sociology
378 Sociology of Women
407 Canadian Sociological Thought
430 Political Participation

Urban and Regional Planning (PLAN)
156 Introduction to Urban and Regional Planning Concepts
232 Rural Planning and Development
259 Regional Planning and Economic Development
322 Canadian Regional Issues
330 Urban Social Planning
344 Principles of Recreation Planning
International Studies

The University of Waterloo is committed to international studies through overseas study programs in a number of departments, through research associations with overseas universities, and through the personal commitments and associations of many faculty members. This Option capitalizes on this experience. It will lead students to an understanding of the world's diverse communities and of the cultural and political implications of achieving closer relations. The program is expected to prove useful to those planning a career in the public service or in those parts of the private sector which have international interests. It should prove attractive also to those intending to teach in those disciplines in which new curricula are increasing the international component. Further, it will provide a background from which students might apply for admission to graduate programs in international studies.

Requirements

The Option is available to students registered in any Honours or equivalent program in any faculty. It requires completion of ten term courses drawn from an approved list of over 120; four of these should be completed in first and second years from a group of 15. Students are expected to achieve an average of 70% in their international studies courses in order to have the Option recognized on their degree certificate.

Students taking the Option in International Studies are advised to contact the Director at their earliest opportunity, although formal registration in the program may be postponed until, but not later than, entry into third year.

With respect to the total number of courses permitted at any given level, students remain subject to the limitations imposed by the faculty and department in which they are registered.

Curriculum

Four courses must be taken from Group One, of which two must be at the 200-level. Six courses must be taken from Group Two, of which four must be outside the student's major department; four of the six must be at the 300- or 400-level.

Group One – Year One and Two

ECON 231 Introduction to international economics
ERS 231 Environmental issues in a global perspective
GEOG 206 The world region and world issues
HIST 130 The modern world in historical perspective
PSCI 281 International politics
SOC 232 Technology and social change
SOC 256 Ethnic and racial relations
PACS 201* Roots of conflict and violence
PACS 202* Conflict resolution
PSCI 102F* Politics in the third world
PSCI 102K* Mass political violence
PSCI 102N* The Politics of Nationalism and Ethnicity
RS 100A* Religions of the East
RS 100B* Religions of the West

Group Two

PSYCH 212 Educational Psychology
PSYCH 213 Exceptional Children (Consult Department)
FINE 219 Canadian Art
FINE 258 Canadian Film
FINE 316 Canadian Native Art
FINE 318 Canadian Ethnic and Traditional Arts
MUSIC 142 Traditional Folk Music of Canada
MUSIC 356 Canadian Music
PHIL 215 Business and Professional Ethics
PHIL 220 Moral Issues
PHIL 315 Ethics and the Engineering Profession
PHIL 327A Philosophy of Law: Part 1
PHIL 327B Philosophy of Law: Part 2
PACS 201 Roots of conflict and violence
PACS 202 Conflict resolution
PSCI 102F Politics in the third world
PSCI 102K Mass political violence
PSCI 102N The Politics of Nationalism and Ethnicity
RS 100A Religions of the East
RS 100B Religions of the West

Further information

Please contact Dr. W.R. Needham, Director, Canadian Studies Program, St. Paul's United College, 885-1460, Fax 885-6364

Environmental Economics

For program description, see page 9:18.

Gerontology

For program description, see page 8:8.
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

HIST 102K Conflict in the Caribbean and Central America
HIST 230 Church and Revolution in Latin America
HIST 232 Revolutions in Latin America
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

Further Information

Please contact the Course Director, M. Gutierrez, ext. 2377.

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 210X History of Law
PHIL 327A Philosophy of Law – Part 1
PSCI 292 Aspects of 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, and PLAN 402 plus at least two other courses in Section 2.
ACC 231 Business Law
ACTSC 456 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 History of the Common Law
ISS 350E Family Law and Social Work
PHIL 327B Philosophy of Law – Part 2
PLAN 402 Planning Law
PSCI 291 The Canadian Legal Process
PSCI 333 Administrative Law
PSCI 363 Canadian Constitutional Law
SOC 224 Law and Order: Regulating Deviance
SOC 225 Juvenile Justice
SOC 227 Criminology
SOC 228 Corrections
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 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.

Interdisciplinary Programs
Legal Studies
Liberal Science
Management Studies

Liberal Science
For program description, see page 149.

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 will 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.

In the Arts Applied Studies Co-op program, students 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
PSCI 295
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 in the major field(s) 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, T.J. Downey, HH 306, ext. 2900.

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 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 Modern Issues in the Ancient World
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
PSCI 281 International Politics
PSCI 282 Foreign Policy
RS 100B Religions of the West
RS 100E Biblical Studies 1
RS 100F Biblical Studies 2
RS 205 The Hebrew Prophets
RS 208 Parables of Jesus
RS 216 Islam
RS 217 Judaism
RS 306 Intermediate Biblical Hebrew
RS 310 The Sacred Book of Islam
RS 318 Islam and Christianity
RS 321 The History and Culture of the Orthodox Church
RS 334 Islamic Theology, Philosophy and Mysticism
SOC 256 Race and Ethnic Relations
SOC 333 Canadian Multiculturalism
WS 200 Introduction to Women’s Studies

Note
Other courses not included in this list may be relevant to the Middle East Studies Option. However, before registration to such courses, students should consult with the Director as to the suitability of these courses to fulfill the requirements of the MES Option.
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 cooperation 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 Core Courses 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 satisfies 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
PACS 202 Conflict Resolution
PACS 301A Liberation and Nonviolence in Latin America
PACS 301B Justice in Third World Development
PACS 301D Inter-National Conflict and Alternative World Orders
PACS 301E Societal Conflict in the former Soviet Union: Past and Present Trends
PACS 302A Community Conflict Resolution
PACS 302B Quest for Peace in Literature and Film
PACS 302C Creative Conflict Resolution in the Schools
PACS 302D The Roots of Violence in Central America
PACS 302E Global Development Education
PACS 302F Advanced Conflict Resolution in the Schools
PACS 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 encour-
egaged 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
ERS 218 Introduction to Environmental and Resource
Systems
ERS 231 Environmental Issues in Global Perspective
ERS 241 Introduction to Environmental and Social Impact
Assessment
ERS 338 Social Impact Assessment
ERS 352 Current Issues in the Canadian North
ENV S 401 Environmental Law

Geography
GEOG 205 Africa
GEOG 206 The World Regions and World Issues
GEOG 225 Urbanization in the Third World
GEOG 226 Food, Agriculture, and Integrated Rural
Development in the Third World
GEOG 326 Gender Roles and Development Alternatives
in the Third World
GEOG 332 Health and Disease in the Third World
GEOG 425 Africa

History
HIST 102C The Origins of Wars in the 20th Century
HIST 102D From Nationalism to Totalitarianism
HIST 102K Conflict in the Caribbean and Central America
HIST 206 History of Canadian Minorities
HIST 208 The Cold War: American-Russian Relations
Since November, 1917
HIST 217 Irish History: The Nineteenth and Twentieth
Century
HIST 221 Race Relations in Canada: An Historical
Perspective
HIST 222 History of Modern Revolutions
HIST 230 Church and Revolution in Modern Latin America
HIST 233 Civil – Military Relations in Latin America
HIST 259 Modern African History
HIST 325/326 History of Canadian Indians
HIST 345 Minorities in an International Perspective
HIST 348 Radical Reformation

Interdisciplinary PACS
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
PACS 390 A/B Field Studies in Peace and Conflict
PACS 398/399 Directed Readings in Peace and Conflict
Studies

Philosophy
PHIL 216 Rational Behaviour and Decision-Making
PHIL 243 Conflict, Contract and Choice
PHIL 327A Philosophy of Law 1
PHIL 329 War, Peace, and Justice
PHIL 422 Political Philosophy 1
PHIL 423 Political Philosophy 2

Political Science
PSCI 101A Introduction to Politics
PSCI 102F Politics in the Third World
PSCI 102K Mass Political Violence
PSCI 102N The Politics of Nationalism and Ethnicity
PSCI 225 Political Theory 1
PSCI 226 Political Theory 2
PSCI 281 International Politics 1
PSCI 282 Foreign Policy
PSCI 321 Marxist Theory
PSCI 322 Marxism after Marx
PSCI 350A The Politics of Developing Areas 1
PSCI 350B The Politics of Developing Areas 2
PSCI 360A World Politics 1
PSCI 381 Foreign Policies of South Asian States
PSCI 433 Public Policy and Underdevelopment in the
Third World
PSCI 436 Comparative Public Policy: The Politics of Food
PSCI 437 Politics of International Resources
PSCI 452 Comparative Civil-Military Relations USSR-
Eastern Europe
PSCI 453 Comparative Politics of Latin America
PSCI 479 Violence in the Political Process
PSCI 481 Research Seminar on World Politics
PSCI 483 Power Politics and World Order Studies
PSCI 484 Contemporary Strategies: Theories and Policies

Psychology
PSYCH 102H Psychology and the Nuclear Threat
PSYCH 235 Psychological Perspectives on Gender and
Sex
PSYCH 253 Social Psychology
PSYCH 254 Interpersonal Relations
PSYCH 333 Industrial/Organizational Psychology
PSYCH 354 Interpersonal Processes in Critical Situations

Religious Studies
RS 257 The Thought and Practice of Christian
Peacemaking
RS 263 Justice, Peace and Development
RS 292 A/B Women in the Church
RS 322 Radical Reformation
RS 353 The Bible and Peace
RS 354 War and Peace in Christian Theology
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 336
   - 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.

3. **Elective courses (four to be chosen)**
   - CS 100
   - ENGL 210E or 210F
   - ECON 351
   - M SCI 311 or SOC 340
   - PSCI 295
   - 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 in the major field(s) 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, T.J. Downey, HH 306, ext. 2900.
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 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.

The Option comprises six courses. Two of these are required core courses; the remaining four are chosen by the student in consultation with the Centre for Society, Technology and Values to form a Theme Package. Theme package courses are normally taken after an introductory STV course.

Requirements
The STV Option consists of six courses in three categories:

Category 1: Introductory Courses
STV 100 Society, Technology and Values: Introduction
or
STV 202 Design and Society (no prerequisite)

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 chosen from any UW department including other STV courses.

Category 3: The final course, namely
STV 400 Society, Technology and Values: Senior Project

Creating a Theme Package
Students create their own Theme Package Areas to reflect their interests. The following are given as examples of theme package areas:

- 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

Soviet and East European Studies

Since its establishment in early 1989 the Waterloo-Laurier Centre for Soviet 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 Soviet and East European Studies. A significant dimension of the Centre's academic objectives is its link with the Interdisciplinary Option in Soviet 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 Soviet and East European Studies Option benefit from a variety of conferences, symposia, workshops and special lectures sponsored annually by the Waterloo-Laurier Centre for Soviet Studies. There are also travel possibilities and fully accredited study abroad opportunities offered by participating departments.

A university background in Soviet 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.
Students must complete a minimum of ten term courses selected from at least three of the following subject areas: (i) History, (ii) Political Science, (iii) Economics and Geography, (iv) Culture, and (v) Language and Literature Studies. Furthermore, 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.

No more than three term courses which are used to fulfill a student’s major program may count toward the Option requirement.

To meet graduation requirements a student must maintain a minimum overall average of 65% in the courses selected to fulfill the Option.

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
- HIST 208 The Cold War: American-Russian Relations Since November, 1917
- HIST 219 Survey of Russian History
- HIST 355 Russian History to 1900
- HIST 356 20th-Century Russia
- HIST 402A Senior Reading Seminar in Russian and Soviet History
- HIST 402B Senior Research Seminar in Russian and Soviet History

**Political Science**
- PSCI 365A Politics in the Soviet Successor States 1
- PSCI 365B Politics in the Soviet Successor States 2
- PSCI 451 Comparative Political Systems: Eastern Europe
- PSCI 452 Comparative Civil-Military Relations: Soviet Union and Eastern Europe

**Economics and Geography**
- GEOG 204 The Soviet Union
- GEOG 423 Central and Eastern Europe
- GEOG 424 The Soviet Union
- ECON 461 A Comparative Economic Systems
- ECON 463B The Soviet Economy

**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

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**Interdisciplinary Programs**
- Soviet and East European Studies
- Speech Communication

**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
- POLSH 101/102 First Year Polish
- POLSH 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, Soviet and East European Studies
  - Department of Germanic and Slavic Languages and Literatures
  - Modern Languages Bldg., Room 222
  - Ext. 3118

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**Speech Communication**

For program description, see page 9:14.
Studies in the French Language/Programme d'études en langue française

This program is designed particularly for graduates of French immersion programs. Studies in the French Language/Programme d'études en langue française provides an opportunity for students in any UW faculty, especially those with significant high school experience in the French language, to extend that experience by taking part of their UW studies in French while majoring in another discipline.

Several UW departments participate in the program by teaching some of their regular course offerings in French. The Department of French also contributes to the program. For 1993-94, courses will be provided by the Departments of French and History.

The program also offers Co-op students the opportunity of taking an academic year at the University of Paris for credit towards their UW degree. Students interested in this exchange arrangement do not need to be taking courses taught in French at UW, but they must possess a level of linguistic competence that will ensure they benefit from their year in France.

Studies in the French Language is administered under the auspices of the UW Interdisciplinary Program board.

Certificat d'études en langue française

Level 1: Four term courses from the approved list, with a 65% average

Level 2: Seven term courses from the approved list, with a 65% average.

Students must pass a proficiency test in French before receiving the certificat upon graduation.

Approved Courses
ENV 195, FR 300, 300A, 303, 400, 400A, 403; HIST 100, 102F, 263; PHIL 200A; PSYCH 212

Participating faculty members are listed in Chapter 17.

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 Director or Margaret Grosch in Co-operative Education and Career Services, NH 1079, ext. 3207.

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 four term courses in the core program:
Psychology of Religion in Historical Perspective (SIPAR 202) provides an historical survey of theories on the relationship between personality and religion; 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.

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. Courses must include SIPAR 202, SIPAR 270 and SIPAR 271 plus three other SIPAR designated courses outside the major field. The subtitle “Studies in Personality and Religion” will be designated on the degree. In every case, students must fulfill all the requirements for the Major in their own departments.

Honours Minor
A minor in SIPAR is available to students pursuing an Honours degree in any Faculty and to student taking the four year General degree in Arts. It consists of ten term courses chosen from among the courses approved for SIPAR credit in any participating department, and must include the SIPAR Core Courses, SIPAR 202, SIPAR 270, SIPAR 271, SIPAR 302.
Interdisciplinary Programs
Studies in Personality and Religion (SIPAR)
Studies in Sexuality, Marriage and the Family

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 16:104 for descriptions)
SIPAR 202 0.5
Psychology of Religion in Historical Perspective
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

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.

Religious Studies (RS)
100C Religious Quests
200 Study of Religion
221 Sects, Cults and Religious Movements
236 Human Sexuality and Christian Morality
292 Women in the Church
370 Dreams in Religious Experience
371 Religion and Suicidal Behaviour
375 Religion and Psychotherapy

Psychology (PSYCH)
101 Introductory Psychology
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)
101 Introduction to Sociology
102 Social Problems

204 Sociology of Adolescence
206 Gender Roles
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

Social Development Studies
ISS 220R Changing Concepts of Childhood
ISS 320R Critical Encounter with Human Nature
ISS 350D Adult Life Crises and Events
ISS 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 201A Introduction to Sexuality and Sex Education 1
and
SMF 202A Introduction to Marriage and the Family 1
2. SMF 201B Introduction to Sexuality and Sex Education 2
of SMF 202B Introduction to Marriage and the Family
2
3. SMF 301A/B Advanced Study of Sexuality and Sex
Education 1 and 2

or
SMF 302A/B Advanced Study of Marriage and the
Family 1 and 2
4. SMF 303A Introduction to Marriage and Family
Therapy 1
5. SMF 402 Independent Study: Special Topics in
Sexuality

or
SMF 403 Independent Study: Special Topics in Marriage
and the Family

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 require-
ments 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 201A Introduction to Sexuality and Sex
   Education 1
   and
   SMF 202A Introduction to Marriage and the Family 1
2. SMF 201B Introduction to Sexuality and Sex
   Education 2
   or
   SMF 202B Introduction to Marriage and the Family 2
3. SMF 301A Advanced Study of Sexuality and Sex
   Education 1
   or
   SMF 302A Advanced Study of Marriage and the
   Family 1
4. SMF 303A Introduction to Marriage and Family
   Therapy 1

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 pursu-
ing 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 pro-
gram 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, stu-
dents 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%.

The SMF courses required for the Diploma will be
offered regularly during the evening: a number of the other
courses on the Approved List of Courses may be offered
during the evening as well.

Approved List of Sexuality, Marriage and the Family
Courses
ANTH 350 Culture and Sexuality
ENGL 108E Women in Literature
ENGL 208E Women Writers of the 20th Century
HIST 202 The Individual and the Family in History
HIST 241 Society and the Sexes in Early Modern Europe
HLTH 220 Health and the Family
ISS 350H Values and the Contemporary Family
PHIL 201 Love
PHIL 202 Philosophy of Women and Men
PHIL 318J Philosophy of the Family
PSYCH 235 Psychological Perspectives on Gender and
Sex
PSYCH 236 A Psychological Analysis of Human Sexuality
PSYCH 254 Interpersonal Relations
RS 236 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

WS 200 Introduction to Women's Studies
WS 300 Seminar in Women's Studies
SMF 201A/B Introduction to Sexuality and Sex Education
   1 and 2
SMF 202A/B Introduction to Marriage and the Family 1
   and 2

Approved List of Sexuality, Marriage and the Family
Courses
Interdisciplinary Programs
Women's Studies

SMF 301A/B Advanced Study of Sexuality and Sex Education 1 and 2
SMF 302A/B Advanced Study of Marriage and the Family 1 and 2
SMF 303A/B Introduction to Marriage and Family Therapy 1 and 2
SMF 402 Independent Study: Special Topics in Sexuality
SMF 403 Independent Study: Special Topics in Marriage and the Family

Further Information
Please contact the Director, J.K. Rempel, University of St. Jerome's College, Room 224; tel. 884-8110.

Women's Studies

Women's Studies at the University of Waterloo (UW) and Wilfrid Laurier University (WLU) reflects a new understanding of the study of "humankind," the study of women and men with a special focus on gender-based experiences.

Women's history and lives, as well as feminist approaches to them, provide a rich field for scholarship and teaching in the humanities, social sciences and natural sciences as researchers seek to discover how and why in all societies, past and present, women have generally had lower status than men. This scholarship and teaching is the foundation of the Women's Studies programs at the two universities.

Our programs offer opportunities for study at the undergraduate and graduate levels, a Joint Option and Diploma at the undergraduate level, and advanced, theoretical courses at the graduate level. At both levels, we explore such topics as the construction of femininity; social expectations for women; feminism as a social and political movement; medical, philosophical and religious assumptions about female capabilities; women's self-perception; biological functions; sexuality; questions of gender identity; and women's achievements in the arts, literature and science. As well we sponsor activities and speakers relevant to women's lives and studies.

W S course offerings can help to prepare students, in a very practical way, for careers in such areas as law, medicine, personnel work, business, teaching and research, politics, community action, social policy and planning, child care, and fine arts.

We invite both women and men to join us in a quest to discover the bountiful history, culture and accomplishments of women.

JOINT OPTION
The Women's Studies Option may be taken in combination with any General or Honours program at either university.

Courses at either university 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.

Required Courses
WS 200 Introduction to Women's Studies
WS 300 Seminar in Women's Studies

Approved Courses
Select six from the "Approved Courses List" (see page 15:18).

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 at the University of Waterloo 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.

General or Non-Major Degree
Students in a General Non-Major Degree program at the University of Waterloo 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 Joint Option (see above).

Students without a university degree must achieve a 65% average in WS 200 and 300 to continue.

Students with a university degree will be admitted and registered as post-degree students.

REGISTRATION (All programs)
Indicate "Women's Studies Option," or "Women's Studies Diploma" on the registration form at your home university. and fill out a "Women's Studies Registration Form" available from the Women's Studies Office at UW.

Check with the WS Director/Co-ordinator about which courses are offered in a particular term and make your selection.

Declare the WS 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 WS designation on your graduation documents.
<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>ANTH 210/310</td>
<td>Anthropology Through Science Fiction/The Anthropological Imagination</td>
</tr>
<tr>
<td>ANTH 350</td>
<td>Culture and Sexuality</td>
</tr>
<tr>
<td>ANTH 404</td>
<td>Human Development in a Cross-Cultural Perspective</td>
</tr>
<tr>
<td>CDN ST 311</td>
<td>Canadian Women and Religion</td>
</tr>
<tr>
<td>CLAS 292</td>
<td>Modern Issues in the Ancient World (=WLU Classics 218)</td>
</tr>
<tr>
<td>ENGL 108E</td>
<td>Women in Literature (=WLU English 225)</td>
</tr>
<tr>
<td>ENGL 208E</td>
<td>Women Writers of the 20th Century</td>
</tr>
<tr>
<td>ENGL 492B</td>
<td>Theory and Practice of Feminist Criticism</td>
</tr>
<tr>
<td>FR 391</td>
<td>French Women Writers</td>
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<tr>
<td>GEOG 326/653</td>
<td>Gender Roles and Development Alternatives in the Third World (=WLU Sociology 338)</td>
</tr>
<tr>
<td>HLTH 220</td>
<td>Health and the Family</td>
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<tr>
<td>HIST 202</td>
<td>The Individual and the Family in History</td>
</tr>
<tr>
<td>HIST 215</td>
<td>The Proper Sphere: Canadian Women in Historical Perspective</td>
</tr>
<tr>
<td>HIST 241</td>
<td>Society and the Sexes in Early Modern Europe</td>
</tr>
<tr>
<td>MUSIC 221</td>
<td>Women and Music</td>
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<tr>
<td>PHIL 201</td>
<td>Love</td>
</tr>
<tr>
<td>PHIL 202</td>
<td>Philosophy of Women and Men</td>
</tr>
<tr>
<td>PHIL 220</td>
<td>Moral Issues</td>
</tr>
<tr>
<td>PHIL 402/670</td>
<td>Modern Feminism</td>
</tr>
<tr>
<td>PSYCH 236</td>
<td>A Psychological Analysis of Human Sexuality</td>
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<tr>
<td>RS 236</td>
<td>Human Sexuality and Christian Morality</td>
</tr>
<tr>
<td>RS 292A</td>
<td>Women and the Church 1</td>
</tr>
<tr>
<td>RS 292B</td>
<td>Women and the Church 2</td>
</tr>
<tr>
<td>RS 329</td>
<td>Mothers of the Church</td>
</tr>
<tr>
<td>SMF 202A</td>
<td>Introduction to Marriage and the Family 1</td>
</tr>
<tr>
<td>SMF 202B</td>
<td>Introduction to Marriage and the Family 2</td>
</tr>
<tr>
<td>SMF 301A</td>
<td>Advanced Study of Sexuality and Sex Education 1</td>
</tr>
<tr>
<td>SMF 301B</td>
<td>Advanced Study of Sexuality and Sex Education 2</td>
</tr>
<tr>
<td>SMF 302A</td>
<td>Advanced Study of Marriage and the Family 1</td>
</tr>
<tr>
<td>SMF 302B</td>
<td>Advanced Study of Marriage and the Family 2</td>
</tr>
<tr>
<td>SOC 206</td>
<td>Gender Relations (=WLU Sociology 234)</td>
</tr>
<tr>
<td>SOC 378</td>
<td>Sociology of Women (=WLU Sociology 233)</td>
</tr>
<tr>
<td>SOC 401</td>
<td>Theoretical Perspectives on Gender</td>
</tr>
<tr>
<td>SOC WK 357R</td>
<td>Family Violence</td>
</tr>
<tr>
<td>SPAN 387</td>
<td>Latin American Women Writers (=WLU Spanish 320/370)</td>
</tr>
<tr>
<td>W S 365</td>
<td>A-D Special Topics in Women's Studies</td>
</tr>
<tr>
<td>W S 475</td>
<td>A-D Directed Readings in Women's Studies</td>
</tr>
</tbody>
</table>

*(The above courses are described fully in Chapter 16.)*
Students celebrating the last day of classes.
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.

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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 (See Note 1, below)</th>
</tr>
</thead>
<tbody>
<tr>
<td>STAT 333</td>
<td>F,W,S</td>
<td>3C</td>
<td>0.5</td>
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</tbody>
</table>

**Course Name** — Applied Probability

**Course Description**


**Additional Information**

Prereq: STAT 230, and third-year standing

**Terminology**

<table>
<thead>
<tr>
<th>Terms Offered</th>
<th>Type of Instruction</th>
<th>Additional Information</th>
</tr>
</thead>
<tbody>
<tr>
<td>F Fall term</td>
<td>C lecture</td>
<td>prereq prerequisite*</td>
</tr>
<tr>
<td>S Spring term (See Note 2, below)</td>
<td>L laboratory</td>
<td>coreq corequisite*</td>
</tr>
<tr>
<td>W Winter term</td>
<td>T tutorial</td>
<td>antireq antirequisite*</td>
</tr>
<tr>
<td>J Summer, first half, July</td>
<td>S seminar</td>
<td></td>
</tr>
<tr>
<td>A Summer, second half, August</td>
<td>D discussion</td>
<td></td>
</tr>
<tr>
<td>M Summer, both terms, July, August</td>
<td>R reading course</td>
<td></td>
</tr>
<tr>
<td></td>
<td>wkshp workshop</td>
<td></td>
</tr>
<tr>
<td></td>
<td>std studio</td>
<td></td>
</tr>
<tr>
<td></td>
<td>std field lab</td>
<td></td>
</tr>
<tr>
<td></td>
<td>P practicum</td>
<td></td>
</tr>
</tbody>
</table>

**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>
</tr>
</thead>
<tbody>
<tr>
<td>Accounting</td>
<td>ACC</td>
<td>Independent Studies</td>
<td>IS</td>
</tr>
<tr>
<td>Actuarial Science</td>
<td>ACTSC</td>
<td>Interdisciplinary Social Science</td>
<td>ISS</td>
</tr>
<tr>
<td>Anthropology</td>
<td>ANTH</td>
<td>Italian</td>
<td>ITAL</td>
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<tr>
<td>Applied Mathematics</td>
<td>AM</td>
<td>Japanese</td>
<td>JAPAN</td>
</tr>
<tr>
<td>Architecture</td>
<td>ARCH</td>
<td>Kinesiology</td>
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</tr>
<tr>
<td>Arts</td>
<td>ARTS</td>
<td>Korean</td>
<td>KOREA</td>
</tr>
<tr>
<td>Biology</td>
<td>BIOL</td>
<td>Latin</td>
<td>LAT</td>
</tr>
<tr>
<td>Canadian Studies</td>
<td>CDN ST</td>
<td>Management Sciences</td>
<td>M SCI</td>
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<tr>
<td>Chemical Engineering</td>
<td>CH E</td>
<td>Mathematics</td>
<td>MATH</td>
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<tr>
<td>Chemistry</td>
<td>CHEM</td>
<td>Mathematics Electives</td>
<td>MTHEL</td>
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<tr>
<td>Chinese</td>
<td>CHINA</td>
<td>Mechanical Engineering</td>
<td>M E</td>
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<tr>
<td>Civil Engineering</td>
<td>CIV E</td>
<td>Middle East Studies</td>
<td>MES</td>
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<tr>
<td>Classical Studies</td>
<td>CLAS</td>
<td>Music</td>
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<tr>
<td>Combinatorics and Optimization</td>
<td>C&amp;O</td>
<td>Optometry</td>
<td>OPTOM</td>
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<tr>
<td>Computer Science</td>
<td>CS</td>
<td>Peace and Conflict Studies</td>
<td>PACS</td>
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<tr>
<td>Croatian</td>
<td>CROAT</td>
<td>Personality and Religion (Studies in)</td>
<td>SIPAR</td>
</tr>
<tr>
<td>Dance</td>
<td>DANCE</td>
<td>Personnel Studies</td>
<td>PERST</td>
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<tr>
<td>Drama and Speech Communication</td>
<td>DRAMA</td>
<td>Philosophy</td>
<td>PHIL</td>
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<tr>
<td>Dutch</td>
<td>DUTCH</td>
<td>Physics</td>
<td>PHYS</td>
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<tr>
<td>Earth Sciences</td>
<td>EARTH</td>
<td>Planning, Urban and Regional</td>
<td>PLAN</td>
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<tr>
<td>East Asian Studies</td>
<td>EASIA</td>
<td>Polish</td>
<td>POLSH</td>
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<tr>
<td>Economics</td>
<td>ECON</td>
<td>Political Science</td>
<td>PSCI</td>
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<tr>
<td>Electrical and Computer Engineering</td>
<td>E&amp;CE</td>
<td>Psychology</td>
<td>PSYCH</td>
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<tr>
<td>English</td>
<td>ENGL</td>
<td>Pure Math</td>
<td>PMATH</td>
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<tr>
<td>Environment and Resource Studies</td>
<td>ERS</td>
<td>Recreation and Leisure Studies</td>
<td>REC</td>
</tr>
<tr>
<td>Environmental Engineering</td>
<td>ENV E</td>
<td>Religious Studies</td>
<td>RS</td>
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<tr>
<td>Environmental Studies</td>
<td>ENV S</td>
<td>Russian</td>
<td>RUSS</td>
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<tr>
<td>Fine Arts</td>
<td>FINE</td>
<td>Science</td>
<td>SCI</td>
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<tr>
<td>French</td>
<td>FR</td>
<td>Sexuality, Marriage and the Family</td>
<td>SMF</td>
</tr>
<tr>
<td>General Engineering</td>
<td>GEN E</td>
<td>Social Work</td>
<td>SOCCW</td>
</tr>
<tr>
<td>Geography</td>
<td>GEOG</td>
<td>Society, Technology and Values</td>
<td>STV</td>
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<tr>
<td>Geological Engineering</td>
<td>GEO E</td>
<td>Sociology</td>
<td>SOC</td>
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<td>German</td>
<td>GER</td>
<td>Spanish</td>
<td>SPAN</td>
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<tr>
<td>Gerontology</td>
<td>GERON</td>
<td>Statistics</td>
<td>STAT</td>
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<tr>
<td>Greek</td>
<td>GRK</td>
<td>Systems Design Engineering</td>
<td>SY DE</td>
</tr>
<tr>
<td>Health Studies</td>
<td>HLTH</td>
<td>Ukrainian</td>
<td>UKRAN</td>
</tr>
<tr>
<td>History</td>
<td>HIST</td>
<td>Women's Studies</td>
<td>W S</td>
</tr>
</tbody>
</table>
Accounting

Undergraduate Officer
D. Carter, HH 290, ext. 2747

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, students in good standing in other Honours programs may be admitted, subject to prerequisite requirements.
2. Students who fail to preregister during normal preregistration periods may be unable to take a particular course in their term of preference.
3. Students may only repeat courses labelled ACC in which they have a grade of D+ or less. A passed course may be repeated once with the approval of the School of Accountancy.
4. Registration in ACC 121, 122, 131, 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 practices 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 to assist in planning, control, and management decision-making will be examined.
Prereq: ACC 121
Antireq: ACC 123, 260, 281

ACC 131/132 F.W, S/W.S 3C 0.5/0.5
Management 1/2
The functional areas of business: finance, personnel administration, production, marketing and accounting are examined within differing organizational structures. Coverage also includes study of the principles of effective management and the financial system in Canada as a source of corporate capital.
Prereq: ACC 131 is a prerequisite for ACC 132

ACC 143 W 3C 0.5
Creative Thinking and Problem Solving for Accountants
This course comprises three modules: problem-solving techniques, including intuitive 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.
Prereq: ACC 443, PHIL 443
PHIL 443 may be substituted for ACC 143, Only one of ACC 143, 443 or PHIL 443 may be taken for credit.
(Formerly ACC 443)

ACC 231 F.S 3C 0.5
Business Law
Particular attention is given to the law relating to contracts and business organizations. Other areas of study include sources of law, the judicial process, real and personal property, torts, agency, credit, and negotiable instruments.
Antireq: MTHEL 100

ACC 232 F 3C 0.5
Communicating Information for Decision Making
The first half of this course stresses interpersonal communications and covers such topics as communications in the workplace and negotiating skills. The second half concerns formal presentation skills with emphasis on those skills that are necessary for the professional accountant.
Antireq: ACC 432, DTMAM 223
(Formerly ACC 432)

ACC 241 F.S 3C 0.5
Accounting Information Systems 1
Examines the accountant's role as user of financial information systems. Applications and software examined include computerized accounting systems, working paper generators, tax form preparation packages and time and billing systems.
Prereq: An introductory course in information technology approved by the School of Accountancy
Antireq: ACC 441

ACC 251 W.S 3C 0.5
Auditing 1
An examination of the principles of attestation, including elements of effective control structures, concept of evidence, ethical conduct, legal and statutory requirements and elements of audit strategy.

ACC 291 F.S 3C, 1T 0.5
Financial Accounting 1
A first course in intermediate financial accounting dealing with the theory and practice of financial statement preparation and reporting. The emphasis will be on asset valuation and the related impact on income measurement.
Prereq: Accounting OAC or ACC 101

ACC 371 F.W 3C 0.5
Managerial Finance 1
Analytic techniques for financial decision-making will be considered within a conceptual framework. Emphasis is placed upon the long-term investment, capital structure and distribution decisions. Developments in capital asset pricing, and efficient markets will be examined.
Prereq: One course in Statistics and either ACC 121 or 281 or permission of School of Accountancy

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 determination, capital markets, and risk/return characteristics of financing alternatives.
Prereq: ACC 371
**Course Descriptions**

**Accounting**

ACC 381 W,S 3C 0.5
Cost Management Systems 2
The development of accounting information in performing the managerial functions of planning, controlling, and decision making. Emphasis is on analysis of costs and analytical tools such as regression analysis, electronic worksheets and linear programming.
Prereq: Second-year standing in an accounting program

ACC 382 W,S 3C 0.5
Cost Management Systems 3
Consideration of more complex topics in management planning and control. Emphasis is on cost accumulation systems, performance evaluation, control models and case analysis of situations involving complex management accounting systems.
Prereq: ACC 381

ACC 392 F,W 3C 0.5
Financial Accounting 2
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 291

ACC 401 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 Accountants
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

ACC 441 S 3C 0.5
Accounting Information Systems
Investigates the concepts and principles of management information systems. Emphasis is on the role of accounting in the planning/decision-making process and the design and implementation of accounting information systems.
Prereq: CS 100 or equivalent, and ACC 381
Antireq: ACC 241 and 442
Last offering will be Spring '93.

ACC 442 S 3C 0.5
Accounting Information Systems 2
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 241
Antireq: ACC 441

ACC 451 S 3C 0.5
Auditing 2: 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 251

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: One of ACC 441, CS 330 or CS 482

ACC 454 F 3C 0.5
Comprehensive/Operational Auditing
Examination of the value for money audit concept in the private and public sectors. This approach goes beyond the scope of the traditional financial audit and looks at all facets of the organization, including human resource management.
Prereq: ACC 251
(Formerly ACC 351)

ACC 461 F,W 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 291

ACC 462 F,W 3C 0.5
Taxation 2
A continuation of ACC 461.
Prereq: ACC 461

ACC 463 F,W 3C 0.5
Taxation 3
A course which integrates the topics covered in ACC 461 and 462 for individual and corporate tax planning through a study of trusts, partnerships, corporate reorganizations and estate planning.
Prereq: ACC 462

ACC 464 F 3C 0.5
Tax Policy
An examination of the economic, political, legal and administrative aspects of selected contemporary issues in Canadian tax policy. The topics may include corporate loss transfers, minimum tax, auto expense rules, deductions for farm losses, tax simplification for small businesses, or other topics of current interest.
Prereq: ACC 461

ACC 465 F 3C 0.5
Taxation Decision Making
An examination of the impact of tax legislation on business decisions.
Prereq: ACC 381

ACC 471 W 3C 0.5
Investments
The objective of this course is to introduce the student to concepts of investment selection, purchase and management. The student should obtain a knowledge of security markets and the risk/return characteristics of forms of investment.
Prereq: ACC 371

ACC 487 F 3C 0.5
Management Accounting Policy and Integration
This course will consider management accounting cases with multi-dimensional problems requiring information from several sources, knowledge from several accounting disciplines and the application of professional judgment.
Prereq: ACC 381

ACC 488 F 3C 0.5
Business Project
This course will provide students with an opportunity to work on a term-length project in the management accounting area.
Prereq: ACC 381
Course Descriptions
Actuarial Science

ACC 491 F 3C 0.5
Financial Accounting 3
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

COURSE NOT OFFERED 1993-94
ACC 471 Investments

Actuarial Science

Undergraduate Officers
M. Bennett, MC 6104B, ext. 4487
H. Panjer, MC 6017, ext. 4472

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 291, MTHEL 3054, STAT 230
Antireq: ACTSC 222

ACTSC 331 W,S 3C 0.5
Life Contingencies 1
Net annual premiums and net premium reserves. Multiple life functions and multiple decrement models.
Prereq: ACTSC 222

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 231

ACTSC 333 F 3C 0.5
OR Applications in Actuarial Science
Problem formulation and solution techniques in linear programming. Project scheduling with applications in insurance. Introduction to dynamic and integer programming.
Coreq: ACTSC 231, MATH 235,
STAT 230
Antireq: C&O 350, 370

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 232, 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 451 W 3C 0.5
Selection of Risks I
The effects of medical and non-medical risk factors on bodily systems are explored to determine the amount and incidence of additional morbidity and mortality. Techniques for expressing the increased risk in premiums are investigated.
Coreq: MTHEL 3058 and third year standing

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 pension plans. 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

ACC 392 Mathematical Finance
A course in mathematical finance for students in actuarial mathematics. The course is intended for students who have completed the prerequisite courses in mathematics and statistics and who are considering further study in mathematical finance.
Prereq: MATH 137 and STAT 330

ACC 393 Investments
A course in investments for students in actuarial mathematics. The course is intended for students who have completed the prerequisite courses in mathematics and statistics and who are considering further study in investments.
Prereq: MATH 137 and STAT 330

ACC 394 Actuarial Mathematics
A course in actuarial mathematics for students in actuarial mathematics. The course is intended for students who have completed the prerequisite courses in mathematics and statistics and who are considering further study in actuarial mathematics.
Prereq: MATH 137 and STAT 330
Course Descriptions
Anthropology

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.
Prereq: ANTH 101

ANTH 223 F 3C 0.5
Archaeology and Cultural Adaptation: Gatherers and Hunters
The technology, social organization and ideology of prehistoric and historic peoples who subsist without domesticated plants or animals. Archaeology and ethnographic evidence concerning human adaptations over the past three million years are considered.
Prereq: ANTH 101

ANTH 230 W 3C 0.5
Indians of Canada
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

ANTH 233 F 3C 0.5
Inuit and Eskimo Cultures
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 analyzed and compared, as will the contemporary problems these communities face.
Prereq: Second-year standing

ANTH 260 W 3C, 1L 0.5
Human Evolution
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 adaptation.
Prereq: ANTH 101 or permission of the instructor

ANTH 261 F 3C 0.5
Primate Behaviour
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.
Prereq: ANTH 261

ANTH 300 W 3C 0.5
Design of Anthropological Inquiry
This course systematically examines research design and methodology in anthropology.
Prereq: ANTH 202

ANTH 311 W 3C 0.5
Magic, Witchcraft and Religion
An introduction to the way in which anthropologists study the system of behaviour and belief known as religion.

ANTH 330 F 3C 0.5
Cultural Ecology
An examination of the relationships among environment, technology, society, and culture. The increasing levels of complexity will be considered in the context of hunting and foraging bands, horticultural tribes and chieftoms, pastoral tribes and agricultural peasantry.
Prereq: Full credit in Anthropology or consent of the instructor

ANTH 390A/B F,W 0.5/0.5
Reading in Anthropology
Guided reading in a selected portion of the anthropological literature.
Prereq: Anthropology Major or Honours student and permission of the instructor

ANTH 391/393 F,W,S 0.5/0.5
Reading in Anthropology
Guided reading in a selected portion of the anthropological literature.
Prereq: Anthropology Major or Honours student and permission of the instructor

ANTH 404 F 3C 0.5
Human Development in a Cross-Cultural Perspective
Seminar in current issues in the anthropology of the life cycle. This course will deal with child rearing, young adulthood, aging and the female and male life cycles, among other topics, from the perspectives of various cultures.

ANTH 461 W 3C 0.5
Selected Topics in Primate Behaviour
This course focuses on methodological and ideational aspects of studying primate behaviour. Topics include fieldwork methods, comparative theoretical approaches, mother-infant interaction, infanticide, socialization and communications patterns.
Prereq: ANTH 261

ANTH 492A/B F,W 0.5/0.5
Reading in Anthropology
Guided reading in a selected portion of the anthropological literature.
Prereq: Anthropology Major or Honours student and permission of the instructor

ANTH 495/497 F,W,S 0.5/0.5
Reading in Anthropology
Guided reading in a selected portion of the anthropological literature.
Prereq: Anthropology Major or Honours student and permission of the instructor
Applied Mathematics

Undergraduate Officer
D. Siegel, MC 5098, ext. 2806

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 Applied Mathematics Handbook.

AM 231 F, W 3c, 1 T 0.5
Calculus I

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 227
Antireq: MATH 210, 212, 212B

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 215, 216
Not available for credit to students in Honours Pure Mathematics programs.

AM 251 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

AM 261 F 3c, 1 T 0.5
Newtonian Mechanics


Prereq: MATH 237

AM 331 F, W 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.

Prereq: MATH 237
Antireq: MATH 322A, PMATH 351
Cross-listed as PMATH 331
Not available for credit to students in Honours Pure Mathematics programs.

AM 332 W, S 3c 0.5
Complex Analysis

Complex numbers; continuity, differentiability, analyticity of functions; the Cauchy-Riemann equations; solution of Laplace's equation; conformal mapping by elementary functions, and applications; contour integration, the Cauchy and allied theorems; Taylor and Laurent expansions, uniform convergence and power series; the residue calculus, and applications.

Prereq: MATH 237
Antireq: MATH 322B, PMATH 352
Cross-listed as PMATH 332
Not available for credit to students in Honours Pure Mathematics programs.

AM 333 F, S 3c 0.5
Elementary Differential Geometry and Tensor Analysis

Curves in Euclidean 3-Space (E^3) and the Serret-Frenet formulae; surfaces in E^3 and their intrinsic geometry: Gaussian curvature and the Gauss-Bonnet theorem. Coordinate transformations and tensors in n dimensions; n-dimensional Riemannian spaces; covariant differentiation; geodesics; the curvature, Ricci and Einstein tensors. Applications of tensors in Relativity and Continuum Mechanics.

Prereq: AM 231 or consent of instructor
Cross-listed as PMATH 365
### Course Descriptions

**Applied Mathematics**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Title</th>
<th>Prerequisites</th>
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<td>AM 343 W</td>
<td>Discrete Models in Applied Mathematics</td>
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<td>AM 351 F</td>
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<td>AM 353 W, S</td>
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<td>AM 375 W</td>
<td>Special Relativity and Electromagnetic Field Theory</td>
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<tr>
<td>AM 431 F</td>
<td>Measure and Integration</td>
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<td>AM 433 F</td>
<td>Differential Geometry</td>
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<tr>
<td>AM 451 W</td>
<td>Introduction to Dynamical Systems</td>
<td>AM 251 or AM 351, or consent of instructor</td>
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</tbody>
</table>

**Description:**

- **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 oscillators, rigid rotor and hydrogen atom.
- **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.
- **Functional Analysis**: Banach spaces, linear operators, geometry of Hilbert spaces, Hahn-Banach theorems, open mapping theorem, compact operators, applications.

**Remarks:**

- Prereq: AM 251 and AM 261, or consent of instructor.
- Coreq: AM 353 and AM/PMATH 332 (or PMATH 332).
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 463C W 3C 0.5
Fluid Mechanics 1
Fundamental equations of invicid fluid, compressibility, vorticity; two and three-dimensional irrotational, incompressible flow. Blasius' theorem, Joukowski hypothesis. Water wave motion.
Prereq: AM 361

AM 464C W 3C 0.5
Fluid Mechanics 2
Shock wave theory, supersonic flow around a corner, Prandtl-Meyer flow. Dynamics of real fluids, Navier-Stokes equations, exact solutions, Stokes and Oseen flow; Turbulence, Boundary layer theory. Introduction to Geophysical Fluid Dynamics.
Prereq: AM 463C

AM 465C 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

AM 473 F 3C 0.5
Quantum Mechanics 2
Prereq: AM 373, or consent of instructor

AM 475 W 3C 0.5
Introduction to General Relativity
Prereq: AM 375, or consent of instructor

AM 477 W 3C 0.5
Statistical Mechanics
Equilibrium statistical mechanics is developed from first principles, based on elementary probability theory and quantum theory (classical statistical mechanics is developed later as an appropriate limiting case). Emphasis is placed on the intimate connections between statistical mechanics and thermodynamics. Although it would be useful, prior knowledge of quantum theory is not necessary.
Prereq: Consent of instructor

AM 495 F 3C 0.5
Reading Course

AM 496 W 3C 0.5
Reading Course

ARCH 100 F 3C 0.5
An Introduction to Architecture
An introductory course for non-architecture students, which explores in broad terms the nature of our architecture and how it has evolved. The main streams in the development of Western architecture are traced up to the present and lead to a discussion of current work, ideas and concerns.

ARCH 112 F 4C 0.5
Mathematics in Architecture
The application of mathematics to architecture through evolutionary geometrical studies, humanist thought, perspective development; geometrical constructions: trigonometry; algebra; calculus and matrices.

ARCH 113 W 2C 0.5
Introduction to Computers in Architecture
This is an introduction to desktop computers as used in architectural practice. Half of the course will focus on 2 and 3-dimensional computer-aided design concepts and skills. Most of the remainder of the course will focus on cost estimating and specifications using data-base, spread sheet and word processing software. All applications will be based on a single case study building which is used throughout the course.
Replaces CS 100
ARCH 124 F 3C 0.5
Introduction to Landscape Design
An introduction to analysis of the form that landscapes take and the processes and ideals leading to those forms. Topics of discussion include the vernacular landscape, the garden, the park, the town and suburban landscape. Emphasis will be on site planning within the above situations and on the introduction of ideas of sustainable development and an ecosystems approach.
Prereq: Consent of instructor

ARCH 125 F 3C 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 126 W 1C2L 0.5
Statics and Structural Analysis
Fundamental concepts of mechanics and structures, as related to architectural design, study of loading conditions, forces, moments, systems of forces, conditions of equilibrium for two and three dimensional structures, centre of gravity of loads and areas, bar forces in trusses, simple frame analysis, friction, moment of inertia.
Prereq: ARCH 112

ARCH 127 F 3C 0.5
Theories and Technologies of Building Construction
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 171 F 3C 0.5
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 172 W 2C 0.5
Building Construction 1
An introduction of 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.

ARCH 174/175 0.5 each
Prereq: Consent of instructor

ARCH 191 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

ARCH 192 F 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 245 WS 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 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; stress and moment diagrams, qualitative deflect ed 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 cafcasuals, design aids, rules of thumb and the latest CSA design standards.
Prereq: ARCH 262

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.
Prereq: 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 site and context. Field trip to a major urban area (one week).
Prereq: ARCH 292

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 site and context. Field trip to a major urban area (one week).
Prereq: ARCH 292

ARCH 297 S 2C.2L 0.5

Computer Aided Design
A study of Computer Aided Design (CAD) seen as the creation of a data base of two-dimensional graphics and three-dimensional models from which drawings and images can be extracted. An important component of the course is therefore the structuring of this two- and three-dimensional information. For architectural subject matter the course will use the works of a classical architect, such as Palladio or Schinkel, by requiring the design and modelling of a building incorporating the design rules perceived to have been used by the architect. By using CAD as a means of criticism, CAD is also used to teach architectural history by allowing visual testing of the validity of the design rules and by allowing one to project oneself into a virtual reality of the past.
Prereq: ARCH 213 or consent of instructor

ARCH 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 346 W 2C.2L 0.5

Historicism and Romanticism: Sense of Periods and Styles
Depiction of "modern" culture as one in which the notion of environmental order as the fulfilling of natural law is replaced by a notion of order as the historical creation of autonomous wills. Selected works in philosophy, literature, art and architecture will be studied.
Prereq: ARCH 247 or consent of instructor
ARCH 348 F (Rome) 2C,2S 0.5
Italian Renaissance Architecture
Architecture and urban design from the early 15th to the early 17th century in central and northern Italy. Special attention is paid to the development of theory and its relation to architectural practice. In addition to the works of the major figures of the period, typical relationships between buildings and their urban and natural contexts are considered.
Prereq: Registration in ARCH 492 or consent of instructor

ARCH 349A/B/C S 4C,T 0.5
Topics in Cultural History
Research into various topics including architectural history, theory, practice, and pedagogy but exploring the means of study (the human mind, the precursors, the tools of searching, ordering of findings, ways of presentation of the results of reflection). Guest lecturers, field trips, and private consultants will diversify the common studies. Because the topics will shift, it is possible to enrol in the course more than once.
Prereq: Consent of instructor
The letter designation allows this course to be taken more than once for credit.

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 tension, flexural and compression members; and connections are studied using calculations, design aids, rules of thumb and the latest CSA design standards.
Prereq: ARCH 262

ARCH 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 I
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 393 or consent of instructor

ARCH 374/375 0.5 each
Experimental Courses
These courses allow for additional electives to the program on a short term basis, and for developing future permanent courses.
Prereq: Consent of instructor

ARCH 392 W 3C,1Reqd 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

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 (Rome) 2C,2S 0.5
Italian Urban History
The course provides a survey of the history of settlement and urban form on the Italian peninsula from antiquity to the present day. In it the influences upon the structure of public and private space are outlined for each historical period. These include the constants such as geography and climate, but more especially the factors that induce and manifest change: politics, warfare, economics, social structure, the arts and theory.
Prereq: Registration in ARCH 492 or consent of instructor

ARCH 447 S 2C,1S 0.5
Japan: Signatures on the Landscape
The ambitions of the course are to make 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 (Rome) 2C,2S 0.5
Rome and the Campagna
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 451 W 2C,1S 0.25
The Financial Aspects of Architecture
The course is an introduction to the financial aspects of the development and construction industries. The economics of property development and the process of cost estimation and control will be treated from a practical perspective.
Prereq: BArch Students or consent of Instructor
ARCH 452 W 2C.1S 0.25
Specifications
Architectural working drawings and specifications; bidding requirements; general conditions; general requirements trade divisions; reference and source material; assembly and reproduction; structural, mechanical and electrical consultants.
Prereq: BArch Students or consent of instructor

ARCH 453 S 2C.1S 0.25
Professional Practice
Discussion of the legal and ethical aspects of architectural practice in Canada and in Ontario; in particular, contracts, bonds and insurance, construction lien, by-laws and regulations, architectural 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 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 FW 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 (Rome) F 3C.18std 2.0
Design Studio
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

ARCH 492 (Waterloo) F 3C.18std 2.0
Design Studio
For students unable to study in Rome, an alternative studio is offered in Waterloo. It presents similar design projects and theoretical questions in a North American context.
Prereq: BES (pre-professional architecture) degree with minimum C- average in design courses

ARCH 493 W.S 3C.18std 2.0
Design Studio Options
A series of studio courses is offered which enables students to select their subject of study and instructor. The studios are presented either by visiting architects or professors or by school faculty, and reflect the instructor's particular interests and expertise. Enrolment is normally limited to a maximum of fifteen in any one studio.
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 4B 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

ARCH 584/585 W.S 3R 0.5 each
Architectural Research
This offers a student an opportunity for independent research into architectural problems not offered in the regular curriculum. It allows guided exploration of a specific architectural problem area, of appropriate complexity to the particular term.
Prereq: Approval of (in house) UGAC

ARCH 592/593 W.S 32C 3.0 each
Design Studio
These courses provide an opportunity for the student to select an area of concentration for study and design in depth. A thesis topic is to be submitted and approved during term eight (4B) and all research work completed by the end of the eight-month Co-op work term five. Terms nine and ten (5A and 5B) will be spent developing the thesis for presentation during term ten. The thesis is to be a vehicle for thinking and design at an innovative level. Thus considerable emphasis is placed on both theory and development of design solutions.
Prereq: ARCH 499 and consent of instructor
A letter grade for ARCH 592 will be submitted only after the completion of ARCH 593.

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 301 0.5
Studies in the Humanities
A one-term multi-disciplinary study of the humanities, including art and music as well as literature, history and religious studies. In addition to the principal professor, visiting lecturers from the different disciplines enable the student to see each discipline through expert eyes. Also discussion of the nature of the humanities, and their role in life, business, etc.
Prereq: Second-year standing
Counts toward the A (/) requirement
(Formerly ARTS 100)

COURSES NOT OFFERED 1993-94
ARTS 122 Quest for Meaning in the Twentieth Century
ARTS 215 A/B Man in Crisis (Literary Views)
ARTS 225 Mennonite Authors and Artists
# Course Descriptions

## Biology

**Undergraduate Officers**
- D. Barton, B2-243, ext. 2559
- M. Gilbas, B2-256B, ext. 2506
- M. Griffith, B2-157A, ext. 6441
- W.R. Hawthorn, B1-280, ext. 2117
- N. Scott, B2-147C, ext. 6435

**Introductory Note**
The Department of Biology reserves the right to limit enrolment in Biology courses to those individuals whose programs require those courses.

### BIOL 111 F 2C 0.5
**Introductory Biology 1**
An introduction to basic concepts in Biology including aspects of cell structure, function, metabolism, reproduction, heredity, and molecular genetics. The biology of viruses and simple organisms will be emphasized.

**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.

### 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 Correspondence only for 1993-94.**

### 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 the 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
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.

Field Course 1

A series of one-day field trips from campus held on Saturdays during the first half of term (omitting Thanksgiving weekend), designed to introduce students to the flora, fauna and major ecosystems of Southern Ontario. Written reports will be required for each trip.

Coreq: BIOL 250 or equivalent

Field trip fee of $75 is required towards the cost of transportation. Minimum enrollment of 24 students is required.

Biol 273 W 2C,3L 0.5

Introductory 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 298 F 1st lab 0.25

Field Course 1

A series of one-day field trips from campus held on Saturdays during the first half of term (omitting Thanksgiving weekend), designed to introduce students to the flora, fauna and major ecosystems of Southern Ontario. Written reports will be required for each trip.

Coreq: BIOL 250 or equivalent

Field trip fee of $75 is required towards the cost of transportation. Minimum enrollment of 24 students is required.

Biol 301A/B F,W 3C,3L 0.5/0.5

Human Physiology

The physiology of the major organ systems of the body. The topics discussed include circulation, respiration, digestion and nutrition, metabolism, muscle, nervous systems, special senses, and the endocrine system.

No credit or grade will be given for the first term course unless the two term sequence is completed.

For Optometry students only.

Biol 402 F 2C,3L 0.5

Embryology

Fundamental processes and concepts in embryonic development including the acquisition of multicellularity, organization of the early embryo, morphogenesis of tissues, major organ systems, fetal membranes, growth, differentiation and analysis of common developmental defects.

Biol 403 F 2C,3L 0.5

Developmental Biology

Analysis of embryonic development of selected organisms with emphasis on growth and the processes of subcellular, cellular and organ differentiation stressing recent experimental methodology.

Biol 404 W 2C,3L 0.5

Histology and Cytology

The structure of mammalian cells, tissues and organs interpreted in functional terms. Cell reproduction and differentiation, with some discussion of the embryological origin of tissues and the regulation of tissue growth. Light and electron microscopy techniques.

Prereq: BIOL 211 or 220 or 273

Antireq: BIOL 202

Course Descriptions

Biology

Biol 410 W 2C,3L 0.5

Invertebrate Zoology

The biology of invertebrate animals, excluding arthropods. Topics covered will include reproduction, development, life history, feeding, locomotion, and behavior. Laboratories will introduce the major invertebrate phyla.

Prereq: BIOL 210

Biol 411 W 2C,3L 0.5

Vertebrate Zoology

Major topics in vertebrate zoology as exemplified by both living and fossil members of the superphylum Craniata.

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 420 W 2C,3L 0.5

The Flora of Canada


Biol 421 F,S 2C,3L 0.5

Plant Anatomy and Morphogenesis

Plant structure in relation to function and development with particular reference to the vascular plants. Cell, tissue and organ differentiation.

Prereq: BIOL 220 and 230

Offered during the Spring term in odd-numbered years.

Biol 422 F 2S,3L 0.5

Myology

Fungal taxonomy and ecology; medical mycology; plant pathology; industrial applications; food and food processing; toxins and hallucinogens; biological control; fungi as coprophiles, predators and symbionts with plants and animals.

Prereq: BIOL 221

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 and physiological mechanisms.

Biol 424 F 3C 0.5

Ferns, Gymnosperms and Fern Allies: an evolutionary survey

A detailed survey of the non-flowering vascular plants with emphasis on the extant members of each major group in Ontario. The phylogeny of the plants will be explored through a study of fossil ancestors in each line of evolution.

Prereq: BIOL 220 and 221 or permission of the instructor

Offered in even-numbered years.

Biol 425 W 2C,3L 0.5

The Flowering Plants


Students entering this course are required to make a flowering plant collection. Instructions should be obtained from the Herbarium prior to the summer break.

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 the instructor

Biol 427X W 2C,3L 0.5

Environmental Physiology

A study of the physiological processes used by plants and animals to respond to changes in the physical environment. The processes of adaptation and acclimation to temperature will be examined in detail from the molecular to the organismal level.

Prereq: BIOL 250 and one of the following: BIOL 423, 436 or 470

Biol 428 F 2C,3L 0.5

Plant Growth Regulation: Biochemical and Molecular Perspectives

A study of the molecular and biochemical processes that control development in plants with emphasis on the growth-regulating compounds and their interactions.
BIOL 432X F 3C 0.5
Biotechnology 2
Genetic engineering entails the directed alteration of the hereditary apparatus of cells. The applications of recombinant DNA technology will be examined including the use of restriction endonucleases, cloning vehicles, transformation procedures, screening methods and expression of cloned genes.
Prereqs: BIOL 437 and 440 or permission of instructor

BIOL 433X W 3C 0.5
Biotechnoloy 3
Techniques and applications of animal and plant cell cultures to biotechnology.
Prereqs: 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 229, 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 or permission of instructor

BIOL 438 W 3C/G 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 the 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, iso-pronoids, 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
Biotechnology 1: Microbial Biotechnology
The role of genetically manipulated microorganisms in biotechnology. Topics examined include the principles of recombinant DNA technology and the development of microorganisms important in biotechnology.
Prereq: BIOL 240/241 or permission of instructor
It is recommended that this course be taken after completion of second year.

BIOL 441 F 2C.3L 0.5
Immunology
Physical and biological properties of immunological agents that protect against disease, the procedures for their identification and their practical applications.
Prereq: BIOL 240/241, 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 240/241 and 437 or permission of instructor

BIOL 443 F 2C.3L 0.5
Fermentation Biotechnology
Biology of industrial micro-organisms: fermentation systems; fermentation raw materials; downstream processing; biomass production; food fermentations; production of industrial chemicals, food additives, enzymes and other products by fermentation.
Prereq: BIOL 240/241

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 940/241
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
Not offered in 1993-94

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 F 2C.3L 0.5
Microbial Physiology 1
A study of the physiology of microorganisms including metabolic and biosynthetic growth, cell permissibility, nutrition, physical and chemical environmental factors and metabolic mechanisms as elucidated by radioactivity labeled tracers.
Prereq: BIOL 240/241 or permission of instructor

BIOL 449 W 2C.3L 0.5
Microbial Physiology 2
A study of the physiology of microorganisms with emphasis on synthetic and assembly processes. Mechanisms underlying the biosynthesis of DNA, protein, stable RNA, peptidoglycan, phospholipids, lipopolysaccharides and polysaccharides as well as assembly of the cell envelope, the nucleoid and polysomes will be discussed.
Prereq: BIOL 240/241 or permission of instructor

Course Descriptions

Biology

BIOL 432X F 3C 0.5
Biotechnology 2
Genetic engineering entails the directed alteration of the hereditary apparatus of cells. The applications of recombinant DNA technology will be examined including the use of restriction endonucleases, cloning vehicles, transformation procedures, screening methods and expression of cloned genes.
Prereqs: BIOL 437 and 440 or permission of instructor

BIOL 433X W 3C 0.5
Biotechnology 3
Techniques and applications of animal and plant cell cultures to biotechnology.
Prereqs: 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 229, 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 or permission of instructor

BIOL 438 W 3C/G 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 the 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, iso-pronoids, 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
Biotechnology 1: Microbial Biotechnology
The role of genetically manipulated microorganisms in biotechnology. Topics examined include the principles of recombinant DNA technology and the development of microorganisms important in biotechnology.
Prereq: BIOL 240/241 or permission of instructor
It is recommended that this course be taken after completion of second year.

BIOL 441 F 2C.3L 0.5
Immunology
Physical and biological properties of immunological agents that protect against disease, the procedures for their identification and their practical applications.
Prereq: BIOL 240/241, 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 240/241 and 437 or permission of instructor

BIOL 443 F 2C.3L 0.5
Fermentation Biotechnology
Biology of industrial micro-organisms: fermentation systems; fermentation raw materials; downstream processing; biomass production; food fermentations; production of industrial chemicals, food additives, enzymes and other products by fermentation.
Prereq: BIOL 240/241

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 940/241
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
Not offered in 1993-94

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 F 2C.3L 0.5
Microbial Physiology 1
A study of the physiology of microorganisms including metabolic and biosynthetic growth, cell permissibility, nutrition, physical and chemical environmental factors and metabolic mechanisms as elucidated by radioactivity labeled tracers.
Prereq: BIOL 240/241 or permission of instructor

BIOL 449 W 2C.3L 0.5
Microbial Physiology 2
A study of the physiology of microorganisms with emphasis on synthetic and assembly processes. Mechanisms underlying the biosynthesis of DNA, protein, stable RNA, peptidoglycan, phospholipids, lipopolysaccharides and polysaccharides as well as assembly of the cell envelope, the nucleoid and polysomes will be discussed.
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 marine field course or permission of the 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 2C S 3 lab: 0.5
Fisheries Biology
The practices of fisheries biology; life history; age and growth, fecundity, production, harvest and management of fisheries resources.
Prereq: BIOL 454 F S 2C, 3L 0.5

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 3 lab: T 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 and population genetics.
Prereq: BIOL 250 and STAT 202, or equivalents

BIOL 457 F 2C, 3L 0.5
Analysis of Communities
A study of the organization, structure and development of communities with emphasis on vegetation change. Topics include: sampling procedures; diversity; stability; succession; niche; multivariate analysis.
Prereq: BIOL 250 and STAT 202, or equivalents

BIOL 458 F 2C, 3L 0.5
Behavioural Ecology
This course will deal with the survival value of behaviour. It will concentrate on how ecological selection pressures associated with acquiring resources and reproducing influence how animals behave. A strong emphasis will be placed on the ultimate causation of behaviour i.e. the evolutionary basis for behaviour.
Prereq: BIOL 250 or permission of instructor

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
Design and analysis of experiments: analysis of variance; experimental designs; factorial experiments; models; missing data; transformations; a-priori and a-posteriori comparisons among means; regression and correlation analysis; analysis of covariance; circular data.
Prereq: STAT 202 or equivalent

BIOL 470 F S 2C, 3L 0.5
Comparative Animal Physiology 1
The comparative physiology of animals with particular emphasis on homeostatic principles as demonstrated by water balance, excretion, nutrition, digestion and the endocrine system.
Prereq: BIOL 210 and 211. Prerequisites are not required by students who are enrolled in the Honours Science Program 2 (Pre Health-Professions option).

BIOL 471 W 2C, 3L 0.5
Comparative Animal Physiology 2
A comparative study of the sense organs and the nervous, endocrine, circulatory and respiratory systems. The lectures emphasize development and function of regulatory processes and include examples of vertebrate adaptations to high altitude and diving.
Prereq: BIOL 273

BIOL 473X W 2C, 3L 0.5
Vertebrate Reproductive Physiology
(formerly Mammalian Reproductive Physiology)
A study of the endocrine and reproductive systems of vertebrates. Major topics include hormone secretion, mechanism of hormone action, hypothalamic regulation of pituitary function, ovarian and testicular physiology, hormone assays, gametogenesis and fertilization.
Prereq: BIOL 273 recommended

BIOL 481 W 2C, 3L 0.5
Introductory Quaternary Ecology
An introduction to Quaternary ecology. The morphology, biostatigraphy, distribution and paleoecological significance of major plant and animal groups in the Quaternary sciences. Relationships of fossil assemblages to modern ecosystems. Students will be expected to arrange with the instructors a field trip in the preceding term.
Prereq: EARTH 440 or consent of instructors
Cross-listed as EARTH 441

BIOL 490 A/B F W S 5Lab 0.5/0.5
Field Course in Marine Biology
A two-week study of marine environments and biota. Emphasis on the flora and fauna of rocky shores, mud flats, and the sub-tidal benthos. Grade based on a field notebook and a research project. This course will normally be held at Huntsman Marine Lab, New Brunswick each September. Courses sponsored by Ontario Universities at other times of the year may also qualify.
Prereq: BIOL 210, 250 or equivalent
Field trip fee: $400-$1500

BIOL 491 A/B F W S 5Lab 0.5/0.5
Field Course in Terrestrial and Aquatic Biology
A two-week study of the flora and fauna of terrestrial environments, lakes and streams. Emphasis on biostatistics, distribution and dynamics of organisms. Both population and community approaches are stressed. This course will normally be held in Algonquin Park, Ontario each September. Courses sponsored by Ontario Universities at other times of the year may also qualify.
Prereq: BIOL 250 or equivalent
Field trip fee: $300-$500

BIOL 492 F W S 5Lab 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 sirens. Additionally, marine-mammal fisheries will be dealt with in both lecture and laboratory work.

BIOL 498A/B F W S 5Lab 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 co-ordinator for BIOL 499 for further details.
A final grade for BIOL 499A will be submitted only after completion of 499B.

COURSES NOT OFFERED 1993-94
BIOL 446 Microbial Ecology
BIOL 472 Comparative Animal Physiology 3

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.

CDN ST 101 F 2C,1S 0.5
Landforms and Mindscapes
An introduction to the Canadian landscape and its early impact upon the creative imagination of Canadians. The course provides a basis for dealing with contemporary Canadian culture.

CDN ST 102 W 2C,1S 0.5
Canadian Cultural Narratives: Facts, 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
Lecturers from various social scientific disciplines examine Canada region by region, looking at how economic disparities, federal-provincial and heartland-hinterland relations, social elites, political parties, etc. influence Canadian regionalism. Focuses on current issues.

CDN ST 202 W 2C,1S 0.5
Regionalism
Lecturers discuss the contribution made by literature, film, drama, and fine arts in defining distinctive regional identities in Canada. Particular attention is paid to the emergence of a distinctive Ontario culture.

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 or 202 or permission of the 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 or 202 or permission of the 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.

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 Canadian 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 1993-94
CDN ST 310 Les francophones hors Québec

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 permission of the Associate Chair (Undergraduate Studies) is a requirement.

CH E 100 F 3C,1T,6L 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 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 teaching.

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.

CH E 023 F,W 3C,1T,3L 0.5
Physical Chemistry 1
Thermodynamics: work and heat as forms of energy. First law, internal energy and enthalpy. Heats of chemical and physical changes. Cycles and the second law, entropy. Sestannery and equilibrium, free energies. Systems of variable composition, chemical equilibrium. Phase equilibrium and the phase rule. Ideal solution, coligative properties.

CH E 025 S,F 3C,2L 0.5
Transport Processes 2 (Fluid Mechanics)

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.

Course Descriptions
Chemical Engineering

CH E 027 W,S,F 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.

CH E 030 W,S 3C,1T 0.5
Transport Processes 4 (Mass Transfer)
Steady state and unsteady state mass transfer by molecular and turbulent motion. Heat-mass transfer analogies. Mass transfer models and applications: absorption; extraction; adsorption. Simultaneous heat and mass transfer in gas-liquid contacting and solids drying.

CH E 031 W,S 3C,1T 0.5
Process Flowsheeting
Process simulation and mathematical modeling of chemical engineering flowsheets involving process units. Design variables; process simulation architectures; flow sheet decomposition theories. Use of modern computer-aided processes design packages such as CHEMSHARE, ASPEN and SPEEDUP.

CH E 032 W,S 3C,1T 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, geneti engineering, biochemistry, microbiology.

CH E 033 W,S 3C,1T 0.5
Chemical Reaction Engineering

CH E 034 W,S 3C,1T,3L 0.5
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 representation of thermodynamic data; aqeous solution thermodynamics. Inorganic materials: structure and properties of metals and alloys; ceramics; composites; semi-conductors. Selected topics in biology, polymers, metallurgy.

CH E 035 W,S 3C,1T 0.5
Chemical Reaction Engineering
Course Descriptions
Chemical Engineering

CH E 037 F.W 3C 0.5
Applied Mathematics 2 (Advanced Mathematics in Chemical Engineering)
Prereq: MATH 114, 210, 216

CH E 038 F.W 3C,3L 0.5
Inorganic Process Principles 2
Prereq: CH E 034
*Alternate weeks

CH E 401/402 S.F,W 1C 0
Seminar
General Seminar

CH E 040 S.F 1C,6L 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,1T,2L 0.5
Introduction to Process Control
Prereq: CH E 037, 101, 102, GEN E 121

CH E 043 S,F 3L 0.25
Research-Design Project 1
Individual research or design on any chemical 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 CH E 048 in 4B. 
Prereq: CH E students only

CH E 044 S,F 3C 0.5
Economics for Chemical Engineering
Prereq: CH E 041

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

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

CH E 051 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 052 W 3C 0.5
Advanced Process Dynamics and Control
Prereq: CH E 041

CH E 054 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. Biotechnology. 
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 understanding thermodynamics, kinetics and transport processes, and on the associated process engineering considerations. 
Prereq: CH E 033
Course Descriptions

Chemistry

Undergraduate Officers
M.F. Tchir, C2-382, ext. 3022
G.E. Toogood, ESC 140, ext. 3314
G.F. Atkinson, C2-260A, ext. 3000

Some courses are regularly given every other year, and are listed in their regular places.

Introductory Notes
In all cases, it is the student's responsibility to determine eligibility to enter a course. It is advisable to obtain special consents in writing before registration period to avoid delays and complications.

Most 300- and 400-level courses are listed as two lecture hours. An additional hour may be scheduled at the discretion of the instructor, usually for a tutorial.

Because of space and equipment limitations in laboratory courses, we must give priority to students whose programs require those courses.

CHEM 001
Pre-University Chemistry
The course covers the material considered essential preparation for first year chemistry courses. Included are formulae, nomenclature, stoichiometry, an introduction to thermodynamics, solution chemistry, chemical equilibria, acids, bases, oxidation-reduction reactions, kinetics and bonding.

Successful completion of this course fulfills the University Admission requirements where high school chemistry is necessary. No University credit. Offered by correspondence only.

CHEM 010 F.W 1C 0.0
General Chemistry Seminar
Required for all Chemistry students beyond Year One, this seminar brings together students from all years to receive information concerning the activities of the Chemistry Department and The Chemical Institute of Canada, and to hear invited speakers.

CHEM 026 F.W 3C.3L 0.5
Organic Chemistry I

Prereq: Grade 13 or OAC Chemistry
Antireq: CHEM 264, 266
For students in Year Two Engineering

CHEM 028 F.S 3C 0.5
Organic Chemistry 2
The preparation and chemistry of alkenes and alkynes are discussed. The concept of aromaticity is introduced and the mechanisms and scope of aromatic substitution chemistry are surveyed. 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 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 124 W.S 0.5
Introductory Organic Chemistry
Bonding in carbon compounds. Structures, properties and nomenclature of several important classes of organic compounds. Interconversions of functional groups. Mechanisms of organic reactions.
Prereq: Grade 13 Chemistry or equivalent
CHEM 120 or 123 strongly recommended
Offered by Correspondence only.
Not for students intending to major in Chemistry or Biochemistry.
CHEM 125 W,S 3C,1T 0.5
Chemical Reactions, Equilibria and Kinetics
An enriched version of CHEM 123 for all students in, or planning to enter, Chemistry or Biochemistry programs.
Prereq: Same as for CHEM 123
Coreq: Same as for CHEM 123
Antireq: CHEM 123
CHEM 129 W,S 3C,3L 0.5
Introductory Spectroscopy
The electromagnetic spectrum and the production and detection of photons in various energy ranges. Elementary descriptions of atomic and molecular spectra and their use in the locations of energy levels. The use of spectra to elucidate energy states of atoms and molecules and to determine molecular structure. Aspects of ultraviolet, visible, infrared, Raman, microwave and nuclear magnetic resonance spectroscopies. For students in, or planning to enter, Chemistry or Biochemistry programs.
Prereq: CHEM 120 or 121
Lab alternate weeks
CHEM 212 F,W 3C 0.5
Structure and Bonding
Structure and symmetry of Main Group and Transition Metal compounds. Valence bond, molecular orbital and ligand field theories applied to polyatomic molecules. Descriptive chemistry of selected elements and compounds.
Prereq: CHEM 120 or 121, 129
Antireq: CHEM 218
For Honours students only
CHEM 218 F 2C,1T 0.5
Development of Chemical Bonding and Structure
Prereq: CHEM 120 or 121
Antireq: CHEM 212
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.
Prereq: CHEM 212 or 218
By correspondence 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.
Prereq: 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.
Prereq: 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,6L 0.5
Analytical Chemistry Laboratory 2
Extensive lab experience for students who have taken CHEM 223.
Prereq: 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.
Prereq: 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.
Prereq: CHEM 264 or permission of instructor
Antireq: CHEM 237
For students in the Honours Biochemistry or the Honours Biology and Chemistry programs 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.
Prereq: 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.
Prereq: CHEM 123 or 125, MATH 127/128 or equivalent
Antireq: CHEM 356
For Honours students only
CHEM 258 W,S 3G 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 rotor and the hydrogen atom; introduction to approximation methods for more complicated systems.
Prereq: CHEM 123 or 125, 129
Coreq: MATH 215 or equivalent
Antireq: PHYS 234, 334, AM 373
For Honours students only
CHEM 264 F,W 3C 0.5
Organic Chemistry 1
Bonding of organic compounds. Acidify
and basicity of organic compounds.
Reaction mechanisms and energetics.
Stereochemistry of organic molecules.
Resonance effects in organic chemistry.
Chemistry of carbonyl compounds and
haloalkanes.
Prereq: CHEM 123 or 125
Antireq: CHEM 265, 266
For Honours students only

CHEM 265 F,W,S 2C,1T 0.5
Organic Chemistry 2
The preparation and chemistry of alkanes
and alkynes are discussed. The concept
of aromaticity is introduced and the mecha-
nisms and scope of aromatic substitution
chemistry are surveyed. Application of
spectroscopic techniques in organic
chemistry.
Prereq: CHEM 129, 264
Antireq: CHEM 036, 267
For Honours students only

CHEM 265L 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
Discussions 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.
Prereq: CHEM 120 and 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,
amacity, carboxylic acids and lipids.
Introduction to nuclear magnetic
resonance and infrared spectroscopy.
Prereq: CHEM 266 or equivalent
Antireq: CHEM 036, 265

CHEM 268 F 2C,1T 0.5
Inorganic Chemistry Laboratory
Experiments appropriate to the inorganic
chemistry program.
Coreq: CHEM 312 or 313
Antireq: CHEM 315L
For Honours students only

CHEM 303 W 2C,1L 0.5
Ionic Equilibria
Algebraic, geometric and computational
methods of analysing the interactions in
systems of equilibria. Applications to aque-
ous solutions, physiological fluids, and
mineral systems may be studied. Labs will
require selected calculations by various
manual and machine methods on typical
systems.
Prereq: CHEM 123 or 125, basic
computer skills

CHEM 305 F 2C,1T 0.5
Atmospheric Chemistry
The chemistry and physics of the terrestri-
al atmosphere with emphasis on the oper-
ation 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 con-
text of their implications for the evolution of
the earth's atmosphere.
Prereq: CHEM 254, 359

CHEM 312 F 2C,1T 0.5
Transition Metal Chemistry
The transition elements and their com-
pounds. Stereochemistry of complex ions;
ligand field and molecular orbital theories
of metal-ligand bonding; electronic spectra
and magneto-chemistry of complexes;
reaction mechanisms (if time permits).
Prereq: CHEM 212
Antireq: CHEM 316
For Honours students only

CHEM 313 W 2C,1T 0.5
Chemistry of Inorganic Solid State
Materials
Introduction to the structure and bonding
of ionic and covalent solids; crystal defects
and non-stoichiometry; relationships
between structure and electrical properties
of solids including metallic conductivity,
semiconductivity, superconductivity and
ionic conductivity; special topics including
one of: fast ion conductors, piezoelectric
and ferroelectric oxides; magnetic oxides.
Prereq: CHEM 212
For Honours students only

CHEM 316 F 0.5
Coordination Chemistry
A basic coverage of first row transition ele-
ments for General and certain Honours
students; preparation, nomenclature and
general chemistry of transition metal com-
plexes emphasizing structure, bonding,
physical properties such as colour and
magnetism, and chemical reactions.
Prereq: CHEM 218 or 212
Antireq: CHEM 312
By correspondence only

CHEM 323 W 2C 0.5
Analytical Instrumentation
Detailed study of selected instruments and
instrumental methods. Introduction to
chemometrics and to computer interfacing.
Prereq: CHEM 223, 223L, 224L, plus
the general knowledge expected of an
Honours Chemistry student in Year Three
For Honours students only

CHEM 323 F 0.5
Structural Biochemistry
Determination of concentration, structure
and sequence of proteins, nucleic acids
and polysaccharides. Protein synthesis.
Enzyme kinetics. Coenzymes.
Prereq: CHEM 237
Coreq: CHEM 265 or 267
By correspondence only

CHEM 333 F,S 2C 0.5
Metabolism I
Metabolism of carbohydrates, lipids and
amino acids.
Prereq: CHEM 233 or 237
Coreq: CHEM 265 or 267

CHEM 334 F,W 3L 0.25
Advanced Biochemistry Laboratory
Selected experiments for students taking
CHEM 333 and CHEM 357.
Prereq/Coreq: CHEM 333, 357

CHEM 355L F,W,S 3L 0.25
Physical Chemistry Laboratory 1
Selected experiments for students in the
3A term.
For Honours students only
transition state theory of

topics, such as laser chemistry, atmospheric and activated complex theory): selected recent developments in reaction rates (collision theory, catalysts.

CHEM 306 W 2C 0.5 Structural and Synthetic Organic Chemistry Stereochemistry in organic reactions; synthesis of selected organic compounds examined in detail with emphasis on cyclo-addition reactions and condensation reactions.

CHEM 306L W 3L 0.25 Organic Chemistry Laboratory Selected experiments for students taking CHEM 306.


CHEM 310 W 2C 0.5 Special Topics in Organic Chemistry Selected microscale synthetic experiments for students in Year Three Chemistry and Biochemistry programs, including spectroscopic identification of organic compounds.

CHEM 312 F 2C 0.5 Organometallic Chemistry The synthesis, characterization and reactivity of compounds containing metal-carbon covalent bonds. Metal carbonyls and their derivatives. Olefin, acetylene, pi-arene and related complexes. The nature of the metal-carbon bond. Catalysis by transition metal organometallics.


CHEM 315 W 2C 0.5 Mass Spectrometry Principles involved in the use of electric and magnetic fields for mass analysis. Ionization methods. Applications of mass spectrometric analysis to the identification and quantitation of chemical compounds.

CHEM 316 F 2C 0.5 Thermal and Electrical Analytical Methods Techniques and fundamental principles of thermal and electroanalytical methods.

CHEM 317 F 2C 0.5 Metabolism 2 Properties and metabolism of porphyrins, purines, pyrimidines and biogenic amines. Structure-function relationships of enzymes. Control and transport mechanisms.

CHEM 318 F 2C 0.5 Considerations. 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 319 F 2C 0.5 Mechanistic Organic Chemistry Simple molecular orbital theory with applications to pericyclic reactions. Carbonyl ions, carbanions, carbonates 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 320 F 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 (collision theory, activated complex theory); selected recent topics, such as laser chemistry, atmospheric chemistry, heterogeneous catalysis.

CHEM 321 W 2C 0.5 Introduction to inorganic Chemistry An introduction to the concepts and principles of solid state chemistry, electronic structure, and coordination chemistry.


CHEM 323 F 2C 0.5 Mass Spectrometry Principles involved in the use of electric and magnetic fields for mass analysis. Ionization methods. Applications of mass spectrometric analysis to the identification and quantitation of chemical compounds.

CHEM 324 F 2C 0.5 Thermal and Electrical Analytical Methods Techniques and fundamental principles of thermal and electroanalytical methods.

CHEM 325 F 2C 0.5 Metabolism 2 Properties and metabolism of porphyrins, purines, pyrimidines and biogenic amines. Structure-function relationships of enzymes. Control and transport mechanisms.

CHEM 326 W 2C 0.5 Structural and Synthetic Organic Chemistry Stereochemistry in organic reactions; synthesis of selected organic compounds examined in detail with emphasis on cyclo-addition reactions and condensation reactions.

CHEM 327 W 2C 0.5 Special Topics in Organic Chemistry Special microscale synthetic experiments for students in the Honours Chemistry (Thesis Option) program.

CHEM 328 F 2C 0.5 Metabolism 2 Properties and metabolism of porphyrins, purines, pyrimidines and biogenic amines. Structure-function relationships of enzymes. Control and transport mechanisms.

CHEM 329 F 2C 0.5 Thermal and Electrical Analytical Methods Techniques and fundamental principles of thermal and electroanalytical methods.

CHEM 330 F 2C 0.5 Metabolism 2 Properties and metabolism of porphyrins, purines, pyrimidines and biogenic amines. Structure-function relationships of enzymes. Control and transport mechanisms.

CHEM 331 F 2C 0.5 Organometallic Chemistry The synthesis, characterization and reactivity of compounds containing metal-carbon covalent bonds. Metal carbonyls and their derivatives. Olefin, acetylene, pi-arene and related complexes. The nature of the metal-carbon bond. Catalysis by transition metal organometallics.


CHEM 333 F 2C 0.5 Mass Spectrometry Principles involved in the use of electric and magnetic fields for mass analysis. Ionization methods. Applications of mass spectrometric analysis to the identification and quantitation of chemical compounds.

CHEM 334 F 2C 0.5 Thermal and Electrical Analytical Methods Techniques and fundamental principles of thermal and electroanalytical methods.

CHEM 335 F 2C 0.5 Metabolism 2 Properties and metabolism of porphyrins, purines, pyrimidines and biogenic amines. Structure-function relationships of enzymes. Control and transport mechanisms.

CHEM 336 W 2C 0.5 Structural and Synthetic Organic Chemistry Stereochemistry in organic reactions; synthesis of selected organic compounds examined in detail with emphasis on cyclo-addition reactions and condensation reactions.

CHEM 337 W 2C 0.5 Special Topics in Organic Chemistry Special microscale synthetic experiments for students in the Honours Chemistry (Thesis Option) program.

CHEM 338 W 2C 0.5 Metabolism 2 Properties and metabolism of porphyrins, purines, pyrimidines and biogenic amines. Structure-function relationships of enzymes. Control and transport mechanisms.

CHEM 339 F 2C 0.5 Organometallic Chemistry The synthesis, characterization and reactivity of compounds containing metal-carbon covalent bonds. Metal carbonyls and their derivatives. Olefin, acetylene, pi-arene and related complexes. The nature of the metal-carbon bond. Catalysis by transition metal organometallics.


CHEM 341 F 2C 0.5 Mass Spectrometry Principles involved in the use of electric and magnetic fields for mass analysis. Ionization methods. Applications of mass spectrometric analysis to the identification and quantitation of chemical compounds.

CHEM 342 F 2C 0.5 Thermal and Electrical Analytical Methods Techniques and fundamental principles of thermal and electroanalytical methods.

CHEM 343 F 2C 0.5 Metabolism 2 Properties and metabolism of porphyrins, purines, pyrimidines and biogenic amines. Structure-function relationships of enzymes. Control and transport mechanisms.

CHEM 344 F 2C 0.5 Organometallic Chemistry The synthesis, characterization and reactivity of compounds containing metal-carbon covalent bonds. Metal carbonyls and their derivatives. Olefin, acetylene, pi-arene and related complexes. The nature of the metal-carbon bond. Catalysis by transition metal organometallics.


CHEM 346 W 2C 0.5 Mass Spectrometry Principles involved in the use of electric and magnetic fields for mass analysis. Ionization methods. Applications of mass spectrometric analysis to the identification and quantitation of chemical compounds.

CHEM 347 F 2C 0.5 Thermal and Electrical Analytical Methods Techniques and fundamental principles of thermal and electroanalytical methods.

CHEM 348 F 2C 0.5 Metabolism 2 Properties and metabolism of porphyrins, purines, pyrimidines and biogenic amines. Structure-function relationships of enzymes. Control and transport mechanisms.

CHEM 349 F 2C 0.5 Organometallic Chemistry The synthesis, characterization and reactivity of compounds containing metal-carbon covalent bonds. Metal carbonyls and their derivatives. Olefin, acetylene, pi-arene and related complexes. The nature of the metal-carbon bond. Catalysis by transition metal organometallics.


CHEM 351 F 2C 0.5 Mass Spectrometry Principles involved in the use of electric and magnetic fields for mass analysis. Ionization methods. Applications of mass spectrometric analysis to the identification and quantitation of chemical compounds.

CHEM 352 F 2C 0.5 Thermal and Electrical Analytical Methods Techniques and fundamental principles of thermal and electroanalytical methods.

CHEM 353 F 2C 0.5 Metabolism 2 Properties and metabolism of porphyrins, purines, pyrimidines and biogenic amines. Structure-function relationships of enzymes. Control and transport mechanisms.

CHEM 354 F 2C 0.5 Organometallic Chemistry The synthesis, characterization and reactivity of compounds containing metal-carbon covalent bonds. Metal carbonyls and their derivatives. Olefin, acetylene, pi-arene and related complexes. The nature of the metal-carbon bond. Catalysis by transition metal organometallics.


CHEM 356 F 2C 0.5 Mass Spectrometry Principles involved in the use of electric and magnetic fields for mass analysis. Ionization methods. Applications of mass spectrometric analysis to the identification and quantitation of chemical compounds.

CHEM 357 F 2C 0.5 Thermal and Electrical Analytical Methods Techniques and fundamental principles of thermal and electroanalytical methods.

CHEM 358 F 2C 0.5 Metabolism 2 Properties and metabolism of porphyrins, purines, pyrimidines and biogenic amines. Structure-function relationships of enzymes. Control and transport mechanisms.

CHEM 359 F 2C 0.5 Organometallic Chemistry The synthesis, characterization and reactivity of compounds containing metal-carbon covalent bonds. Metal carbonyls and their derivatives. Olefin, acetylene, pi-arene and related complexes. The nature of the metal-carbon bond. Catalysis by transition metal organometallics.
Chinese

For courses in Chinese see East Asian Studies.

Civil Engineering

Undergraduate Officer
G. McNeice, E2-2332, ext. 3983

Undergraduate Co-ordinator
R. Cockfield, E2-2324, ext. 3976

CIV E 126 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, elasticity, fluids) and descriptive geometry (points, lines, planes, intersections, developments). Exercises include laboratory experiments to illustrate relation of physics principles to engineering and a team project/experiment involving planning, conducting and reporting results in written and oral presentations. Introduction to group dynamics.

CIV E 127 W,S 3C,2T 0.5
Statics

CIV E 204 F,W 3C,1T 0.5
Mechanics of Solids 1

CIV E 205 F,S 3C,1T 0.5
Mechanics of Solids 2

CIV E 221 F,W 3C,1T 0.5
Calculus 2

CIV E 222 F,S 3C,1T 0.5
Differential Equations

CIV E 224 F,W 2C,2T 0.5
Probability and Statistics

CIV E 225 F,S 2C,2T 0.5
Geology for Engineers
A study of earth processes and earth materials from an engineering point of view. Topics include: mineral and rock identification, the rock cycle, structural geology, geology of Canada, effects of water, ice and wind. Description of aggregates used in engineering works.

CIV E 226 F,W 3C,1T,3L 0.5
Structure and Properties of Materials

CIV E 280 S,F 4C,2T,2L 0.75
Fluid Mechanics and Thermal Sciences

CIV E 291 F,S 1 wk fld 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 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 splitting.

Six lab sessions.

CIV E 353 W,S 3C,1T,2L 0.5
Geotechnical Engineering I
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.

CIV E 354 F,W 3C,1T 0.5
Geotechnical Engineering 2

CIV E 375 W,S 3C,1T,2L 0.5
Water Quality Engineering

Six lab sessions.

CIV E 381 F,W 3C,1T,1L 0.5
Hydraulics

Four lab sessions. Prereq: CIV E 280 or equivalent

CIV E 398 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 1G,3T 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. The students are encouraged to independently 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 402 F,S 3C,1T 0.5
Structural Analysis 2

CIV E 404 W 2C,2T 0.5
Structural Analysis 3
Approximate methods of analysis for a variety of structural forms. Application of approximate techniques to beams, building frames, shear wall structures, plates, buckling and vibration problems. Approximate structural design. Prereq: CIV E 313, 413

CIV E 405 W 3C,1T 0.5
Structural Dynamics

CIV E 407 W 2C,2T 0.5
Building Science and Technology

CIV E 410 F,S 3C,1T 0.5
Structural Steel Design

CIV E 414 S,F 3C,1T 0.5
Structural Concrete Design 2

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 principle, method of weighted residuals, element shapes, and interpolation functions.

CIV E 430 W 2C,2L 0.5
Experimental Mechanics

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
The emphasis is on computer aided characteristics. Primary treatment. Secondary CIV systems. Design of waste and storm water Deatgn of Urban Water Syateme lectures and a subdivision design pmjectment. The course consists of 24 hours of cdlectlon systems. Storm water manage-

Mathematical modelling of tmnsport phe

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Wastewater quantity. Wastewater charac-

treatment. Sludge treatment and diiposal. nomena in rlvers. estuaries and lakes.

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Course Descriptions
Civil Engineering
Classical Studies

CIV E 454 W 2C.2T 0.5
Geotechnical Engineering 3
Simulation of geotechnical consulting practice. Students are required to complete several projects, based on actual case studies, which require problem identification, evaluation of geotechnical data, analysis, design and report preparations.
Prereq: CIV E 353, 354

CIV E 460 F 3C.2T 0.5
Orthopaedic 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. Students must have had background study in properties and mechanics of materials equivalent to CIV E 204 and CIV E 285. Registration in this course will be assessed on an individual basis through scheduled interviews.
Cross-listed as GEN E 460

CIV E 472 F,S 3C.1T 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

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.

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

CIV E 496 W 2C.2T 0.5
Construction Engineering

CIV E 498 S,F 2S 0.0
Seminar

The engineer in society. Principles, methods and practice of Civil Engineering. Informal lectures.


Classical Studies

Undergraduate Officer
L. Neur, ML 240, ext. 2801

CLASSICAL STUDIES
(Courses in Translation)

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. CLAS courses were formerly designated C CIV.

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.

CLAS 101 W 3C 0.5
Colossae – 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: Homer and Heroic Greece; Pheidias and the Rise of Democracy; Socrates, Man and Martyr; Alexander the Great and The Age of Expansion.

CLAS 102 F 3C 0.5
Colossae – 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 Flies; Nero and the Corruption of Power; Hadrian and the Imperial Machine.

CLAS 201 S,F 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.
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 enrollment is limited.

CLAS 251 F 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 S, W 3C 0.5
Roman History
A military, political, social and economic survey of Greece 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 F 3C 0.5
Early Medieval Society
A survey of early medieval civilization featuring such topics as the individual (male and female), political institutions, art, architecture, religion, philosophy, literature, social life and leisure activities.

CLAS 265 F 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 266 3C 0.5
Ancient Tragedy in Translation
This course focuses upon the dramatic literature of the classical age in Athens. It features the Orestes of Aeschylus, the "Oedipus" plays of Sophocles, and the Medea, Hippolytus and Bacchae 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

ancient Greece and Rome. Each year, two of the following will be examined: women in society, slavery and the labour force, the aged and infirm, human sexuality and sexual mores, children and education, minority groups and racial prejudice, war and conflict.
Prereq: CLAS 201 or 202 or instructor's permission

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 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 3C 0.5
Greek Art and Architecture
A survey of the art and architecture of the ancient Greek world from the Minoan to the Hellenistic periods. Not open to first-year students.
Cross-listed as FINE 310

CLAS 352 F 3C 0.5
Roman Art and Architecture
A survey of the art and architecture of the Roman world from Etruscan to Imperial times. Not open to first-year students.
Cross-listed as FINE 311

CLAS 361 F 3C 0.5
History of Ancient Philosophy 1
From the beginnings to Plato.
Cross-listed as PHIL 380

CLAS 362 W 3C 0.5
History of Ancient Philosophy 2
From Aristotle to the close of classical antiquity.
Cross-listed as PHIL 381

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 268 or instructor's permission
Cross-listed as DRAMA 385 (formerly 356)

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
Christianteity and the Roman Empire
This course examines the relationship between Christianity and the Roman Empire, dealing in particular with the Christians in the social context of the Roman Empire generally and its various regions.
Prereq: CLAS 202, 252 or permission of instructor

CLAS 373 3C 0.5
The Fall of the Roman Empire
This course deals with the transition of the Roman Empire into the beginnings of the European states in the West and the Byzantine Empire in the East. Popular theories for the "decline and fall" of the old Roman Empire are examined.
Prereq: CLAS 202, 252 or instructor's permission

CLAS 384 3C 0.5
Science and Technology of Ancient Greece and Rome
A study of scientific thought and achievements in such areas as astronomy, biology, anatomy and medicine, and of the technological skills which produced and distributed raw materials, manufactured goods and agricultural products.
Prereq: First year science or engineering course, or CLAS 201 or 202 or 251 or 252 or instructor's permission

CLAS 402 W 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
# Course Descriptions

## Classical Studies

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Title</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>CLAS 485 2C 0.5</td>
<td>Greco-Roman Civilization and History 1</td>
<td>Senior seminar; intensive study of various problems.</td>
</tr>
</tbody>
</table>
|              | *Introductory Note*                                | Students should consult with the departmental Undergraduate Advisor for the latest information on course offerings. Some courses are offered in rotation. |}

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</tr>
</thead>
<tbody>
<tr>
<td>CLAS 486 2S 0.5</td>
<td>Greco-Roman Civilization and History 2</td>
<td>Senior seminar; intensive study of various problems.</td>
</tr>
</tbody>
</table>
|              | *Introductory Note*                                | Students should consult with the departmental Undergraduate Advisor for the latest information on course offerings. Some courses are offered in rotation. |}

### GREEK

#### Introductory Note
Students should consult with the departmental Undergraduate Advisor for the latest information on course offerings. Some courses are offered in rotation.

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<thead>
<tr>
<th>Course Code</th>
<th>Title</th>
<th>Description</th>
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</thead>
<tbody>
<tr>
<td>GRK 100A F 4C 0.5</td>
<td>Introductory Ancient Greek 1</td>
<td>A course designed for students beginning the study of ancient Greek who have not yet reached the level expected in GRK 231/232. The teaching approach emphasizes exposure to simple texts as soon as possible, but students desiring minimal competence in reading should go on to do GRK 100B. GRK 100A and RS 106A may not both be taken for credit.</td>
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<thead>
<tr>
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<th>Description</th>
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<tbody>
<tr>
<td>GRK 100B W 4C 0.5</td>
<td>Introductory Ancient Greek 2</td>
<td>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</td>
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<tr>
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<th>Title</th>
<th>Description</th>
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</thead>
<tbody>
<tr>
<td>GRK 231 F 3C 0.5</td>
<td>Intermediate Greek</td>
<td>The course will complete the study of Greek grammar and begin more extensive reading in Greek authors (normally Homer and Herodotus). Prereq: GRK 100B, OAC or Grade 13 Greek or instructor's permission</td>
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<thead>
<tr>
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<th>Title</th>
<th>Description</th>
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</thead>
<tbody>
<tr>
<td>GRK 232 W 3C 0.5</td>
<td>Selections from Greek Authors</td>
<td>A literature course designed to follow GRK 231. Authors normally read are Euripides, Thucydides and Plato. Prereq: GRK 100B, OAC or Grade 13 Greek or instructor's permission</td>
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<tr>
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</thead>
<tbody>
<tr>
<td>GRK 262 3C 0.5</td>
<td>Introduction to Plato</td>
<td>Selections from Plato. Prereq: GRK 100B, OAC or Grade 13 Greek or instructor's permission</td>
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<tr>
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<tbody>
<tr>
<td>GRK 271 3C 0.5</td>
<td>Hellenistic and Later Greek Literature</td>
<td>Selections from Christian and pagan writers. Prereq: GRK 100, Grade 13 or OAC Greek, or instructor's permission</td>
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<tr>
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<tbody>
<tr>
<td>GRK 351 2C 0.5</td>
<td>Advanced Composition and Grammar</td>
<td>Intensive study of Greek language and style through composition and translation. Prereq: GRK 251, or consent of instructor</td>
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<tr>
<th>Course Code</th>
<th>Title</th>
<th>Description</th>
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</thead>
<tbody>
<tr>
<td>GRK 361 3C 0.5</td>
<td>The Drama of Euripides</td>
<td>An examination of the dramatic art of Euripides by translation of selected plays and the reading of other plays in translation. Prereq: One full 200-level Greek course or instructor's permission</td>
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</thead>
<tbody>
<tr>
<td>GRK 362 3C 0.5</td>
<td>The Drama of Sophocles</td>
<td>An examination of the dramatic art of Sophocies by translation of at least one play and the reading of others in translation. Prereq: One full 200-level Greek course or instructor's permission</td>
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<tr>
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<tbody>
<tr>
<td>GRK 371 3C 0.5</td>
<td>Introduction to the Greek Historians</td>
<td>Selections from Xenophon and others. Prereq: One full 200-level Greek course or instructor's permission</td>
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</tbody>
</table>

### LATIN

#### Introductory Note
Students should consult with the departmental Undergraduate Advisor for the latest information on course offerings. Some courses are offered in rotation.

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<tr>
<th>Course Code</th>
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</thead>
<tbody>
<tr>
<td>GHK 372 3C 0.5</td>
<td>Herodotus</td>
<td>Selections from the Persian Wars. Prereq: One full 200-level Greek course or instructor's permission</td>
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<tr>
<th>Course Code</th>
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<th>Description</th>
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<tbody>
<tr>
<td>GRK 391 3C 0.5</td>
<td>Advanced Greek Reading</td>
<td>A reading course designed to follow GRK 232 or GRK 262. 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 student. Prereq: One full 200-level course in GRK or instructor's permission</td>
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<tr>
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<th>Title</th>
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<tbody>
<tr>
<td>GRK 452 3C 0.5</td>
<td>Homer</td>
<td>Extended reading of Homer.</td>
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<th>Title</th>
<th>Description</th>
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</thead>
<tbody>
<tr>
<td>GRK 461 2S 0.5</td>
<td>The Drama of Aeschylus</td>
<td>Selected plays</td>
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<tr>
<th>Course Code</th>
<th>Title</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>GRK 462 2S 0.5</td>
<td>The Comedy of Aristophanes</td>
<td>An examination of the dramatic art of Aristophanes by translation of at least one play and the reading of others in translation.</td>
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<th>Description</th>
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<tbody>
<tr>
<td>GRK 471 2S 0.5</td>
<td>Thucydides</td>
<td>Detailed study of the Peloponnesian War.</td>
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<tbody>
<tr>
<td>GRK 481 3C 0.5</td>
<td>The Philosophy of Plato</td>
<td>Detailed study of The Republic.</td>
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<tbody>
<tr>
<td>GRK 482 2S 0.5</td>
<td>The Philosophy of Aristotle</td>
<td>Detailed study of the major works.</td>
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<tr>
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<th>Description</th>
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<tbody>
<tr>
<td>CLAS 490-499</td>
<td>Senior Seminars</td>
<td>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. °Senior standing or instructor's permission is a prerequisite for any 400-level Greek course.</td>
</tr>
</tbody>
</table>

### Notes
- Students should consult with the departmental Undergraduate Advisor for the latest information on course offerings. Some courses are offered in rotation.
Course Descriptions
Classical Studies

LAT 100 A 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. Students are advised to preregister early for this course as enrollment is limited.

LAT 100 B 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 261 3C 0.5
Latin Prose 1
Selections from the Letters of Cicero and Pliny.

LAT 262 3C 0.5
Latin Prose 2
Selections from Livy and Suetonius.

LAT 272 3C 0.5
An Introduction to Vergil
Selections from the Works of Vergil.
Prereq: OAC or Grade 13 Latin, LAT 100B or instructor's permission.

LAT 281 3C 0.5
Latin Poetry 1
Selections from the lyric poems of Catullus and Horace.

LAT 282 3C 0.5
Latin Poetry 2
Selections from Ovid and Martial.

LAT 351 3C 0.5
Latin Composition and Grammar
Composition, translation and grammar with intensive analysis of selected passages.

LAT 352 3C 0.5
The History of the Latin Language
A study of the history and development of the Latin language from its origins to its evolution into the Romance languages.

LAT 361 3C 0.5
Cicero
The life and works of Cicero, his historical importance and his contribution to Latin literature. Selections from various works.
Prereq: One full 200-level course in LAT or instructor's permission

LAT 362 3C 0.5
Lucretius
Selections from the De Rerum Natura.
Prereq: One full 200-level course in LAT or permission of instructor

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: One full 200-level course in LAT or instructor's permission

LAT 371 3C 0.5
Introduction to the Roman Historians
Selections from Sallust and Livy; a study of the development of Roman historiography.
Prereq: One full 200-level course in LAT or instructor's permission

LAT 372 3C 0.5
Tacitus
Selections from the works of Tacitus.
Prereq: One full 200-level Latin course or instructor's permission

LAT 381 3C 0.5
Medieval Latin 1
Selections from the works of the fourth to the 12th centuries A.D.
Prereq: One full 200-level Latin course or instructor's permission

LAT 382 3C 0.5
Medieval Latin 2
Selections from works of the 12th century A.D. to the Renaissance.
Prereq: One full 200-level Latin course or instructor's permission

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: One full 200-level course in LAT or instructor's permission
Recommended: LAT 351

LAT 421 2S 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 461 F 2S 0.5
Vergil 1
Selections from Aeneid 1-6.

LAT 462 2S 0.5
Vergil 2
Aeneid VII - XII (selections); readings from the Eclogues and Georgics.
Prereq: LAT 461 or instructor's permission

LAT 471 3C 0.5
Roman Elegy
Selections from Catullus, Ovid, Propertius and Tibullus.

LAT 481 W 3C 0.5
Roman Satire 1
Selections from Horace and Persius.

LAT 482 3C 0.5
Roman Satire 2
Selections from Petronius, Martial and Juvenal.

LAT 491-494
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.
Senior standing or instructor's permission is a prerequisite for any 400-level Latin course.

LAT 491 2S 0.5
Augustan History
The Res Gestae will be read, as well as selections from Suetonius and Tacitus. Offered at Wilfrid Laurier University.
Combinatorics and Optimization

Undergraduate Office
C.J. Colbourn, MC 5020, ext. 4166
e-mail: cjcolbou@watmath.waterloo.edu

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: E&CE 223, E&CE 250
Antireq: C&O 220
Cross-listed as E&CE 203
Not open to students in the Faculty of Mathematics

C&O 220 W 3C 0.5
Introductory Combinatorics
Elementary principles of enumeration. Principle of inclusion-exclusion, generating functions, recurrence equations. Elementary graph theory and graphical algorithms. Introduction to design theory.
Prereq: C&O 230
Antireq: C&O 220
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
C&O 227 cannot be counted for credit toward a BMath Honours degree.

C&O 230 F,W,S 3C 0.5
Introduction to Combinatorics
Introduction to the combinatorics of ordinary generating functions. Introduction to basic graph theory and graphical algorithms.
Prereq: MATH 136, 138
Antireq: C&O 220
Also offered at St. Jerome’s College in the Fall term

C&O 330 F 3C 0.5
Combinatorial Enumeration
The combinatorics of the ordinary and exponential generating functions. Matrix methods, and decompositions. Applications to the enumeration of sequences, permutations, trees, lattice paths and partitions.
Prereq: C&O 230

C&O 331 W 3C 0.5
Coding Theory
A first course in error-correcting codes. Linear block codes, Hamming-Goley codes and multiple error-correcting BCH codes are studied. Various encoding and decoding schemes are considered.
Prereq: PMATH 338
Offered at St. Jerome’s College.

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
Antireq: C&O 355, ACTSC 355
C&O 355 may be substituted for C&O 350 in any degree program, or for prerequisite purposes.
Also offered at St. Jerome’s College in the Fall term

C&O 351 W 3C 0.5
Network Flow Theory
Prereq: C&O 350
Also offered at St. Jerome’s College in the Winter term

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
Antireq: 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 W 3C 0.5
Algebraic Enumeration
The Lagrange implicit function theorem, hypergeometric series, and the ring of formal Laurent series. The combinatorics of Eulerian generating series, enumeration under the action of a group, the algebra of symmetric functions, the group algebra of the symmetric group, with applications.
Prereq: C&O 330

C&O 434 F 3C 0.5
Combinatorial Designs
Prereq: PMATH 336
C&O 437 W 3C 0.5
Cryptography and Communications Security
Conventional or single key cryptography from the Caesar cipher to the U.S. Data Encryption Standard. Public or two key cryptography. Applications include secrecy/privacy, user or message authentication, financial transactions authentication.
Prereq: STAT 230. At least one of C&O 331 and PMATH 340 is recommended.

C&O 438 F 3C 0.5
Combinatorial Computing
Applications of computers to combinatorial problems. General procedures - backtrack programming, generation of permutations, partitions, etc., as well as the solution of many specific problems. Includes an introduction to computational complexity.
Prereq: C&O 230. Some programming experience is required.

C&O 439 3C 0.5
Topics in Combinatorics
An undergraduate seminar in combinatorics. The primary objective is to study current work in specific areas of combinatorics. Course content may vary from term to term.
Prereq: Consent of instructor

C&O 440 F 3C 0.5
Topics in Graph Theory
An in-depth study of one or two topics in graph theory. Course content may vary from term to term. Topics may include planar graphs, extremal graph theory, directed graphs, enumeration, algebraic graph theory, probabilistic graph theory, connectivity, graph embedding, colouring problems.
Prereq: C&O 342 or consent of instructor

C&O 444 W 3C 0.5
Algebraic Graph Theory
Prereq: C&O 230, PMATH 336

C&O 450 F 3C 0.5
Combinatorial Optimization
Prereq: C&O 351 or 355

C&O 452 W 3C 0.5
Integer Programming
Formulation of problems as integer linear programs. Solution by branch-and-bound and cutting plane algorithms. Introduction to the theory of valid inequalities and polyhedral combinatorics.
Prereq: C&O 351 or 355

C&O 453 F 3C 0.5
Network Design
Prereq: C&O 350. C&O 351 is recommended.

C&O 454 S 3C 0.5
Scheduling
Sequencing algorithms for scheduling tasks on single machines, parallel machines, and flow shops. Applications to scheduling computers and manufacturing facilities. Combinatorial techniques used in algorithm development and convergence proofs.
Prereq: C&O 350. 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 465 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 480 W 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 pi, 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

### 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, as defined on page 13:10, and another designed for non-specialists who wish to become sophisticated computer users.

   CS 130 and 134 are normally restricted to students in the Faculty of Mathematics. 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.

   Several CS Major courses are also open to other students. In addition, where resources permit, students with exceptionally high academic standing in other programs may be considered for admission to restricted CS Major courses on an individual basis. To be considered, students should consult a Computer Science Undergraduate Advisor.

2. Computer Science Major courses require students to have experience programming with a block-structured imperative language such as Pascal, C or Turing. These concepts of 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 II will need to carefully plan the sequence of prerequisites in order to take these courses in the 3B term.

### Course Descriptions

#### Computer Science

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Format</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>CS 100</td>
<td>F,W,S</td>
<td>2C,2L</td>
</tr>
<tr>
<td>CS 102</td>
<td>F,W,S</td>
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<tr>
<td>CS 130</td>
<td>F,W,S</td>
<td>3C,1T,3L</td>
</tr>
<tr>
<td>CS 134</td>
<td>F,W,S</td>
<td>3C,3L</td>
</tr>
</tbody>
</table>

#### Introduction to Computer Usage

This course introduces computer users to the various computer services available on campus. Hands-on experience with common software and hardware is 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.

**Prerequisite:** Computer literacy (e.g., CS 100 or extensive high school computing)

**Antireq:** CS 133, 134

#### Concepts of Computer Programming

This course introduces students to the fundamental concepts of computer programming. Introduction to a programming language applicable to the student's field of study. Topics include: structured programming, simple data elements, sequential operations, iterative statements, selection statements, data aggregations, functions, and subroutines.

**Prerequisite:** Computer literacy

**Antireq:** CS 133

#### Introduction to Computer Programming

This course introduces students to the fundamental concepts of computer programming. Introduction to a programming language applicable to the student's field of study. Topics include: structured programming, simple data elements, sequential operations, iterative statements, selection statements, data aggregations, functions, and subroutines.

**Prerequisite:** Computer literacy

**Antireq:** CS 133

#### Computer Science

- **Prerequisite:** Full-time degree registration in the Faculty of Mathematics
- **Antireq:** CS 100, 102
- **Antireq:** 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**
Course Descriptions
Computer Science

CS 352 F.W.S 3C 0.5
Concurrent Programming
The function of modern operating systems and their relationship to the computer architecture that underlies their implementation, including file systems, I/O and interrupt handling, CPU scheduling and swapping, memory management, parallel processing. The course also includes an overview of computer networking, performance monitoring, modeling and simulation, and the social implications of computing.
Prereq: CS 241
Antireq: CS 330

CS 354 F.W. 3C 0.5
Software Systems
An introduction to the system software of modern computing systems, with an emphasis on the management of hardware resources and the support of multiple processes. Major topics: object-oriented programming, critical sections and synchronization, primitives for concurrency control, the deadlock problem, memory management, file systems, introduction to distributed computing.
Prereq: CS 352 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 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

CS 374 W.S. 3C 0.5
Introduction to Scientific Computation: Numerical Approximation
Prereq: CS 134, MATH 235, 237
Antireq: CS 337

CS 430 F 3C 0.5
Applications Software Engineering
An investigation into the role and function of software engineering practice in the construction of computer based systems. Topics include: requirements and specification; documentation techniques; analysis and design; implementation; testing and maintenance; management issues.
Prereq: CS 330 or permission of instructor and third-year standing
Antireq: CS 446
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
CS 432 cannot be counted for credit in a Computer Science Major program.

CS 435 W 3C 0.5
Computer Applications
An overview of some more advanced computer techniques, with an emphasis on their application in the analysis and design of systems. Topics include: data communication; queuing theory fundamentals; 2-D graphics; advanced software and hardware architectures; computer selection.
Prereq: One of CS 334, 335, 336, and third-year standing
CS 435 cannot be counted for credit in a Computer Science Major program.

CS 437 W 3C 0.5
Simulation by Computer
An introduction to the basic techniques of simulation. Discrete simulation models; random number generators; the SIMSCRIPT and GPSS languages; analysis of simulation output; continuous simulation models and the CSMP language.
Prereq: One of CS 230, 246, and third-year standing
Antireq: CS 457
CS 437 cannot be counted for credit in a Computer Science Major program.

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 Lucid. 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

CS 446 W. S 3C 0.5
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.
Prereq: CS 352, and registration in a Computer Science Major program.
CS 354 is recommended
Antireq: CS 430

CS 448 F.S. 3C 0.5
Introduction to Database Management
The course introduces the student to the techniques that have been developed for processing very large collections of data. The requirement that data be held on secondary storage (disks and tapes) has an enormous impact on the design of algorithms to access that data.
Prereq: CS 340, 354 and registration in a Computer Science Major program
Antireq: CS 338
Course Descriptions
Computer Science

CS 450 W 3C 0.5
Computer Architecture
The course is intended to provide the student with an appreciation of modern computer design and its relation to system architecture, compiler technology and operating system functionality. The course places an emphasis on design based on the measurement of performance and its dependency on parallelism, efficiency, latency and resource utilization.
Prereq: CS 351 or (CS 352 and E&CE 223), and registration in a Computer Science Major program

CS 452 W.S 3C 0.5
Real-time Programming
Intended to give students experience with tools and techniques of real-time programming, this course includes not only issues of microcomputer architecture and a real-time programming language and operating system, but also hands-on experience programming a microcomputer for applications such as process control, data acquisition and communication.
Prereq: CS 354 and registration in a Computer Science Major program. CS 351 is recommended

CS 454 F,W,S 3C 0.5
Distributed Systems
An introduction to distributed systems, emphasizing the multiple levels of software in such systems. Specific topics include fundamentals of data communications, network architecture and protocols, local-area networks, concurrency control in distributed systems, recovery in distributed systems, and clock synchronization.
Prereq: CS 354 and registration in a Computer Science Major program. CS 351 is recommended

CS 457 W 3C 0.5
Queueing Models: Analysis, Simulation, and Computer Applications
An introduction to the basic results of queueing theory and the techniques of discrete event simulation. Emphasis is placed on the application of queueing models to computer systems and computer communication networks.
Prereq: CS 352, STAT 231, 333, and registration in a Computer Science Major program
Antireq: CS 437

CS 458 W 3C 0.5
Design of Microprocessor-Based Systems
An introduction to the design of digital systems such as those used in microcomputers, control and industrial applications, or those dedicated to specific tasks. Topics include: digital electronics, microprocessors, memory chips and systems, standard and specialized peripheral chips, development and integration systems, and case studies. Laboratory-oriented: small teams design and implement microprocessor-based systems.
Prereq: CS 351 and registration in a Computer Science Major program

CS 462 F 3C 0.5
Prereq: CS 360

CS 464 W 3C 0.5
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.
Prereq: CS 360

CS 466 F,S 3C 0.5
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.
Prereq: CS 340, 360

CS 472 W 3C 0.5
Numerical Linear Algebra
Prereq: CS 372, or CS 337 and consent of instructor. CS 374 is recommended

CS 476 F 3C 0.5
Numerical Solution of Differential and Integral Equations
Prereq: CS 374, or 337 and consent of Instructor, or CS 372 and consent of Instructor
Cross-listed as AM 441

CS 482 F,W,S 3C 0.5
Techniques in Systems Analysis
Techniques in organization and management theory. Organization of large software systems. Data base concepts. Implementation of computer based information systems. Survey of current topics of interest such as distributed processing, microcomputers and on-line systems.
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, 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.
Pre: CS 340 and registration in a Computer Science Major program

CS 494 FW 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.
Pre: CS 352 and 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.

COURSE NOT OFFERED 1993-94
CS 457 Queueing Models: Analysis, Simulation, and Computer Applications

Croatian

For courses in Croatian see Germanic and Slavic Languages and Literatures.

Course Descriptions
Croatian
Dance

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 200 F 3std 0.5
Special Studies in Dance 1
Participation in a dance production, and the study of related problems in choreography, rehearsal, production and performance.
Pre: Elementary Ballet and Modern Dance or permission of instructor

DANCE 230 F 2C,1std 0.5
Roots of Western Theatre Dance
History and cultural significance of dance up to and including Fokine and Duncan.

DANCE 235 W 3C 0.5
History of 20th-Century Dance
The two major Western theatre dance forms are examined in their radically different but complementary evolutions as perceived through the work of significant choreographers.
Pre: DANCE 230 or permission of instructor

DANCE 241 F 3C,1.5std 0.5
Benesh Notation 1
A theoretical and practical introduction to Benesh Movement Notation at the elementary level focusing on the reading of ballet syllabus work.
Cor: Elementary ballet or permission of instructor
Offered alternate years

DANCE 264 F 2C,1T 0.5
Developmental Aspects of Movement
A study integrating the theoretical and applied aspects of motor and perceptual motor development in children and adolescents. Tutorials will discuss dance activities for children.
Pre: DANCE 111
Ant: KIN 264

DANCE 266 W 2.5hr C 0.5
Principles of Dance Technique
A study of the principles underlying the Western Theatre Dance forms known as Classical Ballet and Modern Dance.
Pre: DANCE 1020 Pre-elementary Ballet and 104D Pre-elementary Modern Dance, or equivalent

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.
Pre: DANCE 200
Cor: 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.

DANCE 341 W 3C,1.5std 0.5
Benesh Notation 2
A theoretical and practical study of Benesh Movement Notation focusing on the reading and recording of ballet variations.
Pre: DANCE 241
Cor: Elementary Ballet or permission of instructor
Offered alternate years

DANCE 353 W 2C,2std 0.5
Modern Dance Composition
This course explores major forms and theories of modern dance choreography through studio practice and seminars.
Co: DANCE 241

DANCE 355 W 2C,2std 0.5
Modern Dance Composition
This course explores major forms and theories of modern dance choreography through studio practice and seminars.
Co: Intermediate Modern Dance or permission of instructor
DANCE 365 W 3C,1T or 1std 0.5
Developmental Foundations of Dance Technique
A study of the physical development of the child between preschool and adolescence, and an integration of this knowledge to the selection and sequencing of dance technique.
Prereq: DANCE 264 and KIN 200 or permission of instructor

DANCE 367 F 3C,1T or 1std 0.5
Developmental Aspects of Movement Learning
An examination of the developmental changes significant to the learning process with a particular emphasis on those factors which affect the learning of dance during childhood and early adolescence.
Prereq: DANCE 264 and PSYCH 101 or permission of instructor

DANCE 371 W 3C 0.5
Issues in Dance and Society
An introduction to dance as a lifelong learning process. Dance-related issues in such settings as community organizations, schools, continuing education programs, cultural organizations, government, and the mass media will be explored through discussion, workshops, guest speakers and observation of ongoing programs.

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, 346, 343
C: Socio-cultural Issues in Dance: DANCE 371
D: Dance Notation: DANCE 441 or 482 (Benesh), or DANCE 442 or 484 (Labanotation)
E: Dance History: DANCE 333, 334 or 434
F: Developmental Studies with Children in Dance: DANCE 264, 367, 484. Recommend auditing PSYCH 211

DANCE 412 W 3C 0.5
Seminar in Dance
An examination of current and major issues in dance.
Prereq: Honours Dance students only

DANCE 441 F 3C 0.5
Advanced Studies in Benesh Notation
A theoretical and practical study of Benesh Notation with application beyond classical ballet techniques, e.g. national dance, mime, jazz, the use of stage properties and the notation of multiple dancers. Students will experience the process of preparing a full notation score.
Prereq: DANCE 341

DANCE 442 F 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 workshop 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 interests. Topics available include:
DANCE 481 Ballet Choreography
Prereq: DANCE 351 and Elementary Ballet
Coreq: Intermediate Ballet
Course Descriptions
Fine and Performing Arts
Drama and Speech Communication

DANCE 203A,B,C,D,E
Year Two Modern Dance 1 F

DANCE 204A,B,C,D,E
Year Two Modern Dance 2 W

DANCE 301A,B,C,E
Year Three Ballet 1 F

DANCE 302A,B,C,E
Year Three Ballet 2 W

DANCE 303A,B,C,E
Year Three Modern Dance 1 F

DANCE 304A,B,C,E
Year Three Modern Dance 2 W

DANCE 401A,B,E
Year Four Ballet 1 F

DANCE 402A,B,E
Year Four Ballet 2 W

DANCE 403A,B,E
Year Four Modern Dance 1 F

DANCE 404A,B,E
Year Four Modern Dance 2 W

COURSES NOT OFFERED

DANCE 242 Labanotation 1
DANCE 333 Canadian Perspectives on Theatre Dance
DANCE 342 Labanotation 2
DANCE 351 Ballet Choreography

Drama and Speech Communication

Undergraduate Officer
W.R. Chadwick, ML 131, ext. 2855

Co-ordinator of Speech Communication
J. Tommasson 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.

Prereq: None

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 221 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.

Prereq: None
Open to students in all faculties but limited enrolment. 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 the instructor

DRAMA 244 W 2C,2L 0.5
Introduction to Technical Production 2
An extension of the studies described in DRAMA 243.

Prereq: DRAMA 243

DRAMA 251 F 3C 0.5
Survey of Dramatic Literature and Dramatic Theory 1
The Greek and Roman periods.
Cross-listed as CLAS 266

DRAMA 259 3C 0.5
Masterpieces of Western Drama – A Study of Performance 1
Plays on film. This course will entails studying a play and then viewing it as a movie.
Course Descriptions
Drama and Speech Communication

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 the play director

DRAMA 307 A/B/C W std 0.5
Special Studies in Theatre Production 2
See DRAMA 306.
Prereq: Permission of the play director

DRAMA 311 3C 0.5
Survey of Dramatic Literature and Theory 2
The Middle Ages, the Elizabethans and Jacobeans (excluding Shakespeare), and the Spanish Golden Age.
Cross-listed as ENGL 232

DRAMA 312 3C 0.5
Survey of Dramatic Literature and Theory 3
French neo-classicism, the Restoration period and sentimental drama.
Cross-listed as ENGL 233A

DRAMA 313 3C 0.5
Survey of Dramatic Literature and Theory 4
The late 18th and 19th centuries; romanticism and naturalism.
Cross-listed as ENGL 233B

DRAMA 314 3C 0.5
Survey of Dramatic Literature and Theory 5
The first part of the 20th century.
Cross-listed as ENGL 233C

DRAMA 315 3C 0.5
Survey of Dramatic Literature and Theory 6
The second part of the 20th century.
Cross-listed as ENGL 233D

DRAMA 316 3C 0.5
Survey of Dramatic Literature and Theory 7
A survey of the modern drama of Australia, New Zealand, and the drama, in English, of Africa and the West Indies.
Cross-listed as ENGL 234

DRAMA 317 3C 0.5
Survey of Dramatic Literature and Theory 8
American drama from the 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.
Prereq: DRAMA 221, 222
Audition required

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 W 3L 0.5
Speech Writing
The analysis, writing and performance of speeches. Analysis will focus on the theory of communication and speech models for imitation; writing, in class workshops; and performance, on student evaluation of speeches.
Recommended: DRAMA 223
Cross-listed as ENGL 308E

DRAMA 324 F 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 the 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 the 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 the instructor

DRAMA 343 F 2LC 0.5
Theatre Management and Technology 1
The theory and practice of theatre technology. Special attention will be given to stage management, production management, house management, and promotions/advertising. The course is an integral part of the departmental production season.
Prereq: DRAMA 243, 244 and permission of the instructor

DRAMA 344 2LC 0.5
Theatre Management and Technology 2
A continuation of the studies described in DRAMA 343.
Prereq: DRAMA 343 and permission of the 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
**Course Descriptions**

**Drama and Speech Communication - Earth Sciences**

**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 1**
Theatre History from Classical Greece to the Renaissance.

**DRAMA 372 3C 0.5**

**Theatre History 2**
Theatre history from the Classical French and English Restoration periods to the present era.

**DRAMA 380 3C 0.5**

**Canadian Drama**
See ENGLISH 316.
Cross-listed as ENGL 316

**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 GER 356

**DRAMA 385 3C 0.5**

**Ancient Comedy in Translation**
Cross-listed as CLAS 365

**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 the 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 6L 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 433 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 the 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 the 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 the 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 the Department

**DRAMA 499A/B F W T 0.5/0.5**

**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 1993-94**
Consult with Drama Undergraduate Officer to determine offerings for 1993-94.

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**Dutch**

For courses in Dutch see Germanic and Slavic Languages and Literatures.

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**Earth Sciences**

Undergraduate Officers
R.G. Roberts, ESC 2328, ext. 3379
S. Schiff, BFG 2213, ext. 2473
D. Rudolph, BFG 2205, ext. 6778

**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. 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

EARTH 121L F 3L 0.25
Introductory Earth Sciences Laboratory 1
For students taking EARTH 121. Laboratory exercises on selected topics from EARTH 121 lectures.

EARTH 122L W 3L 0.25
Introductory Earth Sciences Laboratory 2
For students taking EARTH 122. Laboratory exercises on selected topics form EARTH 122 lectures.

EARTH 123 F 3C,1T 0.5
 Introductory Hydrology
Introduction to components of the hydrologic cycle, the interaction of these components and their relevance to current environmental concerns. Particular consideration will be given to geologic factors as they influence precipitation, surface runoff, urban runoff, streamflow generation, soil moisture, groundwater and surface water-groundwater interactions.

FARTH 126 W 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.

Cross-listed as GEO E 126
Antireq: EARTH 121/122
Restricted to students in the Geological Engineering and Earth Sciences Hydrogeology Option Programs or with permission of the instructor.

FARTH 221 W,3 3C,1T 0.5
Geochemistry 1

Prereq: EARTH 231 or permission of instructor

FARTH 231 F 2C,3L 0.5
Mineralogy
Systematic mineralogy. Classification and interrelationships of chemical, structural and physical properties of the major rock-forming minerals. Elementary petrology of igneous, metamorphic and sedimentary rocks in outcrop and hand specimen.

Prereq: EARTH 121/121L, 122/122L
126 (= GEO E 126), or permission of instructor

FARTH 232 W,S 2C,3L 0.5
Petrography
An introduction to optical mineralogy. The study and occurrence of important rock-forming minerals and their identification in igneous, metamorphic, and sedimentary rocks. The nature and origin of textural features of rocks.

Prereq: EARTH 231

FARTH 235 F 2C,3L 0.5
Stratigraphy
An introduction to the nature, origin and interpretation of stratified earth materials. Emphasis on principles and approaches.

Prereq: EARTH 121/121L, 122/122L

FARTH 236 F 2C,3L 0.5
Principles of Paleontology
The principles of paleontology with particular stress on the species concept and evolution; examples will be drawn primarily from the fossil record of plants and vertebrates. Laboratory work will include projects related to lecture topics.

Prereq: EARTH 121/121L, 122/122L

EARTH 260 F 3C,2L 0.5
Applied Geophysics 1
An introduction to seismic, gravity, electric, electromagnetic and magnetic methods of exploration geophysics.

Prereq: PHYS 111/112 or 121/122 or consent of instructor

EARTH 331 F 2C,3L 0.5
Igneous Petrology
The principles and theories of igneous rock genesis. Silicate phase equilibria in magmatic systems. Magmatic differentiation; distribution and occurrence of magma types.

Prereq: EARTH 231, 232

EARTH 332 W 2C,3L 0.5
Metamorphic Petrology

Prereq: EARTH 232

EARTH 333 W 2C,3L 0.5
Introductory Sedimentology
The origin, transport and deposition of sediments. Size analysis and sedimentary structures. Recent sedimentary environments as a key to the interpretation of ancient sediments. Sedimentary petrology.

Prereq: EARTH 232, 235

EARTH 336 F 2C,3L 0.5
Paleontology
Advanced paleontology emphasizing morphology, classification, evolution, paleoecology and stratigraphic value of fossil invertebrates. Laboratory study of fossil collections.

Prereq: EARTH 236
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 palaeoecological significance of major plant and animal groups in the Quaternary sciences. Relationships of fossil assemblages to modern ecosystems. Students will be expected to arrange with the instructors a field trip in the preceding term.

Prereq: EARTH 440 or consent of instructors

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 F.S 3C.1T 0.5
Physical Hydrogeology
An introduction to physical hydrogeology, including Darcy's law, the groundwater flow equations for steady-state and transient conditions, applications to flow nets, aquifer testing, groundwater resources evaluation, and construction-project development. The role of groundwater in the hydrologic cycle is explored with emphasis on natural groundwater flow systems and their influence on stream flow, slope stability and soil drainage. Physical processes controlling groundwater contamination are introduced.

Prereq: EARTH 121/121L, 122/122L or GEO E 126 or CIV E 253, MATH 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 221 or CIV E 375 and EARTH 231 or permission of the 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 1flab 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 the instructor

EARTH 490 F 1flab 0.0
Field Course
One or more geology field trips normally conducted at the beginning of the Fall term. These trips will emphasize field observations of a wide-ranging nature; some trips will augment field observations with study of specimens, core laboratory data, etc. Field exercises and reports may be part of the requirements. 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 is a good preparation 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 advisor 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
Upon completion of CHINA 201R and 202R, the student should have a reading vocabulary of 1,000 to 1,500 Chinese characters and a writing vocabulary of 700 to 1,000 characters.

JAPAN 101R F,W 3C 0.5
First Year Japanese 1
An introductory course for students who have little or no knowledge of Japanese to develop basic listening, speaking, reading, and writing skills. Practical oral and written exercises incorporating the Hiragana Writing System are used to provide a firm grammatical foundation for further study.

JAPAN 102R S,F,W 3C 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.

JAPAN 201R S,F 3C 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.

JAPAN 202R 3C 0.5
Second Year Japanese 2
In this course, students will continue to develop their language skills with an increased emphasis on spoken Japanese. In addition, students will work on improving grammatical accuracy and vocabulary development as well as continue to acquire more basic information about Japanese culture. The writing of an additional 200 Kanji will be taught.

KOREA 101R F,W 3C 0.5
First Year Korean 1
An introductory course for students who have no or little knowledge of Korean to develop listening, speaking, reading and writing skills along with a sound basis of grammar. The distinctive features of the Korean language and writing system will be introduced. Practical oral, reading and writing exercises will develop the students’ grammatical skills. Particular emphasis is placed on the acquisition of a basic working vocabulary.

KOREA 102R 3C 0.5
First Year Korean 2
Students will deepen their understanding of basic grammatical (particularly verb, noun and adverb) forms and sentence construction and enlarge their general vocabulary. Reading ability will be expanded and more attention will be given to idiomatic expressions and the use of the language in actual contexts.

Please refer to Renison College for further developments in East Asian Studies.

EASIA 210R Chinese Literature in Translation

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.

Economics
4. Due to sabbatical leaves, some courses normally offered may be cancelled in 1993-94. 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.
Prereq: "M" sections only: Grade 13 or OAC calculus. When appropriate, calculus and algebra will be used in "M" sections.

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.
Prereq: "M" sections only: Grade 13 or OAC calculus. When appropriate, calculus and algebra will be used in "M" sections.

ECON 201 F,W,S 3C 0.5
Microeconomic Theory
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 F,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, and MATH 107
Students who have taken or are taking a course in mathematics should check with their Undergraduate Officer to determine if credit will be granted for MATH 107.
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,W,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
Students who have taken or are taking a course of similar content in another discipline should check with their Undergraduate Officer or the Arts Registrar's Office to determine if credit will be granted for both courses.

ECON 231 F,W 3C 0.5
Introduction to International Economics
Theory of comparative advantage and the gains from trade; tariff theory; concepts and measurement of balance of payments; exchange rate systems; reform of international monetary system.
Prereq: ECON 101, 102

ECON 301 F,W 3C 0.5
Intermediate Microeconomics
Pricing and employment of inputs; general equilibrium theory; theory of modern welfare economics with some applications. Intertemporal choice.
Prereq: ECON 201, 202

ECON 302 F,W 3C 0.5
Macroeconomic Theory 2
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 201, 202, 211
Coreq: ECON 301

ECON 304 W 3C 0.5
Financial Markets
A discussion of topics in finance and financial markets. Topics may include implementation of monetary policy in Canada; the demand for money; efficiency of financial markets; futures and options markets; pricing of financial assets; immunization and durations; global financial markets.
Prereq: ECON 201, 202
(Recommended: ECON 231 or 332)

ECON 310 F 3C 0.5
History of Canadian Economic Development
A study of the economic development of Canada; development theories, industrial structure and national policies analysed in a Classical-Marxian framework.
Prereq: ECON 101, 102

ECON 311 F 3C 0.5
Mathematical Economics
Mathematical treatment of partial and general equilibrium models. Topics usually include some of the following: duality, applications of the envelope theorem, discussion of sufficiency conditions for optimisation problems, programming, and growth models.
Prereq: ECON 201, 202, 211 and MATH 125
Strongly recommended for students who intend to do graduate work in Economics

Students who have taken or are taking a course of similar content in the Faculty of Mathematics should check with their Undergraduate Officer to determine if credit will be granted for both courses.
ECON 321 W.S 3C 0.5
Introduction to Econometrics
An introductory course in the theory and practice of econometrics, focusing on multiple regression analysis and associated topics such as multicollinearity, heteroskedasticity and serial correlation. Simultaneous equation models will also be introduced. Computer assignments make up part of the course.
Prereq: ECON 221
Students who have taken or are taking a course of similar content in the Faculty of Mathematics should check with their Undergraduate Officer to determine if credit will be granted for both courses.

ECON 331 F,W 3C 0.5
International Trade
An examination of theories of international trade at an intermediate level. Topics include the gains from trade, theories of trade determination (Ricardian, Heckscher-Ohlin, increasing returns to scale), the effects of tariffs, the gains from trade, multinational corporation behaviour and factor mobility.
Prereq: ECON 201

ECON 332 W 3C 0.5
International Finance
An analysis of the main issues in international finance. Topics include international borrowing and lending, intertemporal gains from trade, current account and balance of trade movements, the determination of exchange rates and foreign exchange markets.
Prereq: ECON 201, 202

ECON 333 W 3C 0.5
International Economics
An economic analysis of regional development: theories and policies, with special reference to Canada.
Prereq: ECON 201

ECON 335 W 3C 0.5
Economic Development
The nature of the problem of economic development; theories of economic development; major policy issues in economic development.
Prereq: ECON 201, 202, 231

ECON 341 F,W 3C 0.5
Public Finance 1
The economic rationale of governmental fiscal activity; the structure and economic effects of public expenditures and revenues; the analysis of income, consumption and wealth taxes.
Prereq: ECON 102, 201

ECON 343 F 3C 0.5
Urban Economics
Application of economic analysis to urban areas. Topics include location decisions of households 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 101
(Recommended: ECON 201)

ECON 344 F 3C. 0.5
Consumer Theory
Economic principles for consumer analysis; market responsiveness; conditions causing problems; public and private consumption; alternative economic policies.
Prereq: ECON 201

ECON 345 W 3C 0.5
Industrial Organization
An economic analysis of market structure, behaviour and performance with special reference to the Canadian manufacturing sector.
Prereq: ECON 201

ECON 351 W 3C 0.5
Labour Economics
A study of the supply of labour by individuals (and unions) and the demand for labour by firms; topics include the labour market effects of social assistance, unemployment insurance and minimum wages, discrimination in the labour market, efficient wage contracts, the determinants of wage inflation and unemployment.
Prereq: ECON 201, 202

ECON 355 W 3C 0.5
Economics of Energy and Natural Resources
An analysis of the economics of conservation, especially the adequacy of the market mechanism as an allocator of resource use over time. Issues concerning the economic behaviour of Canada's fishery, forest, fuel and nonfuel mineral industries will be considered.
Prereq: ECON 201

ECON 357 F 3C 0.5
Environmental Economics
Application of economic theory to problems of the environment, in particular, air, water, and land pollution. Emphasis is on the theory of the management of common property resources.
Prereq: ECON 201

ECON 361 F,W 3C 0.5
Cost-Benefit Analysis and Project Evaluation
Methods for evaluating private and public projects; decision rules, efficiency conditions and methods of conducting cost-benefit analysis. Application of the technique.
Prereq: ECON 201

ECON 363 W 3C 0.5
Contemporary Canadian Problems
A "topic oriented" seminar course. Problems are selected from a list that includes regulatory economics, poverty, unemployment, industrial policy, safety and others. The format assists the student in gaining analytical skills through work on the selected topics.
Prereq: ECON 201, 202

ECON 365 W 3C 0.5
Economic Development of Modern Europe 1790-1973
Prereq: ECON 101, 102

ECON 381-383 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
Advanced Microeconomic Theory
The course considers a number of advanced topics at the forefront of modern microeconomics. Possible topics: uncertainty, equilibrium analysis, market structures.
Prereq: ECON 211, 301
(Recommended: ECON 311) Preference for admission will be given to fourth-year Honours Economics students. Consent of the instructor or Undergraduate Officer required for other students.

ECON 402 W,S 3C 0.5
Advanced Macroeconomic Theory
The course considers a number of advanced topics at the forefront of modern macroeconomics. Possible topics include growth, business cycle theory, search theory and co-ordination failures.
Prereq: ECON 301, 302
(Recommended: ECON 311) Preference for admission will be given to fourth-year students. Consent of the instructor or Undergraduate Officer required for other students.
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
Advanced Monetary Theory and Policy
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 211, 221, 301, 302
(Recommended: ECON 402, completed or taken concurrently.)

ECON 406 3S 0.5
Keynes and Post Keynesian Economics
This course draws on Keynes, Fisher, Kalecki, Weintraub, Minsky and others to explore alternatives to current macroeconomic theory and policies seeking solutions to problems of stagnation, debt crises, high interest rates and lagging growth.
Prereq: ECON 301, 302
This course is primarily for fourth-year General and Honours students. However, MA students and third-year students who meet the prerequisites may also be admitted.

ECON 410 F 3C 0.5
Economic Thought
A critical survey of the development of Economic Theory from Classical Political Economy to the Keynesian Revolution.
Prereq: ECON 231. 301, 302

ECON 411 F 3C 0.5
Advanced Mathematical Economics
Mathematical formulation of economic theory; introduction to dynamic optimisation and optimal control theory; analysis of stability conditions; introduction to linear and nonlinear programming, game theory.
Prereq: ECON 301, 302, 311

ECON 420 3C 0.5
Economic Development of the United States, 1607-1975
A survey of U.S. Economic Development from the beginnings of organized settlement to the crises of the early 1970's, 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, and MATH 125

ECON 422 W 3C 0.5
Topics in Econometrics
An applied topics course involving extensive use of computers, requiring the completion of a term project. While topics covered will vary with the instructor's interests, they will normally be drawn from the following: estimation of stochastic linear regression models; distributed lags and time series models; identification and estimation of simultaneous equations; non-linear estimation; maximum likelihood method; pooling cross-sections and time series; limited dependent variable models; and specification issues.
Prereq: ECON 211, 321 and MATH 125

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 431 A 3S 0.5
Computable General Equilibrium Modelling
Basic concepts and techniques of computable general equilibrium modelling, fixed-point theory and algorithm, data and calibration, system sensitivity, applications in various fields of economics, e.g., taxation, international trade, industrial organization, economic history, economic development, and fixed-price equilibria.
Prereq: ECON 211, 301
(Recommended: ECON 311, 331, or 341)

ECON 471 3C 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 471 A/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, Neill, Sweezy and others are integrated in what can be termed the "Classical Marxian" tradition.
Prereq: Consent of instructor or Undergraduate Officer

ECON 463B F 3C 0.5
The Political Economy of Socialism
An examination of programs for the creation of socialist economy based on the work of Horvat, Nove, Medvedev and others.
Prereq: Consent of instructor or Undergraduate Officer

ECON 461 3S 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
COURSES NOT OFFERED 1993-94
ECON 213A Political Economy 1: Microeconomics
ECON 213B Political Economy 2: Macroeconomics
ECON 343 Urban Economics
ECON 463A Political Economy of Capitalist Development
ECON 463B The Political Economy of Socialism

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Electrical and Computer Engineering

Undergraduate Officer
J.D. Cross, DC 25979, ext 2889

Introductory Note
The Department reserves the right, where preregistration in a course is less than six, to cancel the course.

E&CE 102 W,S 1C 0.0
Seminar
General Seminar

E&CE 100 W,S 5C,2T,3L 1.0
Fundamentals of Electrical Engineering
Introduction to electrostatics, basic dc circuits, circuit simplification techniques, introduction to magnetic fields, ac circuit components, the dynamic of circuits, analysis of ac circuits, resonance, sinusoids and phasor, three phase power systems, operational amplifiers, transistors as amplifiers, diodes and transistors as switches.

E&CE 201 F,W 1C 0.0
Seminar
General Seminar

E&CE 202 F,S 1C 0.0
Seminar
General Seminar

E&CE 203 S 3C,1T 0.5
Discrete Mathematics
Prereq: E&CE 223, 250

E&CE 205 F,W 3C,1T 0.5
Advanced Calculus for Electrical Engineers 1
Fourier Series; Ordinary differential equations; Laplace transform; applications to linear electrical systems.
Cross-listed as MATH 211

E&CE 206 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 223
-open-

E&CE 223 F,W 3C,1T,3L 0.5
Digital Circuits and Systems
Semi-conductor memories. IC families.
Open

E&CE 231 F,S 3C,1T,3L 0.5
Electronic Devices
Review of band theory and doped semiconductors in thermal equilibrium, charge neutrality, mass action law, recombination and transport mechanisms, Boltzmann relations, derivation of p-n junction dc and ac characteristics, charge storage effects. The bipolar transistor; derivation of dc and ac terminal characteristics, equivalent circuits. The junction field effect transistor (JFET) and metal oxide semiconductor FET, derivation of dc characteristics.
Prereq: PHYS 125 or equivalent
Alternate weeks

E&CE 241 S,F 3C,1T,3L 0.5
Circuit Analysis and Design
An introductory level course on circuit analysis techniques for use in circuit design. The course covers linear circuit analysis and design in detail and touches on extensions for circuits with simple nonlinearities such as opamps, diodes and transistors.
Prereq: E&CE 100
Alternate weeks

E&CE 250 F,W 3C,1T,3L 0.5
Algorithms and Data Structures
Algorithms and Data Structures emphasizes the following topics: data structures, abstract data types, recursive algorithms, algorithm analysis, sorting and searching, and problem-solving strategies.
Prereq: GEN E 121
Alternate weeks

E&CE 251 F 3C,1T,3L 0.5
Programming Languages and Translators
History, virtual machines, representation of data types, sequence control, data control, type checking, run-time storage management, finite state automata, regular expressions, grammars, parsers, language translation systems, programming paradigms.
Prereq: GEN E 121, E&CE 252 or 250
Project

E&CE 252 S 3C,1T,3L 0.5
Data Structures
Introduction to data and data abstraction, fundamental data structures, implementing and manipulating data structures, basic file systems.
Prereq: E&CE 251
Project
Course Descriptions

Electrical and Computer Engineering

E&CE 261 F.S. 3C,1T,3L* 0.5
Energy Systems and Components 1
1Alternate 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.
Prereq: GEN E 121 or equivalent

E&CE 309 W,S 3C,1T 0.5
Introduction to Thermodynamics and Heat Transfer
1Teaching terms: W, F in 1993; W, S after 1993

E&CE 318 W,S 3C,1T 0.5
Introduction to Probability Theory
Conditional probability and independence; Bayes' Theorem; random variables; functions of random variables; distribution functions; marginal and conditional distributions; correlation; reliability; the Poisson process, applications to reliability theory, continuous-time birth and death processes, queueing theory.

E&CE 316 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 spectrums of frequency modulated signals. Techniques for the generation and demodulation of FM signals. Introduction to noise and its effects in AM and FM systems.
1Alternate 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.
Prereq: E&CE 222, 223, 251
1Alternate weeks

E&CE 332 S,W 3C,1T,3L* 0.5
Electronic Circuits
Amplifier biasing networks, single and multi-stage small-signal amplifiers, small-signal equivalent circuits; high and low frequency effects; negative feedback amplifiers; oscillators; noise in electronic circuits; introduction to large signal amplifiers.
Prereq: E&CE 231
1Alternate weeks
Not offered F93,W94,S94

E&CE 342 W,S 3C,1T 0.5
Signals and Systems
Discrete and continuous signals, convolution, network equations, simulation graphs, Fourier series and transform, frequency response of networks, Laplace transformation, z-transform.

E&CE 354 W 3C,1T,3L* 0.5
Real-Time Operating Systems
Introduction, basic concepts, process management, interprocess communication and synchronization, memory management, resource management, interrupt handling, concurrent programming.
Prereq: E&CE 231, 232
1Project

E&CE 362 F, W 3C,1T,3L* 0.5
Energy Systems and Components 2
Prereq: E&CE 261
Formerly E&CE 262
1Alternate weeks

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, set 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
Not available until Winter 1995
1Alternate weeks

E&CE 371 S.W 3C,1T,3L* 0.5
Transmission Lines and Basic Field Theory
Transmission lines: transmission line equations, steady state (sinusoidal) solution, terminated lines, matching and the Smith Chart. Basic field theory: vector calculus, electrostatic and magnetostatic fields, time-varying fields and Maxwell's equations, plane wave propagation, polarization, reflection, refraction, applied boundary value problems.
1Alternate weeks

E&CE 380 F.W 3C,1T,3L* 0.5
Systems and Control
1Alternate weeks

E&CE 401 F.S 1C 0.0
Seminar
General Seminar

E&CE 402 W 1C 0.0
Seminar
General Seminar

E&CE 403-409, 490-497 0.5
Special Topics in Electrical Engineering
Special courses on advanced topics will be offered from time to time, when resources are available. For current offerings, inquire at the Department.
Prereq: Permission of the instructor
E&CE 411 W 3C,1T 0.5
**Data Communications**
- Prereq: E&CE 316, 318 or by permission of instructor

E&CE 412 W 3C,1T 0.5
**Digital Communications**
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 411 or permission of instructor

E&CE 413 W 3C,1T 0.5
**Digital Signal Processing**
- Project

E&CE 427 F,W 2C,1T,3L 0.5
**Integrated Circuits and Device Technology**
Switching characteristics of transistors and diodes, non-sinusoidal wave generation and shaping, comparators, digital integrated circuits, including ECL, TNL, PL, STI, MOS, CMOS, BICMOS.
- Project

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 E&CE 354, 450 or CS 354

E&CE 435 F,S 3C,1T 0.5
**Semiconductor Devices**
Metal-Semiconductor junctions (Schottky barriers), heterostructures, 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 427

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 231 or 435

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.
- 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, TPL, PL, STL, MOS, CMOS, BICMOS.
- 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 332, 333

E&CE 443 W 2C,1T,3L 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 342 or equivalent

E&CE 446 F,S 3C,1T 0.5
**Linear Systems**
Three types of linear multivariable systems are studied:
1. real time-continuous systems;
2. real time-discrete systems; and
3. 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.

E&CE 450 F,S 2C,1T,3L 0.5
**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: E&CE 222 or equivalent

E&CE 455 S 3C,1T,3L 0.5
**Software Engineering**
Requirement analysis, specifications, software design, software development environments, testing, software project management, quality assurance and control.
- Prereq: Computer Engineering Program or Computer Engineering Option

Prereq: E&CE 223 or equivalent
E&CE 456 W 3C,1T,3L° 0.5
Database Systems
Introduction, data models, file systems, database system architectures, query languages, integrity and security, database design.
Prereq: E&CE 252 or 450 or equivalent
1Project

E&CE 457 S 3C,1T,3L° 0.5
Applied Artificial Intelligence
Artificial intelligence concepts and techniques, including search, inference, knowledge representation and planning. Knowledge-based systems. Applications in electrical and computer engineering, with emphasis on design and maintenance.
1Project

E&CE 459 W 2C,1T,3L° 0.5
Sound, Noise and Electroacoustics
An interdisciplinary study of acoustical physics, human response to sound and audio engineering. Main topics include the physics of sound, acoustical measurements, human hearing, environmental noise, electroacoustical systems and transducers.
Every third week
Not offered Winter 1994

E&CE 463 W 2C,1T,3L° 0.5
Power Electronics
Characteristics and ratings of power semiconductor devices with emphasis on the thyristor. General methods of achieving design objectives. Performance and analysis of power conversion circuits for both static and rotating loads.
Open

E&CE 464 F 3C,3L° 0.5
Insulation and High Voltage Engineering
Alternate weeks

E&CE 465 W 3C,1T 0.5
Power Systems
Introduction to system concepts; aspects of power system planning and operation. Energy sources; environmental and resource implications. Per-unit and 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.

E&CE 471 S,F 3C,1T,3L° 0.5
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: E&CE 100, 370, MATH 212
Not available until Spring 1996
Alternate weeks

E&CE 473 W 2C,1T,3L° 0.5
Microwave Engineering
The theory and practice of microwave engineering, transmission line theory and scattering matrices; waveguides and cavities; microstrip lines, directional couplers and other microstrip components; computer aided design of microwave integrated circuits; Butterworth and Chebyshev filters, frequency transformations, side coupled microstrip filters and coupled waveguide cavity filters; microwave system considerations for communications.
Prereq: E&CE 371 or equivalent
Every third week

E&CE 474 F 2C,1T,3L° 0.5
Antenna Engineering
An introduction to the theory of radiation and of antenna and propagation engineering, linear antennas, linear arrays, aperture antennas, frequency independent antennas, measurement theory.
Prereq: E&CE 371 or equivalent
Every third week

E&CE 475 W 3C,1T,3L° 0.5
Guided Wave 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: E&CE 371 or equivalent
Project

E&CE 481 F,S 2C,1T,3L° 0.5
Design of Analog and Digital Control Systems
Alternate weeks

E&CE 482 W 2C,1T,3L° 0.5
Multivariable Control Systems
Prereq: E&CE 446, 481
Open lab

E&CE 485 W 2C,1T,3L° 0.5
Computer Control Applications
Prereq: E&CE 481
Project

E&CE 486 W 3C,3L° 0.5
Robot Dynamics and Control
Prereq: Permission of the instructor
Project

E&CE 499A F,S 9L 0.5
Project
An engineering assignment requiring the student to demonstrate initiative and assume responsibility. The student will select a project at the end of the 3B term from an approved list prepared by the Department. Alternatively students can propose their own project. A faculty member will provide supervision. For a one term project, a report is required at the end of the 4A term. For a two term project, a short progress report at the end of the 4A term and a full report at the end of the 4B term are required.

E&CE 499B W 9L 0.5
Project
Either a continuation of E&CE 499A or a separate one-term project.
English

Undergraduate Officer
M.A. Gerhardstein, HH 269, ext. 2448

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 course.

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.

GROUP ONE

Courses in this group count towards a degree as electives in any program in the University. Normally, none of them qualify 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 140 The Use of English 1
ENGL 141R The Use of English 2
ENGL 150 English as an Instrument of Thought and Communication
ENGL 151 English as an Instrument of Thought and Communication
ENGL 240R Form and Function 1
ENGL 241R Form and Function 2

Students completing any of ENGL 109, 110, 140R, 141R, 150, 151 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.

ENGL 129R F 1C 2L 2T 0.5
Introduction to Written English
Instruction provided in basic grammar, sentence and paragraph structure, elements of composition and essay writing including focus on theme, development of central idea, exposition and argumentation. Minimum of four hours of instruction each week with additional tutorial hours as required.

ENGL 140R W 3C 0.5
The Use of English 1
The use and abuse of spoken and written English. The study and evaluation of language as it is used for various purposes (e.g., colloquial, scientific, legal, political, commercial, journalistic, literary) in order to increase critical awareness and to help students to write clearly and effectively.

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.

Prerea: ENGL 140R
Offered at Renison College

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: Short Stories and Drama
A study of short stories and drama to determine how the shape of a literary work contributes to its meaning.

Also offered at Renison College

ENGL 102B W 3C 0.5
The Major Forms of Literature: Novels and Poetry
A study of novels and poetry to determine how the shape of a literary work contributes to its meaning.

Also offered at Renison College

ENGL 103A F 0.5
The Nature and Structure of the English Language
Introduction to the study of the English language. Topics to be discussed include the nature and origin of language, the structure of English and its development, and the relations between language and reality.

ENGL 103B W 0.5
Varieties of English
Introduction to the study of varieties of the English language – regional, social, temporal, functional, and stylistic. The relations of languages and literature and of speech and writing will be discussed.

Prerea: 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, Laurence, and Atwood.
Prereq: ENGL 105A or consent of instructor

ENGL 107 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 realisation or in tragic defeat.

ENGL 108H F,W,S 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 0.5
Youth and Adolescence
Studies the portrayal of young protagonist 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 108N W 0.5
The War
Studies the experience of war and attitudes toward it as revealed in literary works from different historical periods.

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 enrolment

ENGL 200B W,S 0.5
Survey of British Literature 2
An historical survey of major figures, types, and trends in British literature from the late 18th century to the present.
May be subject to priority enrolment

ENGL 201 F,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 202 F 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 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, C.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, Laurence, Plath, and Anwood. 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 208F F,S 0.5
The Literature of Aging
This course will focus on literary works that present various aspects of aging, such as changes in physical and mental abilities, relationships with children and grandchildren, coping with disease and death, and the satisfactions unique to the elderly.

ENGL 209A F 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 209B F,W 0.5
Detective Fiction
The history and characteristics of the "detective novel," the "novel of crime," and the "thriller." Attention will also be given to the novel of intrigue and espionage. Such authors as Poe, Collins, Doyle, Chesterton, Hammett, Buchan, Greene, Deighton, and Le Carré will be discussed. The course includes the examination of critical approaches to the form of detective fiction.

ENGL 209F F 0.5
Writing Strategies
Students practise effective writing along with the study of established models. The goal is to develop language competence to meet a variety of academic, business, and professional situations.
Prereq: Second-year standing or above, or successful completion of ENGL 109
Counts as an English Major credit as of Fall 1984
May be subject to priority enrolment
ENGL 210C F,W 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 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 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 215 F 0.5
Canadian Regional Literature
This course will provide a survey of literature set in a distinctive region of Canada.
Students may receive credit for only one of ENGL 215 and 214

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 232 W 3C 0.5
Survey of Dramatic Literature and Theory 2
The Middle Ages, the Elizabethans and Jacobean (excluding Shakespeare), and the Spanish Golden Age.
Cross-listed as DRAMA 311

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,S 0.5
Literary Criticism: Theory
Introduction to classical and contemporary theoretical approaches to literature; literary emphasis on drama. Three to five written assignments.
Prereq: ENGL 251A
May be subject to priority enrolment

ENGL 292 F 0.5
Contemporary Issues in Language, Writing, and Rhetoric
The course inductively defines the fields of Rhetoric and Professional Writing through an exploration of contemporary issues in language, writing, and rhetoric, as those issues are identified and dealt with in the pertinent scholarly and professional 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 375

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 306D F 0.5
The History of English
Introduction to the linguistic history of English from earliest documents to the present, with some consideration of various modern dialects.
Prereq: ENGL 306A
Formerly ENGL 373B

ENGL 306E 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 0.5
Introduction to Semiotics
A study of systems of signs, codes, and signification in language, culture, and literature.
Prereq: ENGL 306A

ENGL 307A F 0.5
Computer-Aided Learning and Literature
The principles of computer-aided learning and instruction applied to language and literary themes.
Prereq: Computer experience or permission of instructor

ENGL 309A F 0.5
Rhetoric: Principles and Practice 1
A study of rhetorical theories from the Classical period (Pre-Socratic to Augustine) with an emphasis on how these theories reflect changing attitudes towards language, reality, and the self.
Prereq: Third-year standing, or consent of instructor
Priority may be given to RPW students
ENGL 309B S 0.5
Rhetoric: Principles and Practice 2
A study of the rhetorical theories from the Middle Ages, Renaissance, and Enlightenment with an emphasis on how these theories reflect changing attitudes toward language, reality, and the self.
Prereq: Third-year standing or consent of instructor
Priority may be given to RPW students

ENGL 309C 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 309E F 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 310 A F 0.5
Chaucer 1
An introduction to the poetry and the prose translations of Geoffrey Chaucer, including his dream allegories, "Troylus and Criseyde," and related compositions.

ENGL 310B W 0.5
Chaucer 2
A study of Geoffrey Chaucer's "Canterbury Tales."

ENGL 310C 0.5
Non-Chaucerian Middle English Literature
Non-Chaucerian English writings during the later Middle; the Middle English romance, including "Sir Gawain and the Green Knight," alliterative literature, such as "Piers Plowman"; and representative examples of Middle English non-Chaucerian verse.

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 0.5
Canadian Drama
A study of plays by such dramatists as Merrill Denison, Robertson Davies, Graeme 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 351)

ENGL 317 F 0.5
Canadian Children's Literature
A study of 19th- and 20th-century Canadian literature for children.

ENGL 318 0.5
Canadian Literature Since 1967
A study of developments in Canadian literature since 1967 in prose, poetry, drama and criticism.

ENGL 325 F 0.5
Reading, Leisure, and Human Development
An introduction to the selection and application of literature in Counselling, Recreation, and community settings. Students will be offered theoretical and experiential instruction in a workshop-style seminar. Assignments will be approximately eight novels or anthologies. A bibliography will be provided. A term paper will be required.

ENGL 330 A 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 W,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 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.

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 346 C W 0.5
American Fiction
Special emphasis will be given to the works of two or three major American novelists such as Herman Melville and William Faulkner.
Prereq: ENGL 343 or consent of instructor

ENGL 347 A 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
## Course Descriptions

### English

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Title</th>
<th>Description</th>
</tr>
</thead>
</table>
| ENGL 350A | F 0.5 | 17th-Century Non-Dramatic Literature 1  
A continuation of grammar (e.g. desrcrptfve vs. prescrfp-  
framework for explaining the structure of  
tfte). students develop their own critical  
pemb.sion of the English Undergraduate  
Applied English Grammar 1 |
| 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 365/366 | | Selected Studies  
Designed to provide a study in depth of  
problems and/or authors selected by the  
instructor. Students interested in initiating  
such courses are encouraged to do so by  
bringing their ideas to the attention of  
individual instructors.  
Prereq: Consent of instructor and  
permission of the English Undergraduate  
Officer |
| ENGL 376R | 3C 0.5 | Applied English Grammar 1  
In exploring different definitions and types  
of grammar (e.g. descriptive vs. prescrip-  
tive), students develop their own critical  
framework for explaining the structure of  
English. Of interest to intending teachers  
of English as the native or second  
language.  
Prereq: A minimum of a 100-level  
writing course or consent of instructor |
| ENGL 377R | 3C 0.5 | Applied English Grammar 2  
A continuation of ENGL 376R. Practical  
applications of language theories to error  
analysis and correction.  
Prereq: ENGL 376R |
| ENGL 392A | 0.5 | Theories and Practices of  
Documentation  
This course will introduce students to  
recent research on documentation in fields  
such as information design, reading, and  
technical writing. Students apply this  
knowledge by developing or revising  
documents.  
Prereq: ENGL 292 or consent of  
instructor |
| ENGL 392B | 0.5 | The Rhetoric of Text and Image  
This course introduces students to the  
interaction of texts and images in such  
professional writing fields as advertising,  
book illustration, technical documentation,  
journalism, and public relations. Issues  
may include visual and textual literacy, the  
semiotics and rhetoric of design, and the  
ideological basis of social communication.  
Prereq: ENGL 292 or consent of  
instructor |
| 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.  
Prereq: Fourth-year standing in RPW.  
RPW students below fourth-year are not  
eligible for the course. |
| ENGL 410A | F 0.5 | Satire and Sense: The Restoration and  
Early 18th Century  
The Restoration comedy of manners,  
heroic and high tragedy, poetry of the  
court wits and other amused commenta-  
tors on society, and the major writings of  
Dryden, Swift, Addison, Defoe, and the  
early Pope. |
| ENGL 410B | W 0.5 | Sense and Sensibility: The Middle and  
Later 18th Century  
The probing of mores and manners by  
Pope and Johnson, the emergence of the  
seventeenth-century 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 0.6 | The Romantic Movement 2  
The poetry and critical theory of Byron,  
Shelley, and Keats. Emphasis is primarily  
on poetry; selected minor writers may be  
considered. |
| ENGL 451A | F 0.5 | Literature of the Victorian Age 1  
An historical and critical study of major  
poets (Browning, Tennyson, Arnold) and of  
the literary criticism of the period. |
| ENGL 451B | W 0.5 | Literature of the Victorian Age 2  
An historical and critical study of major  
 novelists (Dickens, Thackeray, Eliot) and  
major essayists (Newman, Ruskin, Mill,  
Huxley). |
| ENGL 460A | F 0.5 | British Literature, 1818-1918  
A study of works by such writers as Shaw,  
Conrad, and Yeats. |
| ENGL 460B | W 0.5 | British Literature, 1918-1945  
A study of works by such writers as  
Joyce, Lawrence, and Woolf. |
| ENGL 480C | 0.5 | British Literature 1845 to Present  
A study of works by such writers as  
Beckett, Pinter, Churchill, Murdoch,  
Rusdie, Carter, Denai, Naipaul, Ackroyd,  
Larkin, Hasney, Hill. |
| ENGL 470A | W 0.5 | Contemporary Critical Theory  
An examination of recent influential critical  
thories. Among the schools studied will  
be feminist criticism, Marxist criticism,  
psychanalytic criticism and, especially,  
deconstruction. |
| ENGL 470B | F 0.5 | History of Literary Criticism  
An historical survey of major critical texts  
and movements from the Greek and  
Roman classics to the New Criticism of  
the mid-20th century, examining different  
critical theories and practices in a context  
of cultural changes. |
| ENGL 492A | F 0.5 | Feminist Theory  
A consideration of various 20th-century  
feminist theoreticians. |
| ENGL 495A/B | 0.5/0.5 | Supervision of Honours Essay  
A letter grade for ENGL 495A will be sub-  
mited only after the completion of ENGL  
495B. |
### Course Descriptions

**English**

**Environment and Resource Studies**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Title</th>
<th>Credits</th>
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</thead>
<tbody>
<tr>
<td>ENGL 233</td>
<td>Drama from 1660</td>
<td>0.5</td>
</tr>
<tr>
<td>ENGL 233A</td>
<td>Drama of the Late 17th and Early 18th Centuries</td>
<td>0.5</td>
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<tr>
<td>ENGL 233B</td>
<td>Drama of the Late 18th, 19th, and Early 20th Centuries</td>
<td>0.5</td>
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<tr>
<td>ENGL 233C</td>
<td>Drama of the 20th Century</td>
<td>0.5</td>
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<tr>
<td>ENGL 235D</td>
<td>Modern Drama</td>
<td>0.5</td>
</tr>
<tr>
<td>ENGL 234</td>
<td>Modern Drama in English from Australia, New Zealand, Africa and the West Indies</td>
<td>0.5</td>
</tr>
<tr>
<td>ENGL 240R</td>
<td>Form and Function</td>
<td>0.5</td>
</tr>
<tr>
<td>ENGL 306C</td>
<td>Historical Linguistics</td>
<td>0.5</td>
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<tr>
<td>ENGL 306D</td>
<td>The History of English</td>
<td>0.5</td>
</tr>
<tr>
<td>ENGL 309D</td>
<td>Approaches to Style</td>
<td>0.5</td>
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<tr>
<td>ENGL 310C</td>
<td>Non-Chaucerian Middle English Literature</td>
<td>0.5</td>
</tr>
<tr>
<td>ENGL 311A</td>
<td>The Novel 1</td>
<td>0.5</td>
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<tr>
<td>ENGL 311B</td>
<td>The Novel 2</td>
<td>0.5</td>
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<tr>
<td>ENGL 312</td>
<td>Literature of the Commonwealth</td>
<td>0.5</td>
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<tr>
<td>ENGL 345B</td>
<td>American Fiction</td>
<td>0.5</td>
</tr>
<tr>
<td>ENGL 377R</td>
<td>Applied English Grammar 2</td>
<td>0.5</td>
</tr>
<tr>
<td>ENGL 346C</td>
<td>American Fiction</td>
<td>0.5</td>
</tr>
<tr>
<td>ENGL 450C</td>
<td>British Literature 1945 to the Present</td>
<td>0.5</td>
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<tr>
<td>ENGL 470B</td>
<td>History of Literary Criticism</td>
<td>0.5</td>
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<tr>
<td>ERS 218 F</td>
<td>Intro to Sustainable</td>
<td>0.5</td>
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<tr>
<td></td>
<td>Environmental and Resource Systems</td>
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<tr>
<td></td>
<td>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.</td>
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<tr>
<td></td>
<td>Prereq: At least second-year standing</td>
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<tr>
<td>ERS 231 F</td>
<td>Environmental Issues in a Global Perspective</td>
<td>0.5</td>
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<tr>
<td></td>
<td>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.</td>
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<tr>
<td></td>
<td>Prereq: ENV S 195 or consent of instructor</td>
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<tr>
<td>ERS 241 W</td>
<td>Intro to Environmental and Social Impact Assessment</td>
<td>0.5</td>
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<tr>
<td></td>
<td>An introduction to means of assessing proposed approaches to environmentally and socially significant problems and opportunities. Special emphasis on the nature and limitations of conventional means of assessing the impacts, and overall desirability of technologies, projects, plans and policies. Close examination of case examples.</td>
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<td></td>
<td>Prereq: At least second-year standing</td>
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<tr>
<td>ERS 275A/B/C</td>
<td>Special Readings</td>
<td>0.5</td>
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<tr>
<td></td>
<td>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.</td>
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<td></td>
<td>Prereq: Consent of instructor</td>
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<tr>
<td></td>
<td>The letter designation allows this course to be taken more than once for credit</td>
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<tr>
<td>ERS 280 S</td>
<td>Applied Field Studies</td>
<td>0.5</td>
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<tr>
<td></td>
<td>Analysis of selected environmental issues or programs with particular emphasis on applied problem-solving/management perspectives. Field trips to chosen sites will be conducted to gather information for analysis. Key organizations/people will be involved in field trips and discussions.</td>
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<tr>
<td></td>
<td>Field trip fee $45 per student</td>
<td></td>
</tr>
</tbody>
</table>

**Course Descriptions**

**Environment and Resource Studies**

- **Course Code:** ENGL 481-492
- **Senior Seminars:**
  - From time to time, the Department may offer senior special topic seminars in the following areas. Consult with the Undergraduate Officer for details.
  - Courses ENGL 481 - 492 may substitute for other required Period and Genre courses.
  - Prereq: Fourth-year standing normally, and permission of the instructor

- **Course Code:** ENGL 481 (A-Z) 0.5
  - Special Topic Seminars in Rhetoric and Professional Writing

- **Course Code:** ENGL 482 (A-Z) 0.5
  - Special Topic Seminars in Linguistics and Lexicography

- **Course Code:** ENGL 483 (A-Z) 0.5
  - Special Topic Seminars in Old and Middle English

- **Course Code:** ENGL 484 (A-Z) 0.5
  - Special Topic Seminars in Elizabethan Literature

- **Course Code:** ENGL 485 (A-Z) 0.5
  - Special Topic Seminars in Early Seventeenth-Century Literature

- **Course Code:** ENGL 486 (A-Z) 0.5
  - Special Topic Seminars in Restoration and Eighteenth-Century Literature

- **Course Code:** ENGL 487 (A-Z) 0.5
  - Special Topic Seminars in Romantic Literature

- **Course Code:** ENGL 488 (A-Z) 0.5
  - Special Topic Seminars in Victorian Literature

- **Course Code:** ENGL 489 (A-Z) 0.5
  - Special Topic Seminars in Twentieth-Century British Literature

- **Course Code:** ENGL 490 (A-Z) 0.5
  - Special Topic Seminars in Canadian and Commonwealth Literature

- **Course Code:** ENGL 491 (A-Z) 0.5
  - Special Topic Seminars in American Literature

- **Course Codes NOT OFFERED 1993-94**

- **Course Code:** ENGL 108A The Hero

- **Course Code:** ENGL 108B The War

- **Course Code:** ENGL 202A/B The Bible and Literature

- **Course Code:** ENGL 203/204 Introduction to Folklore

- **Course Code:** ENGL 204D Modern Sefire

- **Course Code:** ENGL 208Q Ordered Chaos: The Apocalyptic Vision in Literature

- **Course Code:** ENGL 214 Themes in Canadian Literature

- **Course Code:** ENGL 232 The Development of Drama in

- **Course Code:** ENGL 233A Drama of the Late 17th and Early 18th Centuries

- **Course Code:** ENGL 233B Drama of the Late 18th, 19th, and Early 20th Centuries

- **Course Code:** ENGL 233C Drama of the 20th Century

- **Course Code:** ENGL 235D Modern Drama

- **Course Code:** ENGL 234 Modern Drama in English from Australia, New Zealand, Africa and the West Indies

- **Course Code:** ENGL 240R Form and Function

- **Course Code:** ENGL 306C Historical Linguistics

- **Course Code:** ENGL 306D The History of English

- **Course Code:** ENGL 309D Approaches to Style

- **Course Code:** ENGL 310C Non-Chaucerian Middle English Literature

- **Course Code:** ENGL 311A The Novel 1

- **Course Code:** ENGL 311B The Novel 2

- **Course Code:** ENGL 312 Literature of the Commonwealth

- **Course Code:** ENGL 345B American Fiction

- **Course Code:** ENGL 377R Applied English Grammar 2

- **Course Code:** ENGL 346C American Fiction

- **Course Code:** ENGL 450C British Literature 1945 to the Present

- **Course Code:** ENGL 470B History of Literary Criticism

**Environment and Resource Studies**

- **Undergraduate Officer:** S. Lerner, ES1 222, ext. 3060

Courses not offered in the current academic year are listed at the end of this section.

- **ERS 100 F 2C 1T 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 analytic and problem-solving skills.
  - Prereq: Environment and Resource Studies students only

- **ERS 101 W 2C 2T 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 F 2C 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 and Social Impact Assessment

An introduction to means of assessing proposed approaches to environmentally and socially significant problems and opportunities. Special emphasis on the nature and limitations of conventional means of assessing the impacts, and overall desirability of technologies, projects, plans and policies. Close examination of case examples.

- 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

  The letter designation allows this course to be taken more than once for credit

**ERS 280 S 1C,2ndlab 0.5**

Applied Field Studies

Analysis of selected environmental issues or programs with particular emphasis on applied problem-solving/management perspectives. Field trips to chosen sites will be conducted to gather information for analysis. Key organizations/people will be involved in field trips and discussions.

Field trip fee $45 per student
well as the basis of a systems approach to 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 305 F 2C.1T 0.5
Ecosystem Perspectives and Analyses
Examination of the concept of the "ecosystem" presented in recent writings about non-equilibrium thermodynamics, ecological paradigms, conservation biology and environmental philosophy. Discussion of the theoretical and practical implications of these contrasting perspectives for issues of research/environmental management and sustainable development.

Prereq: ENV S 200, at least third-year standing, or consent of instructor

ERS 317 W 3C 0.5
Waste Management
This course will deal with the solid waste system, landfilling, incineration, energy from waste, recycling, composting, reduction and reuse. The context will be primarily Ontario and municipal waste management.

Prereq: Students with third-year standing or consent of instructor

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
Course Descriptions
Environment and Resource Studies
Environmental Engineering

ERS 390B F.W.S 4S.wkshp 0.5
Seminar-Workshop
Normally a continuation of 390A; may also be a separate project as described in 390A.
Prereq: ERS 390A

ERS 391A F.W.S 8S.wkshp 1.0
Seminar-Workshop
Same as ERS 390A but with additional intensive investigation.
Prereq: Environment and Resource Studies students only and consent of faculty

ERS 391B F.W.S 8S.wkshp 1.0
Seminar-Workshop
Normally a continuation of 391A; may also be a separate project as described in 391A.
Prereq: ERS 391A

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 418 F 3C 0.5
Seminar on Strategies for Sustainable Development
Using selected environmental systems and resource use activities the course will analyze 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 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, 377 and 338, or consent of instructor

ERS 475A/B/C F.W.S 2R 0.5 each
Special Readings or Seminar on Selected Topics
See course descriptions under ERS 275 and 375.
Prereq: Consent of instructor
The letter designation allows this course to be taken more than once for credit.

ERS 480
Special Topics Seminar

ERS 490A F.W.S 3C 0.5
Senior Honours Assignment
Continuation of ERS 490A
Co-ordinator

ERS 490B F.W.S 2C 0.5
Senior Honours Assignment
Continuation of ERS 490A
Prereq: ERS 490A

ERS 491F W 4C 1.0
Senior Honours Assignment
See description for ERS 490A.
Prereq: Students with fourth-year standing in Environment and Resource Studies only

ERS 491B F.W.S 3C 1.0
Senior Honours Assignment
Continuation of ERS 491A.
Prereq: ERS 491A

ERS 492A F.W.S 6C 1.5
Senior Honours Assignment
Continuation of ERS 492A.
Prereq: ERS 492A

ERS 498 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 advances; 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 1993-94
ERS 350 Technology Lifestyles for a Conserver Society

Environmental Engineering
Co-ordinator
G.E. Schneider, CPH 1325K, ext. 4792

ENV E 220 F.W 3C 0.5
Environmental Chemistry and Ecotoxicology

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.
Course Descriptions
Environmental Studies

ENV S 278 F,W,S 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

ENV S 200 F,W,S 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.

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 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. Skills 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 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 201 F 3C,1.5S 0.5
Introduction to Environmental and Planning Law
Introduction to legal concepts generally and to environmental and planning law concepts in particular. Designed both for students who do not plan to take further in depth legal courses and as a prerequisite for senior legal courses – ENV S 401 and PLAN 402. Topics to be covered include Sources of Law, Nature of Legal Remedies, Common Law, Administrative Agencies, Planning Act, Environmental Protection and Assessment Acts, and Federal Environmental Protection Act.

ENV S 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 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 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 the student's capacity to practise in an Environmental Engineering capacity in her/his chosen area of expertise, using knowledge gained from her/his academic and employment experiences. The first part of the project (ENV E 430) 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.
Course Descriptions
Environmental Studies

*ENVS 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 then and now.
Prereq: ENVS 220 or consent of instructor

*ENVS 334* W 3C.1L 0.5
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
Students may receive credit for only one of ENVS 334 and REC 334

*ENVS 362Z* F 2.5
Waterloo in USA - Michigan
Description in Environmental Studies program section (page 10:7).

*ENVS 363Z* W 2.5
Waterloo in USA - Michigan
As 362Z.

*ENVS 364Z* S 2.5
Waterloo in USA - Michigan
As 362Z.

*ENVS 365Z* F 2.5
Waterloo in UK - Leeds
Description in Environmental Studies program section (page 10:7).
Cross-listed as GEOG 365Z

*ENVS 366Z* W 2.5
Waterloo in UK - Leeds
As 365Z.
Cross-listed as GEOG 366Z

*ENVS 392Z* F 2.5
Waterloo in Australia - Victoria
Description in Environmental Studies program section (page 11:6).

*ENVS 394Z* S 2.5
Waterloo In Australia - Victoria
As 392Z.

*ENVS 395Z* F 2.5
Waterloo In Australia - Griffith
Description in Environmental Studies program section (page 11:6).

*ENVS 396Z* W 2.5
Waterloo In Australia - Griffith
As 395Z

*ENVS 397Z* S 2.5
Waterloo In Australia - Griffith
As 395Z

*ENVS 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: ENVS 201
ENVS 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
Lab fee of $20

*ENVS 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/ENVS 334
Cross-listed as REC 433
Students may receive credit for only one of ENVS 433 and REC 433

*ENVS 434* W 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/ENVS 334
Cross-listed as REC 434
Students may receive credit for only one of ENVS 434 and REC 434

*ENVS 469* S 0.5
Field Aspects of Applied Ecology
The presentation in the field of advanced techniques for collecting, evaluating and using evidence on ecological management issues. Interaction with professionals from government and private industry on ecological management issues will also be part of the course.
Prereq: One of ERS 305, GEOG/PLAN 367, or 368
Field trip fee: Up to $80 depending on destination

*ENVS 500* F 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 1993-94
ENVS 417 Field Studies in Land Use History and Landscape Change

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Fine and Performing Arts

The University offers courses in:

- **Dance** [see page 16:39]
- **Drama** [see page 16:41]
- **Fine Arts** [see page 16:55]
- **Music** [see page 16:100]

For program information, please see Chapter 8, Faculty of Applied Health Sciences, and Chapter 9, Faculty of Arts
Fine Arts

Undergraduate Officer
J.G. Buyers, ECH 1203, ext. 2614

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, enrollment 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.

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.

FINE 214 3C 0.5
Medieval Art and Architecture
A study of Early Christian Romanesque and Gothic Art.

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 218A 3C 0.5
The Religious Art of India
An approach to understanding the myths, symbols and spirituality of Indian religion through a study of representative art, architecture and folk literature of Hinduism, Jainism, and Indian Buddhism.
Consult Religious Studies Cross-listed as RS 269

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 Hellenic periods.
Consult Classical Studies Cross-listed as CLAS 351

FINE 311 3C 0.5
Roman Art and Architecture
A survey of the art and architecture of the Roman world from Etruscan to Imperial times.
Consult Classical Studies Cross-listed as CLAS 352

FINE 319 3C 0.5
Contemporary Art
A survey of contemporary international art movements with emphasis on work since 1970. Readings in contemporary criticism and gallery visits are an integral part of the course.
Prereq: FINE 210 and 211

FINE 319A 3C 0.5
Special Topics in 20th-Century Art: 1900-1940
A study of the major innovations in early 20th-century painting, sculpture and architecture. Honours Art History majors interested in the modern period are encouraged to use this course as preparation for the fourth-year Honours presentation.
Prereq: FINE 211 or consent of instructor

FINE 330 3C 0.5
Fine Arts Exhibition Curatorship
The development, design, documentation, security, conservation, installation, and interpretation of visual art exhibitions will be explored through lectures on the history, purpose and function of fine 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.

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.

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 creative or research project. The result of this endeavor will be presented in the form of an exhibition or its equivalent (e.g. film, illustrated book, portfolio, or essay) which will be examined by faculty members of Fine Arts and also, where pertinent, by members of other departments.
Admission by permission only
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. Cross-listed as RS 266

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. 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.

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/Minors 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/Minors only.

FINE 275W 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 Académie tradition of the 40's and 50's, and the rebellious nouvelle vague of the 60's. (Bresson, Carné, Ophuls, Renoir, Chabrol, Godard, Malle, Truffaut, Resnais, and others.) Film screenings.

FINE 280W 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 Czechoslovakia, Hungary, Poland, the former USSR, and former Yugoslavia will be discussed (Chytilová, Forman, Jancsó, Makavejev, Tarkovsky, Wajda, and others.) Film screenings.

FINE 325 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 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 Académic tradition of the 40's and 50's, and the rebellious nouvelle vague of the 60's. (Bresson, Carné, Ophuls, Renoir, Chabrol, Godard, Malle, Truffaut, Resnais, 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 Czechoslovakia, Hungary, Poland, the former USSR, and former Yugoslavia will be discussed (Chytilová, Forman, Jancsó, Makavejev, Tarkovsky, Wajda, and others.) Film screenings.
FINE 390 F R 0.5
Selected Subjects in Fine Arts
Research and reading courses under the direction of individual instructors.
This course may be taken only as an elective after a student has completed 30 term courses and has taken all the courses available in the area related to the independent course.
Admission by consent of instructor

FINE 391 W R 0.5
Selected Subjects in Fine Arts
Research and reading courses under the direction of individual instructors.
This course may be taken only as an elective after a student has completed 30 term courses and has taken all the courses available in the area related to the independent course.
Admission by consent of instructor

FINE 470 F 0.5
Senior Seminar in Film Concepts 1
Film screenings.
Admission by consent of instructor

FINE 471 W 0.5
Senior Seminar in Film Concepts 2
Film screenings.
Admission by consent of instructor

FINE 490 F S,std,R 0.5
Senior Honours Presentation 1
Each student will work under the direction of a Fine Arts faculty member on an advanced creative or research project. The result of this endeavor will be presented in the form of an exhibition or its equivalent (e.g., film, illustrated book, portfolio, or essay) which will be examined by faculty members of Fine Arts and also, where pertinent, by members of other departments.
Admission by permission only

FINE 490A F S,std,R 0.5
Senior General Seminar
As in FINE 390A, each student will work under the direction of a Fine Arts faculty member on an advanced research project. Required of all fourth-year general film studies majors.

FINE 491 W S,std,R 0.5
Senior Honours Presentation 2
A continuation of FINE 490.
Admission by permission only

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 0.6
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 introduction to the principles 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.
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. Required of all Fine Arts studio majors.
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.
Prereq: FINE 120/121

FINE 225 W 6C,std 0.5
Analytical Figure Drawing
Analytical figure drawing from the model will be combined with a study of human anatomy for artists.
Prereq: FINE 120/121

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 investigation into a variety of experimental, non-traditional printmaking techniques.

FINE 226D 8std 0.5
Applied Graphics
A studio course using applied graphics techniques, including illustration, typographic composition, and perspective drawing. Methods of preparing work for reproduction will also be explored.

FINE 228E 6std 0.5
Photography for Artists
Introduction to photographic techniques for use as a tool for artists. Basic techniques will be taught through a series of exercises, with emphasis on applications for creative artistic expression and documentation. Intended for Fine Arts majors. Supplies at student's expense.
Prereq: FINE 120/121

FINE 228H W 6std 0.5
Electronic Imaging 1
An introduction to the use of the computer for monochrome and colour two-dimensional image generation and manipulation. Students will produce 35mm colour transparencies and colour photographic prints to document their work. Intended for Fine Arts majors.
Prereq: FINE 226D and consent of instructor

STUDIO OFFERINGS

Note
Students should expect material costs to range between $60 and $200 per studio course.
Course Descriptions

FINE 320 F 6 std 0.5
Advanced Painting 1
Drawing upon the experience gained in FINE 222/221 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 and an introduction to three dimensional image generation and manipulation. Students will produce 35mm transparencies and colour photographs to document their work.
Intended for Fine Arts majors. Supplies at student's expense.
Prereq: FINE 228H

FINE 392 F R std 0.5
Selected Subjects in Fine Arts
Studio and practice courses under the direction of individual instructors.
Prereq: FINE 320

FINE 393 W R std 0.5
Selected Subjects in Fine Arts
Studio and practice courses under the direction of individual instructors.
Prereq: FINE 320

FINE 394A-D 0.5
Fine Arts Abroad
Working in the field with landscapes, cityscape, and monuments of art, students will employ a variety of media to develop techniques for visual reportage, documentation, note-taking, and journal-keeping. 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 397 F R std 0.5
Senior Honours Seminar 1
Each student will work under the direction of a Fine Arts faculty member on an individual research or creative project. The results of this work will be examined in critiques by the full faculty.
Prereq: Consent of instructor

FINE 398 F R std 0.5
Senior Honours Seminar 2
A continuation of FINE 490.
Prereq: Consent of instructor

FINE 474 F R std 0.5
Senior Seminar 3
Independent study/practice course under the direction of individual instructors.
Prereq: Consent of instructor

FINE 475 W R std 0.5
Senior Seminar 4
Independent study/practice course under the direction of individual instructors.
Prereq: Consent of instructor

FINE 490 F 6 std 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 result of this endeavour will be presented in the form of an exhibition or its equivalent (e.g., film, illustrated book, portfolio, or essay), which will be examined by faculty members of Fine Arts and also, where pertinent, by members of other departments.
Prereq: Consent of instructor

FINES NOT OFFERED 1993-94
FINE 220A Watercolour Painting
FINE 226C Printmaking (Screen)
FINE 227 Objective Drawing
FINE 228F Calligraphy
FINE 313 Special Topics in 18th- and 19th-Century Art
FINE 316 Canadian Native Art
FINE 328 Illustration

French

Undergraduate Office
A. Ages, ML 335, ext. 2181

Students should consult the Department of French undergraduate brochure, available from the departmental secretary, before each trimester, to ensure that the courses they want are offered. Budget restrictions, enrollment and availability of faculty may cause some courses to be withdrawn.
Course Descriptions

French

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 French or equivalent should enrol in French 152.

3. Students with Ontario Grade 12 French or equivalent should enrol in French 155.

4. Students with Ontario Grade 13 or Ontario Academic Course French should enrol in French 192A/B and/or French 195A/196A.

5. Students may enrol in courses for which they have secondary school antirequisites only with the written permission of the Department of French.

6. All students who have Ontario Grade 13 or Ontario Academic Course French or equivalent and intend to register in any University of Waterloo French language course at the 100 level (FR 151, 152, 155, 192A, 192B, 195A, 195A) must take the French Language Placement Test to be held on Thursday, September 9, 1993, 11:30 a.m. to 1:30 p.m. in Arts Lecture Hall 116.

7. Linguistics, Language, Civilization, and Literature courses are listed separately below.

FR 155 F,W,S 4C,1L 0.5 Intermediate French Language 1
A comprehensive study of French grammar and vocabulary. Involves reading, writing and speaking French.
Prereq: FR 152 or Ontario Grade 12 French or equivalent
Antireq: Ontario Grade 13 or Ontario Academic Course French or equivalent.
See above, notes 1-6

FR 192A F,W 4C,1L 0.5 Advanced French Language 1A
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 1-6
Also offered at St. Jerome's College

FR 192B F,W,S 4C,1L 0.5 Advanced French Language 1B
Continuation of FR 192A.
Prereq: FR 192A
Also offered at St. Jerome's College

FR 193 3C 0.5 French for Francophone Students 1
A first level course for francophones and near-fluent speakers of French. Emphasis will be on grammatical accuracy.
Prereq: Consent of the Department

FR 200D 3C 0.5 Spoken French Through Drama
A course which will use the rehearsal and performance of a play in French as a basis for intensive oral training. Students will participate in the preparation of the play, and also do a project related to the play.
Prereq: FR 250, 250A or consent of the 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: FR 192A and 192B or 195A and 196A or 201 or consent of the Department
Antireq: Students with credit in FR 250 may not receive credit for 251

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: FR 192A and 192B or 195A and 196A or 201 or consent of the Department
Antireq: Students with credit in FR 250 may not receive credit for 252

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: FR 192A/B, 195A/196A, 201 or consent of the Department

FR 293 3C 0.5 French for Francophone Students 2
A second level course for francophones and near-fluent speakers of French. In addition to continued emphasis on correct usage, attention will be paid to stylistic improvement.
Prereq: FR 193 or consent of the 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 the 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 or 252 or 293 or consent of the Department
Antireq: Students with credit in FR 300 may not receive credit for 351

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 or 252 or 293 or consent of the Department
Antireq: Students with credit in FR 300 may not receive credit for 352

FR 400 F,W 4C 0.5 Advanced French Language 4
Intensive development of advanced comparative stylistics, translation and composition skills. Taught in French.
Prereq: FR 351 or 352 or consent of the Department
Course Descriptions
French

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 263 3C 0.5
Aspects of France
An examination of contemporary French society through documents taken from different media.
Prereq: FR 192 or consent of the Department
Offered at St. Jerome's College

FR 273 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 192, 196A or consent of the Department

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.
See Note under FR 292.

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 291 and 292 are taught in English.
Open to Arts students in second year and higher, and to others in any year. Students in a French Major, Honours, or Minor Program may take this course as a non-French elective.

FR 393A/R 0.5/0.5
French Civilization, 1884-1914
Offered in the Nantes Program.
May be taken as HIST 339F/360F

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.

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 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: OAC or Grade 13 French or equivalent
Also offered at St. Jerome's College

FR 196A 3C 0.5
Survey of 17th-Century French Literature
This course will trace the development of French literature from 1000-1700. Taught in French.
Prereq: FR 195A and 196A or consent of the Department

FR 232 3C 0.5
Topics and Problems in 17th-Century French Literature
A more detailed study of writers/works of the classical period. Taught in French.
Prereq: FR 195A and 196A or consent of the Department

FR 253 3C 0.5
Romanticism
This course will deal with French literature between 1789 and 1848. This course will explore the principal literary movement of this period: Romanticism. Taught in French.
Prereq: FR 195A and 196A or consent of the Department

FR 264 3C 0.5
20th-Century French Theatre
The study of a representative number of authors and texts from Claudel to Ionesco. Taught in French.
Prereq: FR 195A and 196A or consent of the Department
<table>
<thead>
<tr>
<th>Course Code</th>
<th>Title</th>
<th>Description</th>
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<tbody>
<tr>
<td>FR 275</td>
<td>Contemporary French-Canadian Novel</td>
<td>A study of a limited number of texts by authors such as Gabrielle Roy, André</td>
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<td>Langlétin, Hubert Aquin, Gérard Bessette. Taught in French.</td>
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<tr>
<td>FR 342</td>
<td>18th-Century French Literature</td>
<td>This course will trace the development of French literature from 1700 to 1800.</td>
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<td>Taught in French.</td>
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<td>Prereq: FR 195A and 196A or consent of the Department</td>
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<tr>
<td>FR 343</td>
<td>Topics and Problems in 18th-Century French Literature</td>
<td>A more detailed study of one or more aspects of the Enlightenment. Taught in</td>
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<td></td>
<td>French.</td>
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<td>Prereq: FR 195A and 196A or consent of the Department</td>
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<tr>
<td>FR 354</td>
<td>Realism and Naturalism</td>
<td>This course will study the literature from 1848 to 1900. It will cover not</td>
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<td>only the major writers but also the theories behind the social, artistic and</td>
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<td>intellectual trends in this part of the century.</td>
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<td>Taught in French.</td>
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<td>Prereq: FR 195A and 196A or consent of the Department</td>
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<tr>
<td>FR 363</td>
<td>20th-Century French Novel</td>
<td>A survey of the Novel from Proust to the present day through the study of a</td>
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<td>selection of Key Texts. Taught in French.</td>
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<td>Prereq: FR 195A and 196A or consent of the Department</td>
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<tr>
<td>FR 371</td>
<td>French-Canadian Poetry</td>
<td>A study of its evolution from Octave Crémazie to Anne Hébert and the present.</td>
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<td>Taught in French.</td>
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<td>Prereq: FR 195A and 196A or consent of the Department</td>
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<tr>
<td>FR 372</td>
<td>Contemporary Quebec Theatre</td>
<td>A study of contemporary Quebec theatre, from Gratien Gélinas to the present.</td>
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<td>Taught in French.</td>
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<td>Prereq: FR 195A and 196A or consent of the Department</td>
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<tr>
<td>FR 391</td>
<td>French Women Writers</td>
<td>A study of selected works by women writers in France from the Middle Ages to</td>
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<td>the twentieth century. The course will focus on the literary features of these</td>
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<td>works and on their value as reflections of the position of women in French</td>
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<td>society throughout the period. Taught in French.</td>
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<td>Prereq: FR 195A and 196A or consent of the Department</td>
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<td>Prereq: FR 195A and 196A or consent of the Department</td>
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<tr>
<td>FR 410</td>
<td>Medieval French Literature</td>
<td>An introduction to French literature of the Middle Ages through the study of</td>
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<td>representative texts, including excerpts from the epic, courtly and satirical</td>
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<td>works. Taught in French.</td>
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<td>Prereq: FR 195A and 196A or consent of the Department</td>
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<td>Prereq: FR 195A and 196A or consent of the Department</td>
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<tr>
<td>FR 424</td>
<td>Topics and Problems in 16th Century French Literature</td>
<td>A focussed study of a particular theme of Renaissance (1500-1600) writing.</td>
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<td>Taught in French.</td>
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<td>Prereq: FR 195A and 196A or consent of the Department</td>
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<tr>
<td>FR 451</td>
<td>Symbolist Poetry</td>
<td>The course will concentrate on the works of four poets – Baudelaire, Verlaine,</td>
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<td>Rimbaud and Mallarmé. Special emphasis will be placed on the “explication de</td>
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<td>texte” as a technique in the analysis of poetry.</td>
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<td>Prereq: FR 195A and 196A or consent of the Department</td>
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<tr>
<td>FR 482</td>
<td>Study of Individual Authors</td>
<td>Each year a different author is the subject of specialized study to permit an</td>
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<td>in depth exploration of her/his literary qualities. Taught in French.</td>
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<td>Prereq: FR 195A and 196A or consent of the Department</td>
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<tr>
<td>FR 483</td>
<td>French Literary Criticism</td>
<td>An introduction to modern critical theories. A study of concepts and methods</td>
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<td>from semiotic, psychoanalytic and sociological approaches.</td>
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<td>Prereq: FR 195A and 196A or consent of the Department.</td>
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<tr>
<td>FR 490-498</td>
<td>Senior Tutorial</td>
<td>A small group of students follows a course of study under the supervision of a</td>
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<td>faculty member. For details, inquire of the Department.</td>
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<td>Prereq: FR 195A and 196A or consent of the Department</td>
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</tbody>
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### General Engineering

#### Undergraduate Officer
J.D. Ford, CPH 1325F, ext. 3754

#### 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.

#### Problems Laboratory
Students may be assigned to a Problems Laboratory by the Director of First-Year Engineering according to their performance during the term.

#### Courses Taken at Other Universities
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 020X-099X**

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
Course Descriptions

General Engineering

GEN E 020K - 090K
International Exchange Program Courses
- Civil and Geological Engineering

GEN E 020E - 099E
International Exchange Program Courses
- Electrical and Computer Engineering

GEN E 020M - 099M
International Exchange Program Courses
- Mechanical Engineering

GEN E 020D - 099D
International Exchange Program Courses
- Systems Design Engineering

GEN E 121 W.S. 3C,2T 0.5
Digital Computation
Introduction to electronic digital computers, hardware and software organization; basic features of FORTRAN and/or PASCAL, examples of efficient numerical algorithms for basic scientific computations.

GEN E 123 W.S. 3C,1T,3L1 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, Geotechnical and Mechanical Engineering students.

1Alternate 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.

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 301/302 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 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 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 are registered in the Option in International Studies in Engineering.

GEN E 315/415 W.S,F 3D 0.5
Special Directed Non-Technical Studies
This course is provided for students who, through academic studies during international exchange programs or other university related scholarly activities, wish to request a course credit for this work.

Students wishing to claim this credit must show evidence of university level academic activity not otherwise claimed for credit.

Prereq: Permission of the Associate Chair of the Department in which the student is registered.

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 Practice; Introduction to Patent Law. Ethical aspects of professional practice.

Restricted to fourth-year Chemical, Computer, Electrical and Systems Design Engineering Students.

GEN E 412 W 3C 0.5
Ethics and The Engineering Profession
An application of philosophical analysis and theories of ethics to issues of moral conduct in the engineering profession. Discussions will include such matters as the social responsibilities of engineers, standards of product safety and liability, the assessment of acceptable risk, conflicts of interest and obligation, professional loyalty and "whistle blowing", use and enforcement of professional codes of ethics, the "democratization" of the profession, and the moral implications of technology.

Not open to First Year students

Cross-listed as PHIL 315

GEN E 452 W 3C 0.5
Technical Entrepreneurship
Technical entrepreneurship is examined considering the role of independent business, entrepreneurial behaviour, types of business and enterprises, business structure, sources of venture concepts and capital, company operation and control, and business start-up.

Prereq: A course in Engineering Economics (or equivalent)

Restricted to fourth-year Engineering students.
Course Descriptions
Geography

GEN E 460 F 3C,2T 0.5
Orthopaedic Biomechanics
Introduction of engineering technology to the field of orthopaedics. Specific topics deal with the repair and reconstruction of portions of the musculoskeletal system affected by trauma or pathological response. Primary study is directed toward the skeletal joints and major load carrying structure.
Prerequisite: Students must have background study in properties and mechanics of materials equivalent to CIV E 204 and 265. Registration in this course will be assessed on an individual basis through scheduled interviews. Cross-listed as CIV E 460

GEOG 102 F 2C,2L 0.5
Introduction to Cartography and Map Analysis
Basic concepts involved in the analysis and use of existing types of cartographic products. Background theory of the production and reproduction of topographic and thematic maps, including historical development, collection of data and symbolization.
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.
Prerequisite: GEOG 102 or EARTH 121 or 126 or GEO E 126

GEOG 202 A F 3C 0.5
Location of Economic Activities
The locational structure of economic activities in the context of regional development, with the use of case studies. Basic concepts and tools are used to analyse the location structure of primary, secondary and tertiary activities.
Prerequisite: A first-year human geography course or equivalent

GEOG 202B W 3C 0.5
The Geography of Economic Development
This course focuses upon the integrative nature of economic development through analysis of space-time relationships at different scales of geographic analysis (community, regional, national and international).
Prerequisite: GEOG 202A

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 207 W 3C 0.5
Water Resources of Canada
A regional review of nature and distribution of natural waters in Canada. A simple water balance of the major climatic inputs and outputs, hydrologic stores and surface runoff provides the systematic framework for the regional approach. Students will learn about the seasonal variability of such factors as precipitation, evaporation, snow melt, groundwater storage, lake levels and stream flow across Canada.

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 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.
Prerequisite: Any Faculty of Environmental Studies course or Third World Development course

Cross-listed as PLAN 225

Students may receive credit for only one of GEOG 225 and PLAN 225

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 229 S 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.

Prerequisite: ENV S 178 and GEOG 160
Antirequisite: PLAN 225

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

Undergraduate Officer
J. Law, ES1 119, ext. 3285
Courses not offered in the current academic year are listed at the end of this section.

GEOG 101 F,W 2C,2L 0.5
Introduction to Human Geography
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-and location analysis themes.

GEOG 102 F,W 2C,2L 0.5
Introduction to Physical Geography
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 300 F 2C.2L 0.5
Geomorphology and the Southern Ontario Environment
Study of the origin and evolution of land forms 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 $10-$15

GEOG 303 F 2C.2L 0.5
Geographical Hydrology
Study of the land based hydrological cycle and water balance with Canadian emphasis. Focus on snowcover, glacier ice, ground ice, streams and lakes and their physical, ecological and socio-economic significance.
Prereq: GEOG 201 or one of 208 or 309

GEOG 304 F 4ldlab 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 307 F 2C.1D 0.5
Social Survey Techniques
Social research and the planning process, interview and self administered surveys; questionnaire design; profile data; sampling; data processing; non-survey data collection techniques; practical applications.
Prereq: Second- or third-year students with ENV S 178 or consent of instructor
Cross-listed as PLAN 307
Students may receive credit for only one of GEOG 307 and PLAN 307.
Estimated additional cost to student: $10

GEOG 309 F 2C.1D 0.5
Physical Climatology
Principles of physical climatology with emphasis on climatic regions of Canada. Topics include radiation and energy balances, general circulation patterns, synoptic development, climatic variability 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 W 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 316
Students may receive credit for only one of GEOG 316 and PLAN 316

GEOG 317 W 3C 0.5
Nonparametric Statistics
The theory and application of nonparametric statistics, with particular emphasis upon social science problems.
Prereq: ENV S 278 or consent of instructor
Cross-listed as PLAN 317
Students may receive credit for only one of GEOG 317 and PLAN 317

GEOG 319 F 2C.1L 0.5
Economic and Social Techniques for Regional Planning
Critical appraisal of a selection of descriptive and evaluative regional analysis techniques. Economic considerations of regional development, reliability and applicability of data; input-output analysis; cost-benefit analysis; planning, programming and budgeting systems; and social area analysis.
Prereq: ECON 101, 102 or consent of instructor
Cross-listed as PLAN 319
Students may receive credit for only one of GEOG 319 and PLAN 319.

GEOG 322 F 3C 0.5
Geographical Study of Canada
Geographical basis 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 for tourism are examined through consideration of tourism in a variety of countries and regions, both developed and developing. Topics include the nature and significance of tourism; economic, environmental and social impacts of tourism; and costs and benefits of tourism to destination areas.
Prereq: GEOG 202A, REC 230 or consent of instructor

GEOG 332 F 3C 0.5
Health and Disease in the Third World
Geographic concepts and issues in studying health related problems. Topics include morbidity and mortality patterns, "population at risk", malnutrition, poverty, access to modern health care, and alternative health care systems. Regional case studies from the developing countries (seminar method).
Prereq: Second-year Third World Development courses or consent of instructor
Estimated additional cost to student: $10

GEOG 333 W 3C 0.5
Recreation Geography
Implications of existing and potential recreation 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 341 F 2C.1S 0.5
Historical Geography of Canada
The changing geographies of settlement and resource use in the nineteenth and early twentieth centuries.
Prereq: A second-year human geography course or consent of instructor

GEOG 349 F 3C 0.5
The City as a System
Theories, models, and research procedures in the study of internal urban structure. Focuses on city-wide processes, urban land use, spatial economics, interaction systems, decision-making, urban growth, and the processes of development and redevelopment.
Prereq: GEOG 202A or consent of instructor
Field trip fee $5-$10
Course Descriptions

Geography

GEOG 350 W 3C 0.5
Regional Urban Systems
Theories, models and research procedures dealing with the growth and support of urban centres and city systems and their role in regional development.
Prereq: GEOG 202A or consent of instructor

GEOG 351 W 2C,1S 0.5
Geography of Transportation
Examines transportation systems from both a theoretical and practical perspective. Focuses on principles and models of spatial interaction, the development and form of transportation networks, and related spatial, social and environmental impacts.
Prereq: GEOG 202A and ENV S 178 or consent of instructor

GEOG 355 F,W 2C,2L 0.5
Spatial Data and Spatial Data Bases
This course focuses on building a GIS database. 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: GEOG 255 or PLAN 255
Cross-listed as PLAN 355
Students may receive credit for only one of GEOG 355 and PLAN 355

GEOG 356 F 3C 0.5
Resources Management
Reviews selected theories, methods, and terminology related to economic, behavioural, institutional and decision-making aspects of resources and environmental problems.
Prereq: ENV S 178 or consent of instructor
Field Trip fee $10-$15

GEOG 358 W 3C 0.5
Water Planning and Management: Strategies and Experiences
Benchmark theory and principles of comprehensive water planning and integrated river basin management. Selected international to local scale case studies.
Prereq: Consent of Instructor
Lab fee $10-$15

GEOG 359 S 2C,1L 0.5
Geography of Energy
Issues related to energy resources. The course examines both Canadian energy management problems and international issues such as cartels and relationships between energy and economic development.
Prereq: GEOG 202A or consent of instructor

GEOG 360 W 1C,2L 0.5
Preparation of Maps and Illustrations
Cartographic design and communication in the context of rapidly evolving technology.
Prereq: GEOG 160
Lab fee $20

GEOG 365Z F 2.5
Waterloo in UK - Leeds
Description in Environmental Studies program section (page 117).
Cross-listed as ENV S 365Z

GEOG 366Z W 2.5
Waterloo in UK - Leeds
As GEOG 365Z.
Cross-listed as ENV S 366Z

GEOG 367 W 3C 0.5
Conservation in Wildland and Resource Management
Consideration of the constraints and guidelines that an application of the principles of ecology place on the planning and management of resources within natural and agricultural ecosystems. The theory and history of this subject will be discussed together with the management of wildlife, forestry, fisheries, parks and open space, and agriculture.
Prereq: ENV S 200
Cross-listed as PLAN 367
Lab fee $10-$15
Students may receive credit for only one of GEOG 367 and PLAN 367

GEOG 368 F 3C 0.5
Conservation/Resource Management of the Built Environment
Consideration of the constraints and guidelines that an application of the principles of ecology place on the planning and management of resources within urban and urban shadow ecosystems. The theory and history of this subject will be discussed together with urban environment, the management of waste, urban open space and parks, rehabilitated sites, and environmentally sensitive areas.
Prereq: ENV S 200
Cross-listed as PLAN 368
Lab fee $10-$15
Students may receive credit for only one of GEOG 368 and PLAN 368

GEOG 375 F 2C,2L 0.5
Air Photo Interpretation
The principles of air photo interpretation utilizing specific criteria visible in the conventional air photo. Examples from local and foreign environments.
Prereq: GEOG 275 and 201
Lab fee $20

GEOG 376 F 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,W 3C 0.5
The Nature of Geography
The roots and evolution of geographic thought, conceptual approaches and pathways. 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

GEOG 390 F,W 2S 0.5
Honours Thesis Proposal
The development of a research proposal under the supervision of an appropriate faculty member. Normally taken in the third year. Students considering a topic demanding questionnaire data should take GEOG 307 in third year.
Prereq: Honours Geography students only

GEOG 391 F,W falllab 0.5
Field Research
One week field camp in which a specific area will be analysed from a geographic point of view. Individual or group analysis of specific field problems. General students may take this course only in fourth year.
Prereq: Honours or fourth-year Geography students only
Estimated cost to student: $225

GEOG 404 W 3L 0.5
Advanced Techniques in Cartographic Design and Production
Advanced photomechanical and digital analysis techniques in thematic mapping. Laboratory emphasis on production and design, including typography, symbology, colour, and printing techniques.
Prereq: GEOG 360
Lab fee $40-$60

GEOG 411 W 2S 0.5
Geography of Manufacturing Firms and Associations
Emphasis on decision-making, multinational corporations, technological change, and analysis of the locational patterns of specific industries.
Prereq: GEOG 202A and 202B or consent of instructor
GEOG 412 W 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.
Prereq: GEOG 202A or 206 or consent of instructor

GEOG 422 W 2S 0.5
Canada
Seminar on geographical regional synthesis as applied to Canada. Study of regions at different scales. Issues of continuing Canadian concern. A self-directed learning approach is emphasized in this course.
Prereq: GEOG 222

GEOG 423 F 3C 0.5
Central and Eastern Europe
Detailed study of physical, cultural, economic, and political geography of Central and Eastern Europe. Geographical aspects of agricultural problems, industrialization, distribution of trade, economic planning, and relations with the Soviet Union and the West.
Prereq: GEOG 120 or 227

GEOG 430A/B/C S (lab) 0.5/1.0/1.5
Field Research in Regional Geography
430A (0.5 course credits) or 430B (1.0 course credits) 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).
Prereq: Third- or fourth-year geography students or consent of instructor

GEOG 455 F 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.
Prereq: GEOG 355 or PLAN 355

GEOG 459 F 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 consumption patterns of different countries. Attention will also be paid to the environmental impact of different energy systems.
Prereq: GEOG 202A or 359 or consent of instructor

GEOG 461 S 3C 0.5
Land Dereliction and Rehabilitation
Reasons for land dereliction, its processes, and effects.
Prereq: Fourth-year Environmental Studies students or consent of instructor

GEOG 470 W 2C,2L 0.5
Advanced Remote Sensing
Principles of earth resource analysis using remotely sensed imagery and digital data with emphasis upon satellite platform sources. The coordination of supplemental imagery and ground truth missions with satellite data in a multi-strategy perspective.
Prereq: GEOG 376

GEOG 475A/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 develop a brief outline to be filed with the Associate Chair, Undergraduate Studies. A faculty member must agree to supervise the study.
Prereq: Third- or fourth-year geography students and consent of instructor
The letter designation allows this course to be taken more than once for credit

GEOG 490A F,W,S, 3S 1.0
Honours Thesis Preparation
Preparatory work and first draft of thesis.
Prereq: GEOG 390; only fourth-year Honours students

GEOG 490B F,W,S 3S 1.0
Honours Thesis Completion
Completion of thesis.
Prereq: GEOG 390 and 490A; only fourth-year Honours students

GEOG 491A F,W 3S 0.5
Senior Research Paper Preparation
Preparatory work and first draft of senior research paper. Students will select topics from a list prepared by faculty advisors.
Prereq: GEOG 390; Fourth-year Honours Regular students

GEOG 491B F,W 3S 0.5
Senior Research Paper Completion
Completion of senior research paper.
Prereq: GEOG 390 and 491A; only fourth-year Honours Regular students

COURSES NOT OFFERED 1993-94
GEOG 204 Soviet Union
GEOG 205 Africa
GEOG 208 Applied Climatology
GEOG 226 Food, Agriculture and Integrated Rural Development in the Third World
GEOG 302 Geomorphological Processes
GEOG 318 Spatial Analysis
GEOG 320 Regional Geography
GEOG 326 Gender Roles and Development Alternatives in the Third World
GEOG 340 Towns and Villages of Rural Canada
GEOG 353 Marketing Geography
GEOG 400 Climatic and Periglacial Morphology
GEOG 401 Glacial Geomorphology and Some Contemporary Applications
GEOG 405 Wetlands
GEOG 407 Statistical Models in Hydrometeorology
GEOG 409 Energy Balance Climatology
GEOG 421A/B Western Europe
GEOG 455 City and Regional Systems
Geological Engineering

Undergraduate Officer
L. Rothenburg, E2-3320, ext. 3759

GEO E 126 W 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, analytic, numerical, or field oriented. The thesis format must follow accepted engineering practice and be of professional quality.

All other courses in the Geological Engineering program are listed under the course descriptions in Earth Sciences or Civil Engineering.

A detailed booklet describing Geological Engineering is available in Room 2304, Engineering 2.

Germanic and Slavic Languages and Literatures

Undergraduate Officer
P. Karpiak, ML 222, ext. 3118

GERMAN

Introductory Note
Not all courses listed in this section are available. Please consult the 1993-94 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 3C.1L 0.5
First Year German
For students with little or no knowledge of German. The basic elements of German grammar with an emphasis on oral practice and pronunciation. Language laboratory, introduction to aspects of German culture and reading of appropriate graded texts.

GER 101/102 are beginners’ courses for students with little or no knowledge of German. Not open to students who have credit for GER 111, 112, Grade 12 or equivalent. If in doubt, consult the Department.

GER 102 F.W,S 3C.1L 0.5
First Year German
As GER 101
Prereq: GER 101

GER 111/112 are beginners’ courses for students with little or no knowledge of German. Not open to students who have credit for GER 101, 102, Grade 12 or equivalent.

GER 111 F.W,S 3C 0.5
First Year Scientific German
For students with little or no knowledge of German. The basic elements of German grammar and pronunciation with an emphasis on reading and translation of elementary scientific literature from various fields.

GER 112 F.W,S 3C 0.5
First Year Scientific German
As GER 111
Prereq: GER 111

GER 121 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

GER 122 W 3C 0.5
Studies in German Literature with Language Practice
As GER 121
Prereq: GER 121, or permission of the instructor

GER 201 F,W 3C 0.5
Second-Year German
This course is a continuation of first year GER 101/102. It offers extensive practice in both the spoken and written language. It provides vocabulary building, grammar review, and exercises in pronunciation and comprehension. Language lab.
Prereq: GER 102 or equivalent

GER 202 W 3C 0.5
Second-Year German
As GER 201
Prereq: GER 201, or permission of the instructor

GER 251 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

GER 252 W 3C 0.5
German Conversation and Composition
As GER 251
Prereq: GER 251, or equivalent

GER 261 F 3C 0.5
The Age of Goethe (Classicism)
Reading, interpretation, and critical analysis of representative works (Goethe, Schiller, Hölderlin, etc.).
Prereq: GER 122, 252 or equivalent

GER 262 W 3C 0.5
The Age of Goethe (Romanticism)
Reading, interpretation, and critical analysis of representative works (Novalis, Tieck, Brentano, etc).
Prereq: GER 122, 252 or equivalent
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.
Open to all students above first year.

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.
Open to all students above first year.

GER 281 F 3C 0.5
Post-War Literature
Reading and Interpretation of major works since 1945 in prose, drama and poetry. Main authors: Kollwitz, Ernst, and Bertolt Brecht. Taught in English.
Open to all students above first year.

GER 282 W 3C 0.5
Survey of German Literature
Introduction to the major periods of German literature. Taught in English. Open to all students above first year.

GER 291 F 3C 0.5
Survey of German Literature
A study of prescribed texts relating to the major linguistic structures of German. Taught in English. Open to all students above first year.

GER 292 W 3C 0.5
Survey of German Literature
A study of prescribed texts relating to the major linguistic structures of German. Taught in English. Open to all students above first year.

GER 300A-Z FW 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.
Open to all students above first year.
Cross-listed as FINE 359.

GER 311 F 3C 0.5
Theory of Translation
Theory, methodology, and techniques of translation. Taught in German.

GER 312 W 3C 0.5
Theory of Translation
Taught in German.

GER 315 F 3C 0.5
Intermediate Conversation and Composition
Conversation on modern topics. Exercises in advanced grammar, stylistics, and composition. Taught in English. Open to all students above first year.

GER 316 W 3C 0.5
German Thought and Literature
Taught in English. Open to all students above first year.

GER 351 F 3C 0.5
Theory of Translation
Prereq: GER 281, 252 or equivalent.

GER 352 W 3C 0.5
Theory of Translation
Prereq: GER 281, 252 or equivalent.

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, Büchner, Brecht and Dürrenmatt. Taught in English.
Prereq: Open to students from all departments; not normally to first-year students.
This course is complemented in the Winter term by RUSS 356.
Cross-listed as DRAMA 383 (formerly 355).

GER 361 F 3C 0.5
Young Germany and Biedermeier
Reading, interpretation and critical analysis of prescribed prose, drama and poetry.
Prereq: GER 122, 252 or equivalent.

GER 362 W 3C 0.5
Poetic Realism
Reading, interpretation and critical analysis of prescribed prose, drama and poetry.
Prereq: GER 122, 252 or equivalent.

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 122, 252 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, Brecht, etc.).
Prereq: GER 122, 252 or equivalent.

GER 381 F 3C 0.5
Fascism in Germany: Holocaust and Resistance in Literature
This course will focus on the literary rendering, including film versions, of the Holocaust experience by authors from the German speaking countries, such as Jurak Becker, Paul Celan, Max Frisch, Edgar Hilsenrath, Peter Weiss and others. Also studied will be works dealing with anti-Nazi resistance by individuals and groups as described by Bert Brecht, Rolf Hochhuth and Anna Seghers.
This course is taught in English.
Open to all students.

GER 391 F 3C 0.5
Masterpieces of German Literature in Translation
A study of significant prose and drama from 1770 to the present representing themes such as Revolution, Duty vs. Inclination, Flesh vs. Spirit, Modern Germany East and West. Works studied include Danton's Death (Büchner), Maria Stuart (Schiller), Derniernr (Hesse), Galileo (Brecht), and Cat and Mouse (Grass).

GER 392 W 3C 0.5
Masterpieces of German Literature in Translation
As GER 391.

GER 3952 F 2.5
Waterloo in Germany Program
Description in Arts program section.

GER 3962 W 2.5
Waterloo in Germany Program
As GER 3952.

GER 421 F 3C 0.5
Introduction to German Linguistics
Study of the major linguistic structures of German, especially in contrast to the structures of English. Coverage of phonetics and phonology, morphology and lexicology, syntax and semantics, and differences between spoken and written German.
Prereq: GER 352 or equivalent.
A study of the main thoughts, themes, forms and schools in German poetry from German Romanticism to the present.

GER 471 F 3 C 0.5
German Poetry
A study of the main thoughts, themes, forms and schools in German poetry from German Romanticism to the present.

GER 472 W 3 C 0.5
German Poetry
A study of the main thoughts, themes, forms and schools in German poetry from German Romanticism to the present.

GER 422 W 3 C 0.5
Introduction to German Linguistics
As GER 421
Prereq: GER 421

GER 441 F 3 C 0.5
Humanism, Reformation and Baroque
Reading, interpretation, and critical analysis of prescribed texts (Erasmus, Luther, Sachs, Opitz, Gryphius, Grimmelshausen, etc.).
Prereq: Second-year standing in German

GER 442 W 3 C 0.5
Enlightenment and Storm and Stress
Reading, interpretation, and critical analysis of prescribed texts (Lessing, Wieland, Klopstock, Lenz, Klinger, etc.).
Prereq: GER 352 or equivalent

GER 451 F 3 C 0.5
Advanced Conversation, Composition and Stylistics
This course provides intensive practice in spoken and written German on the advanced level.
Prereq: GER 352 or equivalent

GER 452 W 3 C 0.5
Advanced Conversation, Composition and Stylistics
As GER 451
Prereq: GER 451 or equivalent

GER 461 F 3 C 0.5
Introduction to the History of the German Language with Readings in Middle High German
Prereq: GER 122, 252 or equivalent
Offered in alternate years

GER 462 F 3 C 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 "Blutezeit" in German literature (1170 to 1250); Early Minnesang, Walther von der Vogelweide, Nibelungenlied, Hartmann von Aue, Wolfram von Eschenbach, etc.

GER 470 F 3 C 0.5
Reading Courses in Approved Topics
As GER 421
Prereq: Approval of the Department

DUTCH
DUTCH 101 F 3 C 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 a very limited knowledge of Dutch.
Prereq: DUTCH 101 or equivalent

DUTCH 201 F 3 C 0.5
Intermediate Dutch
This course will be conducted partly in spoken and written Dutch and offers advanced study in grammar, composition, and conversation. Special emphasis will be given to comprehension and practice in the spoken language.
Prereq: DUTCH 102 or equivalent

RUSS
RUSS 101 F 3 C, 1 L 0.5
First Year Russian
A study of Russian grammar and disposition with emphasis on oral practice and pronunciation.
Prereq: RUSS 101

RUSS 111 F,S 3 C 0.5
First Year Scientific Russian 1
A rapid, intensive course, designed to enable the students to master reading and translating Russian. Special emphasis on international and scientific terminology, ranging over many of the main branches of science. Notwithstanding its simplified approach, the main features of Russian grammar are treated in full.
Taught in English
Open to all students with little or no knowledge of Russian, except those who have credit for RUSS 101 or 102

RUSS 102 W 3 C, 1 L 0.5
First Year Russian
As RUSS 101
Prereq: RUSS 101 or equivalent

RUSS 111 F,S 3 C 0.5
First Year Scientific Russian 1
A rapid, intensive course, designed to enable the students to master reading and translating Russian. Special emphasis on international and scientific terminology, ranging over many of the main branches of science. Notwithstanding its simplified approach, the main features of Russian grammar are treated in full.
Taught in English
Open to all students with little or no knowledge of Russian, except those who have credit for RUSS 101 or 102

RUSS 101 F 3 C, 1 L 0.5
First Year Russian
A study of Russian grammar and disposition with emphasis on oral practice and pronunciation.
Prereq: RUSS 101

RUSS 111 F,S 3 C 0.5
First Year Scientific Russian 1
A rapid, intensive course, designed to enable the students to master reading and translating Russian. Special emphasis on international and scientific terminology, ranging over many of the main branches of science. Notwithstanding its simplified approach, the main features of Russian grammar are treated in full.
Taught in English
Open to all students with little or no knowledge of Russian, except those who have credit for RUSS 101 or 102

RUSS 102 W 3 C, 1 L 0.5
First Year Russian
As RUSS 101
Prereq: RUSS 101 or equivalent

RUSS 201 F 3 C 0.5
Intermediate Scientific Russian
A review of the fundamentals of grammar is followed by a more advanced study of the language structure and idiom. Readings and translation from contemporary scientific writing with the aim of helping the student to acquire a greater vocabulary and to master the stylistic difficulties peculiar to technical writing.
Prereq: RUSS 101 or equivalent

RUSS 202 W 3 C 0.5
Intermediate Scientific Russian
As RUSS 201
Prereq: RUSS 201 or equivalent

RUSS 251 F 3 C 0.5
Conversational, Composition, Grammar and Phonetics
This course is basically a continuation of First-Year Russian. It provides intensive practice in spoken and written Russian. Vocabulary building, comprehension, pronunciation and intonation are emphasized.
Prereq: RUSS 101 or equivalent
Course Descriptions

Germanic and Slavic

RUS 222 W 3C 0.5
Conversation, Composition, Grammar and Phonetics
As RUS 251
Prereq: RUS 251 or equivalent

RUS 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: RUS 102 or equivalent

RUS 262 W 3C 0.5
Introduction to Russian Literary Movements
As RUS 261
Prereq: RUS 102 or equivalent

RUS 271 F 3C 0.5
Russian Thought and Culture
A survey of cultural history from the beginnings to 1905. Lectures will focus on major developments in literature, philosophy, art, architecture, and music as seen against the background of Russia's historical past. Discussion will be devoted primarily to works of Russian literature.
Taught in English
Open to all students

RUS 272 W 3C 0.5
Russian Thought and Culture
A survey of cultural history from 1905 to the present. Lectures will focus on major developments in literature, philosophy, art, and music as seen against the background of Russia's historical past. Discussion will be devoted primarily to works of Russian literature.
Taught in English
Open to all students

RUS 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: RUS 202 or equivalent

RUS 312 W 3C 0.5
Theory of Translation
As RUS 311
Prereq: RUS 311

RUS 341 F 3C 0.5
Russian Drama
A study of the origins and development of Russian drama up to 1905. Reading and critical analysis of major works in various genres with emphasis on authors of the nineteenth century.
Taught in English
Extra work in Russian required of Russian majors only
Cross-listed as DRAMA 381 (formerly 352)

RUS 342 W 3C 0.5
Russian Drama
As RUS 341
Taught in English
Extra work in Russian required of Russian majors only
Cross-listed as DRAMA 382 (formerly 353)

RUS 351 F 3C 0.5
Intermedi ate Conversation and Composition
In principle, this course is a continuation of RUS 251/252. In terms of vocabulary building, apart from the spoken language, the comprehension of the literary language is especially stressed.
Prereq: RUS 252 or equivalent

RUS 352 W 3C 0.5
Intermediate Conversation and Composition
As RUS 351
Prereq: RUS 351 or equivalent

RUS 356 W 3C 0.5
The Stage as Forum: Russian Drama in Translation
Major Russian dramas will be studied from various points of view including historical importance, themes, and technique. The course includes theory and selected dramas of such playwrights as Gogol, Chekhov, Tols toy, Gorky, Mayakovsky, and Pogodin.
Taught entirely in English
Fall term: See GER 355
Open to students from all departments; not normally open to first-year students
Cross-listed as DRAMA 384 (formerly 356)

RUS 361 F 3C 0.5
Russian Short Story
A study of the form and a detailed examination of Russian short stories by major representative writers.
Taught in English
Extra work in Russian required of Russian majors only
Open to all students

RUS 362 W 3C 0.5
Russian Short Story
As RUS 361

RUS 381 3C 0.5
The Peoples of the Soviet Union
Especially emphasized will be the study of non-Slav peoples of the Caucasus and Central Asia, European Russia and Siberia. Czarist and Soviet policy towards national minorities; assimilation and integration problems in the light of linguistic division; development of literary languages. Some achievements of Soviet anthropology.
Open to all students

RUS 391 F 3C 0.5
Great Russian Novels
Reading and interpretation of 19th century novels selected from the works of Gogol, Turgenev, Dostoevsky, and Tolstoy. Lectures on social and intellectual background.
Taught in English.
Extra work in Russian required of Russian majors only
Open to all students

RUS 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
Open to all students

RUS 442 3C 0.5
Russian Epic Tradition
As RUS 441

RUS 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: RUS 352 or equivalent
Course Descriptions
Germanic and Slavic

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
20th-Century Russian Literature
Reading, interpretation, and critical analysis of selected fiction and drama (Andreev, Bunin, Gorky, Kataev, Sholokhov, A.N. Tolstoy).
Taught in English
Extra work in Russian required of Russian majors only
Open to all students

RUSS 462 W 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
Open to all students

RUSS 481 F 3C 0.5
Russian Poetry
A study of themes and forms of representative authors of Classicism, Romanticism (Lomonosov, Derzhavin, Pushkin, Lermontov, Nekrasov, Fet, Tютчев, etc.).
Prereq: RUSS 102 or equivalent

RUSS 482 W 3C 0.5
Russian Poetry
A study of themes and forms of representative authors from Symbolism to the present (Blok, Esenin, Mayakovskiy, Akhmatova, 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
Open to all students

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
Open to all students

RUSS 496-498 F,W,S,J,A R 0.5
Reading Courses in Approved Topics
Prereq: Approval of the Department

POLISH

POLSH 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.

POLSH 102 W 3C 0.5
First Year Polish
As POLSH 101
Prereq: POLSH 101 or equivalent

POLSH 201 F 3C 0.5
Intermediate Polish
This course will be conducted largely in Polish and provides intensive practice in grammar, composition and conversation.
Prereq: POLSH 102 or equivalent

POLSH 202 W 3C 0.5
Intermediate Polish
As POLSH 201
Prereq: POLSH 201 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
Open to all students

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
Open to all students
Course Descriptions
Germanic and Slavic - Greek

CROATIAN

CROAT 101 F 3C 0.5
Introductory Croatian
For students with little or no knowledge of Croatian. The basic elements of Croatian grammar with emphasis on oral practice and pronunciation, along with appropriate graded texts.
Open to all students

CROAT 102 W 3C 0.5
Introductory Croatian
As CROAT 101
Prereq: CROAT 101 or equivalent

CROAT 201 F 3C 0.5
Intermediate Croatian
This course is a continuation of first-year Croatian. It offers extensive practice in both the spoken and written language. Vocabulary building, comprehension and pronunciation are stressed.
Prereq: CROAT 102 or equivalent

CROAT 202 W 3C 0.5
Intermediate Croatian
As CROAT 201
Prereq: CROAT 201 or equivalent

CROAT 301 F 3C 0.5
Advanced Croatian
This course is conducted in Croatian and provides intensive practice in spoken and written Croatian on the advanced level. Conversation on modern topics will be stressed.
Prereq: CROAT 202 or equivalent

CROAT 302 W 3C 0.5
Advanced Croatian
As CROAT 301
Prereq: CROAT 301 or equivalent

CROAT 371 F 3C 0.5
Croatian Culture and Literature
This course presents the evolution of Croatian culture from the beginnings to the present. Particular emphasis is placed on developments in literature; however, other significant manifestations of Croatian civilization (art, architecture, music) are also examined. Integral to this course are the cultural aspects of Croatian settlements in Canada.
Taught in English
Open to all students

CROAT 372 W 3C 0.5
Croatian Culture and Literature
As CROAT 371
Taught in English
Open to all students

CROAT 3952 F 2.5
Waterloo In Zagreb Program
Description in Arts program section.

CROAT 396Z W 2.5
Waterloo In Zagreb Program
As CROAT 395Z

CROAT 496/497 0.5/0.5
Special Topics In Croatian Studies
Prereq: Approval of the Department

Gerontology

Undergraduate Officer
J.P. Hirdes, PAG 3015, ext. 2007

GERON 100 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.

GERON 208 W 0.5
The Literature of Aging
This course will focus on literary works that present various aspects of aging, such as changes in physical and mental abilities, relationships with children and grandchildren, coping with disease and death, and the satisfactions unique to the elderly.
Cross-listed as ENGL 208F

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. In some cases, the instructor may consider waiving the course prerequisite listed.
Cross-listed as SCI 255

GERON 344 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 KIN 352/SOC 344

GERON 400 S 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 enroll in this seminar must have completed at least six of the courses towards the Certificate and must consult the Director before preregistering.

GERON 401A/B
Directed Studies in Special Topics
For the student who desires to pursue a particular topic in depth through independent research and/or extensive reading. A faculty member must approve a student's project prior to registration for this course. Open to exceptional students who have permission of the instructor and the director of the program.

GERON 402 W 2C 0.5
Epidemiology of Aging
Factors contributing to various disease processes, with special reference to quantitative evaluation of environmental factors relevant to human disease and aging.

Greek

For courses in Greek see Classical Studies.
### Course Descriptions

**Health Studies**

**Undergraduate Officer**
R.S. McCall, BMH 2319, ext. 2720

**Introductory Note**
HLTH 101/102 have replaced HLTH 140/141.

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Credits</th>
<th>Description</th>
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| HLTH 101 F | 3C; 0.5 | Introduction to Health Studies 1  
This 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 |
| HLTH 245 F | 3C; 0.5 | The Canadian Health Care System  
The 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 students only or permission of instructor |
| HLTH 349 W S | 3C; 0.5 | Principles of Behaviour Modification  
An overview of behaviour modification principles and procedures. Basic principles of reinforcement, punishment, modelling and desensitization are examined as they relate to health behaviour.  
Prereq: PSYCH 101 or consent of instructor |
| 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 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 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.  
Prereq: KIN 300 or permission of instructor  
Cross-listed as KIN 407 |
| HLTH 420 W | 2C; 0.5 | Health, Environment, and Planning  
A seminar course on the environment and the 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 420  
Estimated additional cost to student: $20 |
HLTH 431 F,W,S 0.5
Honours Thesis (A)
An independent research project on an approved topic, supervised by a faculty member. Includes an approved proposal and completion of the first 3 chapters of the thesis - Introduction, Review of Literature, and Methods.
Recommended for students planning graduate studies.
Offering is contingent on the availability of resources.

HLTH 432 F,W,S 0.5
Honours Thesis (B)
An independent research project on an approved topic, supervised by a faculty member. Includes data collection, data analysis and presentation of results in thesis form.
Prereq: Completion of HLTH 431
Recommended for students planning graduate studies.
Offering is contingent on the availability of resources.

HLTH 433 F 0.5
Advanced Research Methods
A course designed to familiarize students with the skills requisite for the formulation, execution and written presentation of an empirical research project. After a general discussion of the pertinent issues, students will be asked to analyse independently a data set related to a topic of interest to Health Studies students and to present this in the form of a research report.
Prereq: KIN 222, 330 and CS 316
Students must be enrolled in either fourth-year regular or 3B Co-op of the Health Studies program.

HLTH 442 F 3C 0.5
Epidemiology of Chronic Diseases
An introduction to the field of epidemiology. The primary objective is to provide an understanding of the fundamental concepts, principles and applications of chronic disease epidemiology. The course emphasizes understanding of epidemiologic methods and identification of risk factors.
Prereq: An introductory statistics course or consent of instructor

HLTH 443 W 3C 0.5
Behaviour and Chronic Disease
A critical analysis of behavioural dimensions of major current health problems. The role of behaviour as a determinant and complicator of disease is examined. Prospects for and principles of behaviour change in the prevention and management of disease are addressed.
Prereq: HLTH 344, 348, 349

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

Course Descriptions
Health Studies
History

HLTH 102M F 0.5
Law and Society in the Middle Ages: 500-1000
A study of the laws and legal procedures of the Early Middle Ages. Anglo-Saxon and Germanic law will be examined along with legal procedures and institutions of that era.
Offered at St. Jerome's College

HIST 130 W,S 0.5
The Modern World in Historical Perspective
This course will introduce students, through interconnectedness and interaction of selected themes, to contemporary history. Its format includes two interpretive lectures per week plus major films on 20th-century crises and discussion groups.

HIST 200 W 0.5
History and Film
An introduction to issues in modern cultural history through the study of selected narratives and documentary films with supplementary reading, lectures and discussions.

HIST 204 W 0.5
Life on the Ontario Frontier
The course examines the cultural, moral, social, and economic adaptations of European settlers to the Upper Canadian frontier environment.

HIST 207 W 0.5
Canadian labour History
This course deals with the history of organized labour in Canada with an emphasis on prominent labour leaders, major industrial disputes and labour's role in politics. It will also evaluate the development of the Canadian industrial relations systems.
Offered at St. Jerome's College

HIST 208 S 0.5
American-Russian Relations Since November, 1917
Traditional and revisionist historians examine the history of this super-power rivalry: Wilson vs. Lenin; F.D.R., Truman and Stalin; containment, coexistence, and the politics of crisis from 1945 to the present.

HIST 210 F,W 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

Undergraduate Officer
K.D. Eagles, HH 116, ext. 3160

Courses not offered in the current academic year are listed at the end of this section.
HIST 212 W 0.5
British History Since 1603
A survey of the shaping of British society and the British experience from the time of Shakespeare to the present; constitutional conflict and compromise, rise and fall of empire, industrial and urban revolution, world wars and welfare state.
This course is primarily intended for non-history majors. History majors may wish to take one or more of HIST 305, 307 and 308.

HIST 215 F 0.5
The Proper Sphere: Canadian Women in Historical Perspective
This course will examine the history of women in Canada from New France to the present day. The course will focus on the inter-relationship between women and their society, particularly as it affects the issues of work, health, reform and legal status.
Offered at Renison College

HIST 218 F 0.5
German History 1740-1945
The development of Germany from the Austrian-Russian rivalry of 1740 through to the end of World War II.
Offered at Conrad Grebel College

HIST 221 F 0.5
Race Relations in Canada: An Historical Perspective
The "race problem" has appeared on the Canadian public agenda for the 1980's, but the issue is not of recent origin. 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 222 W 0.5
History of Modern Revolutions
An introduction to historical explanations of revolutions with special focus on social change and revolutionary theories. The French, Russian and Chinese Revolutions will be used as case studies.
Offered at Conrad Grebel College

HIST 235 F.W 3C 0.5
History of Christianity
The development of Christianity in its Roman Catholic, Eastern Orthodox and Protestant traditions from the time of Christ to the present.
Offered at Conrad Grebel College (Fall)
Offered at St. Jerome's College (Winter)
Cross-listed as HIS 230

HIST 239 F 0.5
History of Modern China, 1911 to the Present
Some of the topics studied in this course include: the three stages of warlordism, the May Fourth Movement and the structure of society in the People's Republic of China.

HIST 240 W 0.5
20th-Century Japanese History
This course will examine the historical influences, both domestic and foreign, which led Japan to follow the course which has brought it to the present status of a powerful Asian nation.

HIST 241 F 0.5
Society and the Sexes in Early Modern Europe
This course will examine the changing importance of gender roles from the 15th to the 18th centuries. It will focus on topics such as sexuality, marriage, the family and the role of women in society and the work force.

HIST 247 F 0.5
Mennonite History: A Survey
This course covers Mennonite origins, teachings, migrations, settlement patterns, divisions, leaders, institutions, and religious and social practices, indeed all facets of Mennonite history in various national settings.
Offered at Conrad Grebel College

HIST 250 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 permission of the professors to take this course.

HIST 253 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.

HIST 254 W.S 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.

HIST 255 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 258 F 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 260 W 0.5
Europe: 16th to 19th 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 political structure, daily life, the role of women and the family.

HIST 262 W 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 306 W 0.5
The English Reformation
A history of the English reformation, expansively considered from the beginnings of the European Reformation to the establishment of the Anglican church in the Revolutionary and Restoration periods in the 17th century.

HIST 308 W 0.5
Britain Since 1877
A study of the British experience and of Britain's part in world history from the 1860's to the 1980's.

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, craftsman ship, obligation, time, family, work, from the age of Edwards and Franklin to that of Tocqueville and Emerson.

HIST 316 W 0.5
American Cultural History 2: Devices and Desires
Modern American industrial society and popular, modernist and post-modernist culture will be examined. Specific themes will include ideas and practices of progress, consumption, leisure, entertainment, sex, liberation, from the age of Veblen and William James to that of McLuhan and Warhol.

HIST 319 F 0.5
French-Canadian History
An examination of pre-industrial French Canada with emphasis on the cultural, political and economic themes which form the background to modern Quebec history.

HIST 325 W 0.5
History of Canadian Indians in 1870's
"From Freedom to Conquest". The history of Indian-white contact and its effect on the life and culture of the native Canadians.

HIST 328 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.

HIST 339 F 0.5
The History of France in the 19th Century
A study of French society and the four revolutions that influenced it with particular attention to social and institutional forces.

HIST 348 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.

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 358 W 0.5
The History of Modern Germany: From the Weimar Republic to Reconstruction
A study of Germany from the rise of the Nazis through the War experience, the post-War settlement, the integration of the refugees, the division into East and West, and the economic miracle.

HIST 379 F 0.5
Reformation History
A study of the major 16th-century reformers and their intellectual background in humanism and late medieval scholasticism. Special attention will be given to the Lutheran and Reformed traditions and their ideological, social, political expressions.

Course Descriptions

HIST 385 F 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. Offered at St. Jerome's College

HIST 387 W 0.5
Ontario History since Confederation
The course will examine the emergence of Ontario as an industrial giant and the development of its hegemony in Canada. An emphasis will also be placed on the sources and methods of local historical research.

HIST 389 W 0.5
Canada in World Affairs: From Laurier to Trudeau
An analytical and historical examination of Canadian foreign policy in the international system. Domestic sources of Canadian foreign policy and international sources of Canadian foreign policy are examined in detail.

HIST 390 F 0.5
The History of the American South
This course traces the main eras and issues in Southern history from the 18th century to the mid-20th century. Topics examined will include pre-revolutionary and ante-bellum South, the Trial of Tears, the Civil War and reconstruction, the New South, the "lost cause", the era of Jim Crow, and the search for the central theme.

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.
Course Descriptions
History - Italian

HIST 400A/B F,W 1.0/1.0
Reformation

HIST 401A/B 1.0/1.0
European

HIST 402A W 1.0
Russian

HIST 403A/B 1.0/1.0
Canadian

HIST 405A/B 1.0/1.0
British

HIST 407A/B 1.0/1.0
Imperial

HIST 409A/B 1.0/1.0
American

410A/B CREDITS 1.0/1.0
Historiography

HIST 491 F,W,S 1.0
Independent Study in Special Subjects

COURSES NOT OFFERED 1993-94
HIST 102F Introduction to Western
Intellectual History
HIST 102N Introduction to African History
HIST 201 Canadian Urban History
HIST 202 The Individual and the Family in
History
HIST 203 Modern Quebec
HIST 206 History of Canadian Minorities
HIST 209 Health, Disease and Medicine in
Canadian History, 1500-1984
HIST 211 British History to 1603
HIST 213 Modern Western Popular
Culture
HIST 219 Survey of Russian History
HIST 230 Church and Revolution in Latin
America
HIST 232 Revolutions in Latin America
HIST 233 Civil-Military Relations in Latin
America
HIST 234 Catholic Church in Canada
HIST 237 Ancient Civilization 1
HIST 238 Ancient Civilization 2
HIST 248 History of Canadian-American
Relations to 1014
HIST 249 Canadian-American Relations
Since 1914
HIST 257 U.S. to 1900
HIST 259 Modem African History
HIST 261 Europe: 14th to 16th Century
HIST 263 Europe: 1789-1945
HIST 273 Canadian Social History 1
HIST 274 Canadian Social History 2
HIST 304 Medieval Church History
HIST 307 British History 1760-1867
HIST 320 The History of Modern Quebec
HIST 321 Race Relations - Modern
HIST 326 Canadian Indians since 1870's

HIST 340 History of France in the 19th
Century
HIST 346 Mennonite History - Topics
HIST 390 Shaping the Canadian City,
1880-1900

IS 302A,B,C,D,E F,W,S 1S 0.5 to 2.5
Advanced Independent Research
Continued
Criteria as above.  
Prereq: IS 301 and/or consent of
instructor

Independent Studies

Undergraduate Officer
G. Griffin, PAS 1054, ext. 6147

IS 101A F,W,S 1S 0.5
Introductory Independent Research
Each half credit will involve one seminar a
week devoted to the philosophy, methodology and practicality of carrying out inde-
pendent study. Emphasis will be placed
upon such different forms of independent study as self-directed learning, problem
posing, and critical thinking. In addition,
each student enrolled in the course will
spend at least seven hours a week of
independent research supervised by an IS
faculty member or by a consenting super-
visor from any of the other academic units
on campus.
Prereq: IS students must be in good
standing. Non-IS students must be in
good standing in an Honours program.
Consent of instructor

IS 101B 1.0
Same as above

IS 101C 1.5
Same as above

IS 101D 2.0
Same as above

IS 101E 2.5
Same as above

IS 102A,B,C,D,E F,W,S 1S 0.5 to 2.5
Introductory Independent Research
Continued
Criteria as above.  
Prereq: IS 101 and/or consent of
instructor

IS 301A,B,C,D,E F,W,S 1S 0.5 to 2.5
Advanced Independent Research
Each half credit will involve regular meet-
ings with a designated faculty member
and at least seven hours a week of inde-
pendent research on a topic of particular
interest to the student and faculty member.
Prereq: IS 101 or 102 or evidence of
ability to undertake advanced individual
research and consent of instructor

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 101 F 3C,1L 0.5
Intermediate Italian 1
Advanced study of grammar. Conversation
sessions will be based on intermediate
level readings reflecting contemporary
Italian life. Short works by modern writers
will also be studied.
Prereq: ITAL 101/102 or consent of
instructor
ITAL 192 W 3C.1L 0.5
Intermediate Italian
A continuation of ITAL 191 with emphasis on discussion of modern texts as illustrations of the creative possibilities and the limitations of the language.
Prereq: ITAL 191 or consent of instructor

ITAL 251 F 3C 0.5
Italian Conversation and Composition 1
This course offers extensive practice in idiomatic spoken and written language. Conversation will be based on social, political and cultural aspects of Italian life.
Prereq: ITAL 191/192 or consent of instructor

ITAL 252 W 3C 0.5
Italian Conversation and Composition 2
A continuation of ITAL 251 with more emphasis on composition based on articles from present day newspapers and magazines.
Prereq: ITAL 251 or consent of instructor

ITAL 291 F 3C 0.5
Italian Culture and Civilization 1
A survey of developments in Italian culture—history, literature and the arts—up to and including the Renaissance.
Prereq: Second-year standing Taught in English

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 312 W 3C 0.5
Renaissance Italian Literature
An introduction to the Italian literary production of the 15th and 16th centuries, focusing on selections from the major works of the period, including some by Machiavelli, Ariosto and Tasso.
Prereq: ITAL 191/192 or consent of the instructor.

ITAL 396 F 3R 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 the instructor

ITAL 397 W 3R 0.5
Special Topics/Directed Readings
Winter term of ITAL 396.

Course Descriptions
Italian - Kinesiology

COURSES NOT OFFERED 1993-94
ITAL 311 Medieval 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. 2826

KIN 102 F 3C,1T 0.5
Biophysical Basis of Kinesiology
Human physical movement is discussed from mechanical, anatomical and physiological viewpoints. The course provides a general orientation to the study of Kinesiology.
Prereq: KIN 103 and SOC 101

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 and Health Studies students only

KIN 200 F 3C,2L 0.5
Human Anatomy: Limbs and Trunk
Functionally-oriented regional anatomy of the limbs and trunk using predissected 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 predissected cadavers. Included is an introduction to the histology and embryology of the nervous system.
Prereq: KIN 200 or consent of instructor
**Course Descriptions**

**Kinesiology**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Credits</th>
<th>Title</th>
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</thead>
<tbody>
<tr>
<td>KIN 264 F 2C 1T</td>
<td>0.5</td>
<td>Developmental Aspects of Movement</td>
</tr>
<tr>
<td>KIN 300 F,S 3C 3L</td>
<td>0.5</td>
<td>Physiology of Physical Activity</td>
</tr>
<tr>
<td>KIN 330 W,S 3C 3L</td>
<td>0.5</td>
<td>Human Biochemistry</td>
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<tr>
<td>KIN 331 W,S 3C 3L</td>
<td>0.5</td>
<td>Nutrition</td>
</tr>
<tr>
<td>KIN 332 W,S 3C 3L</td>
<td>0.5</td>
<td>Research Design</td>
</tr>
<tr>
<td>KIN 333 W,S 3C 3L</td>
<td>0.5</td>
<td>Evaluation of Human Motor Performance</td>
</tr>
<tr>
<td>KIN 334 W,S 3C 3L</td>
<td>0.5</td>
<td>Principles of Behaviour Modification</td>
</tr>
<tr>
<td>KIN 340 F 3C 2L</td>
<td>0.5</td>
<td>Injuries in Work and Sport</td>
</tr>
<tr>
<td>KIN 341 W 3C 2L</td>
<td>0.5</td>
<td>Selected Topics in Sport and Work Injuries</td>
</tr>
<tr>
<td>KIN 345 W,S 3C 3L</td>
<td>0.5</td>
<td>Social Psychology of Health Behaviour</td>
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<tr>
<td>KIN 346 W,S 3C 3L</td>
<td>0.5</td>
<td>Information Processing in Human Perceptual Motor Performance</td>
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<tr>
<td>KIN 352 3C 0.5</td>
<td>Sociology of Aging</td>
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<tr>
<td>KIN 354 W,S 3C 1T</td>
<td>0.5</td>
<td>Social Psychology and Physical Activity</td>
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<tr>
<td>KIN 355 F 3C 0.5</td>
<td>Research Methods in Human Movement and Motor Control</td>
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<tr>
<td>KIN 356 W,S 3C 3L</td>
<td>0.5</td>
<td>Physiological Adaptations to Physical Activity</td>
</tr>
</tbody>
</table>

**Prerequisites:**
- KIN 300 and 317
- PSYCH 101
- CHEM 116 or equivalent
- PHYS 103, KIN 200 and 222
- KIN 317 or Year Three or Four
- cross-listed as GERON 344/SOC 344
- cross-listed as HLTH 349
- cross-listed as HLTH 348
- cross-listed as HLTH 348
- cross-listed as HLTH 349

**Course Descriptions:**

**Kinesiology**

- **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.
  - **Prerequisites**: Year Two or Year Three standing only.
  - **Antirequisites**: DANCE 264
  - **Cross-listed as**: DANCE 264

- **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.
  - **Prerequisites**: BIOL 230 and 273

- **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.
  - **Prerequisites**: CHEM 116 or equivalent

- **Introduction to the Biomechanics of Human Movement**: Anatomical, neural and mechanical considerations in the qualitative and quantitative analysis of human movements are examined. Concepts related to the biomechanics and biodynamics of linked segment models of human motion are introduced.
  - **Prerequisites**: PHYS 103, KIN 200 and 222

- **Nutrition**: An elementary course in nutrition with special emphasis on diet for sport and certain physiological conditions.
  - **Prerequisites**: PSYCH 101 or consent of instructor
  - **Cross-listed as**: HLTH 348

- **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).
  - **Prerequisites**: PSYCH 101 or consent of instructor
  - **Cross-listed as**: HLTH 348

- **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.
  - **Prerequisites**: PSYCH 101 or consent of instructor
  - **Cross-listed as**: HLTH 349
<table>
<thead>
<tr>
<th>Course Descriptions</th>
<th>Kinesiology</th>
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</thead>
<tbody>
<tr>
<td><strong>KIN 402 F 3C 0.5</strong></td>
<td><strong>Hydrospce, Altitude and Aerospace Physiology</strong></td>
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<tr>
<td>An examination of human cardiorespiratory responses at rest and during work to selected stresses of hyperbaric and hypobaric environments.</td>
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<td><strong>Prereq:</strong> KIN 300</td>
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<tr>
<td><strong>KIN 405 W 3C,2L 0.5</strong></td>
<td><strong>Exercise Management</strong></td>
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<tr>
<td>An examination of the rationale and procedures used in the development of exercise programs for normally healthy individuals.</td>
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<tr>
<td><strong>Prereq:</strong> KIN 300 or 321</td>
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<tr>
<td><strong>KIN 407 W 3C 0.5</strong></td>
<td><strong>The Physiology of Coronary Heart Disease</strong></td>
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<tr>
<td>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.</td>
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<td><strong>Prereq:</strong> KIN 300 or equivalent</td>
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<tr>
<td><strong>Cross-listed as HLTH 407</strong></td>
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<tr>
<td><strong>KIN 416 F 3C 0.5</strong></td>
<td><strong>Neuromuscular Integration</strong></td>
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<tr>
<td>An examination of the neural processes involved in the maintenance of posture and the control of movement.</td>
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<tr>
<td><strong>Prereq:</strong> KIN 201 or PSYCH 261 or consent of instructor</td>
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<tr>
<td><strong>KIN 420 W 3C 0.5</strong></td>
<td><strong>Occupational Biomechanics</strong></td>
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<tr>
<td>Biomechanical methods are applied to the study of the effect on 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 analyze low back loading during manual lifting, the design of helmets, shoes and office chairs.</td>
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<tr>
<td><strong>Prereq:</strong> KIN 425 (may be taken concurrently) or consent of instructor</td>
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<tr>
<td><strong>KIN 422 F 3C,2L 0.5</strong></td>
<td><strong>Human Gait, Posture, and Balance: Pathological and Aging Considerations</strong></td>
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<tr>
<td>This course will provide a detailed understanding of the kinematics, kinetics, and neural control of standing posture, stepping, walking, and running under normal and perturbed conditions. Measurement techniques, processing data, and the interpretation of total body and limb synergies will be emphasized from a biomechanical and neural control perspective. The problems of the elderly and the assessment of those with pathologies will be emphasized.</td>
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<tr>
<td><strong>Prereq:</strong> KIN 425, 416, or permission of instructor</td>
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<tr>
<td><strong>KIN 425 W 3C,2L 0.5</strong></td>
<td><strong>Biomechanics of Human Movement</strong></td>
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<tr>
<td>The quantitative measurement and analysis of the movement of the human musculoskeletal system. Multisection 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.</td>
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<td><strong>Prereq:</strong> KIN 321</td>
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<tr>
<td><strong>KIN 426 F 3C,2L 0.5</strong></td>
<td><strong>Biophysical Signal Processing and Control Systems</strong></td>
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<tr>
<td>Basic electricity and electronics required for the understanding of bioelectric recording and electrophysiology. Application of signal processing to bioelectrical signals encountered in kinesiology. Mathematical modelling of passive and active systems and the control systems (cardiac, respiratory, neuromuscular) associated with human movement.</td>
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<tr>
<td><strong>Prereq:</strong> KIN 321, 300 or consent of instructor</td>
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<tr>
<td><strong>KIN 431 F,W,S 0.5</strong></td>
<td><strong>Research Proposal</strong></td>
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<tr>
<td>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 modeling, fitness appraisal, etc. The format is to be determined with the supervisor and may be in chapters or in journal style.</td>
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<tr>
<td><strong>Prereq:</strong> Fourth year Honours Kinesiology</td>
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<tr>
<td><strong>KIN 431 A Biomechanics</strong></td>
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<tr>
<td><strong>KIN 431 B Biochemistry</strong></td>
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<td><strong>KIN 431 C Work Physiology</strong></td>
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<tr>
<td><strong>KIN 431 D Psycho Motor Behaviour</strong></td>
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<tr>
<td><strong>KIN 431 G Sociology of Physical Activity</strong></td>
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<tr>
<td><strong>KIN 431 H Psychology of Human Movement</strong></td>
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<tr>
<td><strong>KIN 431 I Sports Medicine</strong></td>
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<td><strong>KIN 431 J Anatomy</strong></td>
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<td><strong>KIN 431 K Nutrition</strong></td>
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<td><strong>KIN 431 L Gerontology</strong></td>
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<td><strong>KIN 431 M Movement Disorders</strong></td>
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<td><strong>KIN 431 N Motor Control</strong></td>
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<td><strong>KIN 431 O Ergonomics</strong></td>
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<tr>
<td><strong>KIN 431 P Cardiac Rehabilitation</strong></td>
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<tr>
<td><strong>KIN 431 Q Psychological Behaviour</strong></td>
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<tr>
<td><strong>KIN 431 R Nutrition</strong></td>
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<tr>
<td><strong>KIN 431 S Movement Disorders</strong></td>
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<tr>
<td><strong>KIN 431 T Ergonomics</strong></td>
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<tr>
<td><strong>KIN 432 F W,S 0.5</strong></td>
<td><strong>Research Project</strong></td>
</tr>
<tr>
<td>An independent research project on an approved topic, supervised by a faculty member. This is the completion of the research proposed in KIN 431. The format is to be determined with the supervisor and may be in chapters or in journal style.</td>
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<tr>
<td><strong>Prereq:</strong> KIN 431</td>
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</tbody>
</table>

It is strongly recommended that students planning graduate studies take KIN 431 and KIN 432.

| **KIN 433 A Biomechanics** |
| **KIN 433 B Biomechanics** |
| **KIN 433 C Work Physiology** |
| **KIN 433 D Psycho Motor Behaviour** |
| **KIN 433 E Sociology of Physical Activity** |
| **KIN 433 F Psychology of Human Movement** |
| **KIN 433 G Sociology of Physical Activity** |
| **KIN 433 H Psychology of Human Movement** |
| **KIN 433 I Sports Medicine** |
| **KIN 433 J Anatomy** |
| **KIN 433 K Nutrition** |
| **KIN 433 L Gerontology** |
| **KIN 433 M Movement Disorders** |
| **KIN 433 N Motor Control** |
| **KIN 433 O Ergonomics** |
| **KIN 433 P Cardiac Rehabilitation** |

**KIN 452 F 3C 0.5**

**Sport in Society**
An advanced course in the sociology of sport with a particular focus on sport in Canadian society. Topics include the structure and processes of Canadian sport and its place in Canadian social structure and culture.

**Prereq:** KIN 250

| **KIN 453 F,S 3C 0.5** | **The Psychology of Sport and Physical Activity** |
| 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 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 492 A/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, 348, 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 the course co-ordinator.

Korean
For courses in Korean see East Asian Studies.

Latin
For courses in Latin see Classical Studies.

Management Sciences

Undergraduate Officer
N.M. Fraser, CPH 4303, ext. 3291

M SCI 211 F,W,S 3C,1T 0.5
Organizational Behaviour
Introduction to the concepts of learning, person perception, attitudes and motivation in an organization. Consideration of communication, roles, norms and decision making within a group. Discussion of power, control, leadership and management in light of the above concepts.
Prereq: PSYCH 333 or 338

M SCI 251 F,W 3C 0.5
Probability and Statistics 1

M SCI 251 F,W,S 3C,1T 0.5
Managerial and Engineering Economics
This course is designed to satisfy Engineering Economics requirements of the Canadian Accreditation Board. Price and output decisions. Choosing among alternative inputs and production processes. Evaluating alternative investments, equipment service life, and new products.

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.
Prereq: M SCI 211 or PSYCH 338

M SCI 331 F,W,S 3C 0.5
Operations Research 1
Course Descriptions
Mathematics

M SCI 431 W 3C 0.5
Operations Research 2
Classification of stochastic processes.
Recurrent events including birth and death
processes, and branching processes.
Waiting line models and applications.
Markov processes and decision problems.
Applications include inventory control, reli-
ability, equipment replacement, mainte-
nance, design of service facilities, etc.
Prereq: M SCI 251 or equivalent and M SCI 331

M SCI 432 F,W,S 3C 0.5
Introduction to Production
Management
Introduction to a number of problem areas
in the management of production/industri-
al engineering. Topics chosen from pro-
duction planning and inventory control,
planning/control of large projects, quality
control, reliability/maintenance, facilities
layout, job design, production standards
and work measurement.
Prereq: M SCI 331, C&O 350, or
equivalent

M SCI 441 W 3C 0.5
Management of Information Systems
Structures, functions and processes of
development of computer hardware, soft-
ware and databases for the management
of information. Concepts of information,
humans as information processors, infor-
mation management concepts, introduc-
tion to information systems analysis.

M SCI 452 W 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 S,F 3C,1T 0.5
Managerial and Engineering
Economics 2
The course is concerned with cost mini-
mizing 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; pro-
ductivity 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.)

Undergraduate Office
MC 5115, ext. 3905

Some first-year MATH courses have been renumbered. The chart below identifies the renumbered courses and shows the present first year
MATH course offerings:

<table>
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<tr>
<th>Subject</th>
<th>92/93 Calendar</th>
<th>93/94 Calendar</th>
<th>Unchanged</th>
<th>Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>Calculus 1</td>
<td>MATH 106</td>
<td></td>
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<td>Mathematics for Kinesiology</td>
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<td></td>
<td>MATH 113A</td>
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<td>Mathematics for Accounting</td>
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<td>MATH 116</td>
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<td>Calculus 1</td>
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<td>MATH 115A</td>
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<td>Calculus 1 for Engineering</td>
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<td>MATH 113B</td>
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<td>Calculus 1 for Honours Physics/Chemistry</td>
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<td>MATH 115B</td>
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<td>Calculus 1 for Honours Mathematics</td>
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<td>MATH 111A</td>
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<td>Calculus 1 (Advanced Level)</td>
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<td>MATH 108</td>
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<td>MATH 137</td>
<td>Mathematics for Accounting</td>
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<td>MATH 109</td>
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<td>MATH 147</td>
<td>Calculus 1</td>
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<td>MATH 107</td>
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<td>Calculus 1 for Engineering</td>
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<td>MATH 117</td>
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<td>Calculus 1 for Honours Physics/Chemistry</td>
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<td>MATH 127</td>
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<td>Calculus 1 for Honours Mathematics</td>
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<td></td>
<td>Calculus 1 (Advanced Level)</td>
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<tr>
<td>Calculus 2</td>
<td>MATH 113B</td>
<td>MATH 108</td>
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<td>Calculus 2</td>
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<td>MATH 126</td>
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<td>Calculus 2 for Engineering</td>
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<td>MATH 115B</td>
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<td>Calculus 2 for Honours Physics/Chemistry</td>
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<td>MATH 128</td>
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<td>Calculus 2 for Honours Mathematics</td>
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<td>MATH 138</td>
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<td>Calculus 2 (Advanced Level)</td>
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<td>MATH 148</td>
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<tr>
<td>Algebra</td>
<td>MATH 111A</td>
<td>(not offered)</td>
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<td>MATH 135</td>
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<td>Algebra for Honours Mathematics</td>
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<td>MATH 145</td>
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<td>Algebra (Advanced Level)</td>
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<tr>
<td>Linear Algebra 1</td>
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<td>MATH 125</td>
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<td>Applied Linear Algebra 1</td>
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<td></td>
<td>MATH 114</td>
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<td></td>
<td>Algebra and Vector Geometry for Engineering</td>
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<td>MATH 136</td>
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<td>Linear Algebra 1 for Honours Mathematics</td>
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<td>MATH 146</td>
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<td>Linear Algebra 1 (Advanced Level)</td>
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Courses not offered in the current academic year are listed at the end of this section.

MATH 010 F,W,S 0.0
Non-Credit Year One Testing Slot
All students enrolled in one or more of MATH 135, 136, 137, 138, 145, 146, 147, 148, and CS 130, 134 are automatically enrolled in a non-credit lab that is scheduled one evening each week from 7:00 to 9:00 p.m. This time slot appears as a MATH 010 entry on student timetables and is reserved for mid-term tests in the above courses. This time slot is used only on those evenings when mid-term tests are scheduled.

MATH 020 F,W,S 0.0
Non-Credit Year Two Testing Slot
All students enrolled in any second-year mathematics course offered by the Faculty of Mathematics, with the exception of various service courses designed for students in other faculties, are automatically enrolled in a non-credit lab that is scheduled from 4:30 to 6:30 p.m. Tuesday and Thursday each week. This time slot is used only on those days when mid-term tests are scheduled.

MATH 103 F 3C,1T 0.5
Introductory Algebra For Arts and Social Science
An introduction to applications of algebra to business, the behavioural sciences, and the social sciences. Topics will be chosen from set theory, permutations and combinations, binomial theorem, probability theory, systems of linear equations, vectors and matrices, mathematical induction. Prereq: Grade 12 Mathematics or equivalent

Not open to students in the Faculties of Engineering, Mathematics or Science, or to other students who have credit in OAC Calculus 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 chosen will include the study of polynomial, rational, exponential and logarithmic functions; elementary analytic geometry; linear and quadratic systems of equations. The major concepts introduced to solve problems are: rate of change; optimization; growth and decay; and integration.

Prereq: Grade 12 Mathematics or equivalent

MATH 107 F,W,S 3C,2T 0.5
Calculus 1
Review of functions, limits and differentiation, including trigonometric, exponential and logarithmic functions. Interpretation and applications of the derivative. Riemann sums and the integral. Prereq: OAC Calculus or equivalent

MATH 108 F,W,S 3C,2T 0.5
Calculus 2

MATH 109 F 3C,2T 0.5
Mathematics For Accounting

Prereq: OAC Calculus, or MATH 104

MATH 114 F 3C,2T 0.5
Algebra and Vector Geometry (For Engineering Students)

Prereq: OAC Algebra

MATH 117 F 3C,2L 0.5
Calculus 1 For Engineering

Prereq: OAC Calculus

MATH 118 W,S 3C,2L 0.5
Calculus 2 For Engineering

Prereq: MATH 117 or equivalent

MATH 125 F,W,S 3C,1T 0.5
Applied Linear Algebra 1

Prereq: One of OAC Algebra, OAC Finite Mathematics, MATH 103

MATH 126 F,W,S 3C 0.5
Applied Linear Algebra 2

Prereq: MATH 125, or equivalent

MATH 127 F 3C,2T 0.5
Calculus 1 For Honours Physics and Chemistry

Prereq: OAC Calculus

MATH 128 W,S 3C 0.5
Calculus 2 For Honours Physics and Chemistry

Prereq: MATH 127 or equivalent

Courses not offered in the current academic year are listed at the end of this section.
MATH 128 W.S 3C,2T 0.5
Calculus 2 For Honours Physics and Chemistry

Approximations using Taylor polynomials, estimating errors, order symbols.
Convergence of series. Taylor series.
Prereq: MATH 127, or equivalent
Also offered at St. Jerome’s College in the Fall term.

MATH 135 F,W 3C,1T 0.5
Algebra For Honours Mathematics
A study of the basic algebraic systems of mathematics: the integers, the integers modulo n, the rational numbers, the real numbers, the complex numbers and polynomials.
Prereq: OAC Algebra or equivalent
Not open to students in the Faculty of Mathematics.

MATH 136 F,W,S 3C,1T 0.5
Linear Algebra 1 For Honours Mathematics
Prereq: OAC Algebra or equivalent.
MATH 135 is recommended but not required.
Also offered at St. Jerome’s College in the Winter term.

MATH 137 F,W,S 3C,2T 0.5
Calculus 1 For Honours Mathematics
Prereq: OAC Calculus
Also offered at St. Jerome’s College in the Fall term.

MATH 138 F,W,S 3C,1T 0.5
Calculus 2 For Honours Mathematics
Separable and linear differential equations. Taylor’s theorem and polynomial approximations. L’Hospital’s theorem and order symbols. Limits at infinity and improper integrals. Convergence of series. Functions defined as power series.
Prereq: MATH 137
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) and an OAC math average of at least 85%, or consent of instructor
Also offered at St. Jerome’s College in the Fall term.

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
Not open to students in the Faculty of Mathematics.

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) and an OAC math average of at least 85%, or consent of instructor
Also offered at St. Jerome’s College in the Winter term.

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
Not open to students in the Faculty of Mathematics.

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 213A, 227, 237, 247
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 210, 213B
Cross-listed as E&CE 206
Not open to students in the Faculty of Mathematics.

MATH 213A F 3C 0.5
Calculus 3 For Science
Infinite series. Partial derivatives, chain rule, total differential, Taylor’s theorem, extreme values.
Prereq: MATH 108 or 129
Coreq: MATH 125
Also offered at St. Jerome’s College as E&CE 205
Not open to students in the Faculty of Mathematics.

MATH 213B W,S 3C 0.5
Calculus 4 For Science
Multiple integrals. Vector calculus: gradient, directional derivative, divergence, curl, line integrals and path independence. Green’s theorem, Stokes’ theorem, and Gauss’ theorem.
Prereq: MATH 213A or equivalent
Antireq: AM 231, MATH 210, 212
Not open to students in the Faculty of Mathematics.

MATH 215 F,W 3C 0.5
Differential Equations For Chemistry
Prereq: MATH 108 or 129, or equivalent
Antireq: AM 250, MATH 218
Not open to students in the Faculty of Mathematics.
MATH 216 F,S 3C 0.5  
**Differential Equations For Physic and Chemical Engineering**  
**Prereq:** One of MATH 108, 118, 128 or equivalent  
**Antireq:** AM 250, MATH 215  
Not open to students in the Faculty of Mathematics.

MATH 227 F 3C,1T 0.5  
**Calculus 3**  
Calculus of functions of several variables. Limits, continuity, differentiability, the chain rule, Taylor's formula. Optimization problems, mappings, the Jacobian. Multiple integrals.  
**Prereq:** MATH 108 or equivalent  
**Coreq:** MATH 125 or equivalent  
**Antireq:** MATH 211, 213A, 237, 247  
Not open to Honours Mathematics students.

MATH 235 F,W,S 3C 0.5  
**Linear Algebra 2 For Honours Mathematics**  
Linear transformations, eigenvalues and eigenvectors. Applications selected from computer graphics, cryptography, differential equations, quadratic forms, conic sections.  
**Prereq:** MATH 136  
**Antireq:** MATH 126, 245  
Also offered at St. Jerome's College in the Fall term.

MATH 237 F,W,S 3C,1T 0.5  
**Calculus 3 For Honours Mathematics**  
Calculus of functions of several variables. Limits, continuity, differentiability, the chain rule, Taylor's formula. Optimization problems, mappings, the Jacobian. Multiple integrals.  
**Prereq:** MATH 138  
**Coreq:** MATH 136  
**Antireq:** MATH 211, 213A, 227, 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 148 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 148 or consent of instructor  
**Coreq:** MATH 136 or 146  
**Antireq:** MATH 211, 213A, 227, 237  
**COURSE NOT OFFERED 1993-94**  
**MATH 111A Algebra**

### Mathematics Electives

**Undergraduate Office**  
MC 5115, ext. 3905

**Introductory Note**  
MTHEL courses are not restricted to students in the Faculty of Mathematics. When taken by Mathematics students, MTHEL courses count as non-mathematics courses.

**MTHEL 100 F,S 2C 0.5**  
**Commercial and Business Law for Mathematics Students**  
**Prereq:** ACC 231  
**Coreq:** ACC 232

**MTHEL 102 W,S 3C 0.5**  
**Uses and Abuses of Statistics**  
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, regression models.  
**Prereq:** MTHEL 100

**MTHEL 206A F,S 2C 0.5**  
**Introduction to Mathematics Education**  
Current trends in education, professional practices and administration, the role of the department head, lesson planning, techniques of teaching, evaluation of students, special students, extracurricular activities, the relationship between elementary and secondary school mathematics, audio-visual materials.  
**Prereq:** Consent of instructor.  
This course is normally open only to students in the Co-op Math/Teaching Option.

**MTHEL 305A F 3C 0.5**  
**General Life Insurance 1**  
Types of Life Insurance contracts and their uses, basis of risk measurements, modified valuation methods, non-forfeiture values, dividend formulae, selection of risks, substandard risks, and principles of reinsurance.

**MTHEL 305B W,S 3C 0.5**  
**General Life Insurance 2**  
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.  
**Prereq:** MTHEL 305A

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### Mechanical Engineering

**Undergraduate Office**  
M. Rankiszulut, E2-2330, ext. 3977

**Introductory Notes**

1. All courses extend over 1 term only, and consist of 3 hours of lectures per week unless otherwise specified.  
2. In general, the only prerequisites are the core courses, unless otherwise specified.

**M E 126 W,S 2C,3L1T 0.5**  
**Scientific Principles of Mechanical Engineering**  

**M E 200A/200B F,W,S,F 2C 0.0**  
**Seminar**  
Discussion of Structure of Mechanical Engineering curriculum, operation of Department, Faculty, University, technical societies.
Course Descriptions
Mechanical Engineering

M E 340 F,W 3C,3L,1T 0.5
Manufacturing Processes
The principles of manufacturing unit processes including casting, forming, machining and joining. Interactions between design, materials (metals, polymers, ceramics) and processes. Advantages and limitations, relative cost, and production rates of competitive processes.

M E 351 W,S 3C,1T,3L 0.5
Fluid Mechanics 1
Physical properties of fluids and fundamental concepts in fluid mechanics. Hydrostatics. Conservation laws for mass, momentum and energy. Flow similarity and dimensional analysis as applied to engineering problems in fluid mechanics. Laminar and turbulent flow. Engineering applications such as flow measurement, flow in pipes and fluid forces on moving bodies. Introduction to compressible flow.

M E 353 F,W 3C,3L,1T 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.

M E 354 W,S 3C,1T 0.5
Thermodynamics 2
Emphasis on applications of thermodynamics to flow processes, real fluids, evaluation of state functions of real fluids. Non-reacting mixtures, reacting mixtures, equilibrium considerations.

M E 360 F,W 3C,3L,1T 0.5
Introduction to Control Systems

M E 362 F,W 3C,3L,1T 0.5
Fluid Mechanics 2
Basic equations of two-dimensional flow, potential flow, exact visous solutions, introduction to lubrication, boundary layers, and introduction to turbulence. Turbomachinery fundamentals and applications. Selected advanced topics.

M E 400A/400B S,F,W 2C 0.0
Seminar
Research frontiers in Mechanical Engineering, specific discussion of research done at Waterloo, seminars by members of research groups.

M E 401* F,S 3C 0.5
Law for the Professional Engineer
The Canadian Legal System, Forms of Business Organizations, Tort Law, the role of the professional; Contract Law, the Elements of a Contract, Statute of Frauds, Misrepresentation, Duress and Undue Influence, Mistake, Contract Interpretation, Discharge of Contract; Breach of Contract and fundamental breach; Agreements between the client and Engineer; General Law, the Mechanics’ Lien Act, comparative discussion of the Professional Engineers Act as it relates to the earlier statute, Intellectual Property and Industrial Property. It is intended to prepare the student for the examination in law which must be written by the Engineer for the Association of Professional Engineers of the Province of Ontario. This course is restricted to senior Mechanical Engineering students. *Course will be graded on a CR/NCR basis. A written final examination is mandatory.

M E 423 F,S 3C,1T 0.5
Mechanical Design 2
A continuation of the M E 322 course in analysis and synthesis of machinery, including advanced analysis of machine elements such as clutches, brakes, couplings, journal bearings and gears. Advanced machine design concepts such as reliability, optimization and techniques for simulating innovative design. A synthesis project involving the machine elements studied is usually included.

M E 432 W 3C,1L 0.5
Physical Metallurgy of Deformation and Fracture

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.

M E 447 F,S 3C,2L 0.5
Advanced Manufacturing Technologies

M E 448 W 3C 0.5
Production Engineering and Design of Manufacturing Systems

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 most air by extended surface coils; solar radiation; heating and cooling loads on buildings; effects of the thermal environment; air conditioning and calculations.
M E 466 F,S 3C,1L 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.

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 fission and fusion energy. Design of nuclear fission power plants including design of reactor core for critical conditions, fuel cycles and radiation hazards. Design considerations for solar energy conversion devices including: availability of solar energy, solar-thermal converters, thermal storage and photovoltaics. Principles of fuel cells and some aspects of their design. Other topics as appropriate.

M E 469 F,S 3C 0.5
Dynamics of the Atmospheric Boundary Layer
For those students interested in working on engineering problems that involve the flow of air in the lower 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.

M E 482 F,W,S 9L 0.5
Mechanical Engineering Projects
Engineering assignments requiring the student to demonstrate initiative and assume responsibility. Student activity is guided and co-ordinated by a faculty supervisor. In selecting projects, particular account is taken of the student's field of specialization. Projects, in general, involve technical disciplines beyond the strictly mechanical engineering field.
Course Descriptions
Mechanical Engineering

M E 544 F,W 3C,1L 0.5
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.

M E 546 W 3C,3L 0.5
Theory of Solid Modelling
This course examines various aspects of Geometric Modelling. It includes Theory of Solid Modelling, Parametric Design and Feature Based Design Methodology. Topics covered include: Decomposition Models, Constructive Solid Geometry, Half-Space Models and Boundary Models. Student projects provide hands-on experience in developing solid modelling techniques.

M E 547 W 3C,1L 0.5
Robot Manipulators: Kinematics, Dynamics, Control
This course is designed to provide a background in the area of industrial robotic manipulators. The kinematics, dynamics, control programming of robots is considered with emphasis on space and mechanical aspects of the topic.

M E 548 F,S 3C,3L 0.5
Numerical Control of Machine Tools 1

M E 557 W 3C 0.5
Combustion 1
Combustion thermodynamics; Introduction to chemical kinetics of combustion; Combustion properties of fuels; Flammability of combustible mixtures. Flame propagation mechanisms, premixed and diffusional; Stability of flames; Introduction to combustion aerodynamics, jet flames; Atomization; Droplet and spray combustion; Elementary ignition concepts and theory. Basic detonation theory.

M E 559 F,S 3C 0.5
Finite Element Methods
A course presenting the fundamental ideas involved in conventional finite element analysis in Mechanical Engineering. Domain discretization, interpolation and shape functions, element derivation and types, element stiffness or property equations, assembly procedure, boundary conditions, solution methods for the algebraic 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.

M E 561 F,S 3C 0.5
Fluid Power Control Systems

M E 563 W 3C 0.5
Turbomachines

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.

M E 565 W 3C 0.5
Gas Dynamics
Basic laws of compressible fluid flow. Wave propagation in compressible fluids, isotropic 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.

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. Reynold's 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.

M E 568 F,S 3C 0.5
Noise Analysis and Control

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.

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.

M E 580 W 3C 0.5
Basics Tribology
The science of friction, lubrication and wear. The topography and contact mechanics of real surfaces. The measurement of friction and wear. Friction and wear theories for elastic and plastic contact. Lubrication mechanisms; hydrostatic, hydrodynamic, elastohydrodynamic, boundary, extreme pressure, and solid film. Physical and chemical properties of lubricants. Bearings and their selection.
# Middle East Studies

**Undergraduate Officer**
To be announced, HH 322A, ext. 2640

Middle East Studies courses and approved courses are listed in Chapter 15.

**MES 200 W 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**
Introduction to Middle East
An interdisciplinary introduction to the Middle East, its geography, history, culture, religious and political diversity.

**MES 303A-D**
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

**MES 350A-D**
Study-Travel Seminar In the Middle East

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# Fine and Performing Arts

The University offers courses in:

- **Dance** see page 16:39
- **Drama** see page 16:41
- **Fine Arts** see page 16:55
- **Music** see page 16:100

For program information, please see Chapter 8, Faculty of Applied Health Sciences, and Chapter 9, Faculty of Arts

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# Music

**Undergraduate Officer**
K. Hull, Conrad Grebel College, Room 257, 885-0220, ext. 244

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 101 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 216 F,W,S 2L 0.25**
Music Ensemble
See MUSIC 116 for course description.

**MUSIC 217 F,W,S 2L 0.25**
Music Ensemble
See MUSIC 116 for course description.

**MUSIC 222 F 3C 0.5**
Conducting 1
A study of conducting techniques appropriate for song leading, choral rehearsal and public performance. The course will include score analysis and rehearsal procedures for music from a wide variety of historical styles.

**Prereq:** MUSIC 100 and 270/271 or consent of instructor

**MUSIC 226 F,W std 0.5**
Music Studio
Individual instruction in Voice, Piano, Organ, Classical Guitar and orchestral instruments. This course is available only to Music majors and minors.

**Prereq:** Royal Conservatory Grade 8 level and auditions with Music Faculty

**MUSIC 227 F,W,S std 0.5**
Music Studio
See MUSIC 226 for course description.

**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 256 W 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 move-
ments. The course will include seminars,
lectures, listening, and analysis.
Prereq: MUSIC 100 or consent of
instructor
(Formerly MUSIC 354)
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 rec-
ommended. 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 intro-
duction to figured bass and functional har-
mony. Ear-training, sight-singing and key-
board lab sessions will be integrated with
written and analytical work.
Prereq: A basic knowledge of scales,
triads, and music notation or MUSIC 111
(Formerly MUSIC 250)
MUSIC 271 W 3C,1L 0.5
Music Theory 2
The study of harmony, counterpoint and
form of 18th- and early 19th-century
music. Sight-singing, ear-training and key-
board 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
Studio Fee
(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
Studio Fee
(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 perfor-
mances during the Vienna Music Festivals,
as well as tours of places relating to the
culture of Vienna.
Prereq: MUSIC 100 or consent of
instructor
Offered Spring 1994
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 W 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.
Prereq: MUSIC 100 or consent of
instructor
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 371 or consent of
instructor
MUSIC 371 W 3C,1L 0.5
Music Theory 4 (20th Century)
A study of the compositional aspects of
20th-century music, including extended
tonality, atonality, 12-tone writing, neo-
classical idioms and contemporary compo-
sitional procedures. Lab sessions will
cover non-tonal melodic reading and
complex chord structures.
Prereq: MUSIC 370 or consent of
instructor
MUSIC 375 W 3C 0.5
Electroacoustic Music and MIDI
Applications
The study of electroacoustic music and
MIDI applications in sequencing and pro-
gramming with synthesizers and comput-
er. Composition, analysis and history of
electroacoustical music, as well as
practical studies experience, are included.
Prereq: MUSIC 271 or consent of
instructor
MUSIC 376 W 3C 0.5
Composition Seminar
Creative and critical potential is developed
through supervised practice, tutorials and
seminars. Free composition, style emula-
tion, arranging and orchestration will be
dealt with.
Prereq: MUSIC 271 or consent of
instructor
MUSIC 380 F,W 0.5
Directed Study in Music
Prereq: Advanced standing in music
and consent of instructor
MUSIC 381 F,W 0.5
Directed Study in Music
Prereq: Advanced standing in music
and consent of instructor
MUSIC 425 F,W,S std 0.5
Music Studio
See MUSIC 226 for course description.
Prereq: MUSIC 327 and consent of Music Faculty
Studio Fee
(Formerly MUSIC 468)

MUSIC 427 F,W,S std 0.5
Music Studio
A continuation of Music Studio. A recital is required.
Prereq: MUSIC 426 and consent of Music Faculty
Studio Fee
(Formerly MUSIC 467)

MUSIC 490A/B F,W,S 0.5/0.5
Senior Honours Seminar
A research seminar required of all honours students. The topics will vary from year to year depending on the interests of the students and instructor(s).

COURSES NOT OFFERED 1993-94
MUSIC 141 Traditional Folk Music
MUSIC 142 Traditional Folk Music of Canada
MUSIC 150 Survey of Music History 1
MUSIC 151 Survey of Music History 2
MUSIC 211 Psychology of Music
MUSIC 241 Principles of Music Therapy
MUSIC 255 Music of the Romantic Period
MUSIC 290 Special Topics
MUSIC 322 Conducting 2
MUSIC 332 Music Aesthetics and Criticism
MUSIC 355 Canadian Music
MUSIC 360 Music of the Church
MUSIC 362 Piano Literature
MUSIC 390 Special Topics in Music 1
MUSIC 391 Special Topics in Music 2

Course Descriptions
Optometry

Optometry

Undergraduate Officers
J.K. Hovis, OPT 247, ext. 6768
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 2C 0.5
History and Orientation
A brief history of the profession and the development of visual science; a consideration of legal and organizational development of optometry; the role of professional associations. The role and scope of optometry and its relationship to other professions and the community.

OPTOM 104 W 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 W 3C,2L 0.5
Anatomy of the Eye 2
A continuation of OPTOM 104.
Prereq: OPTOM 104

OPTOM 111 W 3C,3L 0.5
Fundamentals of Visual Optics
Prereq: OPTOM 106

OPTOM 114 W 3C,2L 0.5
Anatomy of the Eye 2
A continuation of OPTOM 104.
Prereq: OPTOM 104

OPTOM 115 W 4C,1T 0.5
General Pathology 2
A continuation of 105.
Prereq: OPTOM 105

OPTOM 149 W 3C 0.5
Public Health Optometry
Introduction to the foundation and basic sciences of public health optometry with an emphasis on the epidemiology of vision problems.

OPTOM 216 F 3C,4L 0.5
Ophthalmic Optics 1
Prereq: PHYS 246, OPTOM 106

OPTOM 241 F 3C,3L 0.5
Cataract and Cataract surgery
Prereq: OPTOM 111

OPTOM 245 F 3C,3L 1T 0.5
Cataract Surgery
Surgical techniques for the treatment of cataracts.
Prereq: OPTOM 111

OPTOM 246 F 3C,3L 0.5
Cataract Surgery
Surgical techniques for the treatment of cataracts.
Prereq: OPTOM 111

OPTOM 247 F 3C,3L 0.5
Cataract Surgery
Surgical techniques for the treatment of cataracts.
Prereq: OPTOM 111

OPTOM 248 F 3C,3L 0.5
Cataract Surgery
Surgical techniques for the treatment of cataracts.
Prereq: OPTOM 111

OPTOM 249 W 3C,2L 0.5
Neurophysiology of Vision
The neural processing of colour, brightness, movement and form by the retina, lateral geniculate, cortex, superior colliculus and other brain centres. Neural mechanisms underlying binocular depth perception, the accommodative response and eye movement.
Prereq: OPTOM 104/114
OPTOM 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 difficulties 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, retinopathies.
Prereq: OPTOM 245, 255

OPTOM 418 S Clinic 0.0
Spring/Summer Practicum
Students will be required to complete a supervised clinical practicum lasting at least eight weeks. This will be arranged by faculty.

Course Descriptions
Optometry

OPTOM 440 F 2C 0.5
Optometric Practice Management
A continuation of the practice management section of OPTOM 350.

OPTOM 441 F 3L 0.5
Optometry Research Project
Students with an interest in research may arrange with a professor to undertake a research project of mutual interest.
This course serves as an alternative to PSYCH 357. Contact the course coordinator for details.

OPTOM 442 F 3C 0.5
Advanced Contact Lens Practice
A series of lectures and practical demonstrations of the principles and procedures of advanced contact lens materials and resources including their physiological implications.
Prereq: OPTOM 347

OPTOM 448A/B F, W 24 Clinic 0.75/0.75
Optometry Clinic
Optometry students are taught how to provide full scope optometric care within a clinical environment. In addition to primary care, students are instructed in the provision of ocular health, electrodiagnostic, binocular vision, contact lens, aniseikonia, low vision and optical services to the clinic patient population. Students also take part in a variety of outreach programs which provide optometric services to special populations including geriatric, preschool and mentally retarded groups. Practical and oral comprehensive examinations in clinical optometry are held in the final examination period of the winter term. Students may be allowed no more than two attempts to pass all parts of the comprehensive examinations. Repeated failure of these examinations may result in dismissal from the program.
Prereq: OPTOM 348A/B, 364, 418

OPTOM 449 F 4C 0.5
Community Health Optometry
Governmental and social aspects of health and vision care delivery are discussed in relation to the epidemiology of vision problems.

OPTOM 451 W 3L 0.5
Optometry Research Project
A continuation of 441. An elective may be chosen as an alternative to OPTOM 451.
Prereq: OPTOM 441

OPTOM 452 W 2C 0.5
Special Populations
A. Visual Aspects of Learning Difficulties
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.
B. Elderly or Mentally Retarded Populations
The optometrical management of problems of the elderly, and of mentally retarded individuals. The effect of aging on the visual system. Special vision problems associated with mental retardation.
Prereq: OPTOM 342, 352; PSYCH 101

OPTOM 459 W 4C 0.5
Environmental Vision
Series of lectures designed to improve the ability to assess occupational visual requirements. Aspects of ocular hazards and visual efficiency in the workplace and recreation are addressed.

OPTOM 488 F Clinic 0.5
Vision Care Projects
Reports covering spring/summer practice are submitted by all optometry students. These will be carefully evaluated for clinical content and writing ability.
Prereq: Successful completion of OPTOM 348, 418

OPTOM 480 F 2S 0.5
Senior Seminar
An opportunity for discussion of clinical cases, new techniques and instruments. Presentations by students, visiting lecturers and faculty.

OPTOM 490 W 2S 0.5
Senior Seminar
A continuation of OPTOM 480.

OPTOM 499A-E W,S
Comprehensive Examinations
Written comprehensive examinations in Anatomy and Physiology, Pathology and Pharmacology, Physiological Optics, Ophthalmic Optics, and Optometry are held in the final exam period of the winter term, fourth professional year. Graduation in Optometry is contingent upon the successful completion of these examinations. Students may be allowed no more than two attempts to pass all parts of the comprehensive examinations. Repeated failure of these examinations may result in dismissal from the program.
Prereq: Successful completion of all previous Optometry courses
Peace and Conflict Studies

Undergraduate Officer
T.R. Yoder Neufeld, Conrad Grebel College, 885-0220

CORE COURSES

PACS 201 F 2C,1D 0.5
Roots of Conflict and Violence
An examination of the influential theories of the nature and roots of human conflict on both the interpersonal and intergroup level. Contributions of the behavioural and social sciences, as well as the humanities, will be explored.

PACS 202 W 2C,1D 0.5
Conflict Resolution
An examination of the resolution of conflict, ranging from interpersonal to broader social and international conflicts. Students are introduced to negotiation, mediation, and nonviolent resistance, and are encouraged to develop their own theoretical understandings that aid in addressing conflict.

PACS 301A-F 3S 0.5
Special Topics in Peace and Conflict Studies
A seminar course investigating special issues related to peace and conflict. Content may vary from year to year. Topics may include, for example, "Liberation and Nonviolence in Latin America," "Justice in Third World Development," "Inter-National Conflict and Alternative World Orders," or "Societal Conflict in the former Soviet Union: Past and Present Trends".

PACS 302A-F 3S 0.5
Special Topics in Peace and Conflict Studies
Same as 301 above. Topics may include, for example, "Community Conflict Resolution," "Quest for Peace in Literature and Film," "Creative Conflict Resolution in the Schools," "The Roots of Violence in Central America," or "Global Development Education."

PACS 499A/B F,W,S T 0.5/0.5
Senior Honours Essay Seminar
Each Honours student will work on a research paper and will meet regularly with other students working on similar projects to discuss and evaluate their own work. A letter grade for PACS 499A will be submitted only after completion of PACS 499B.

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 1993-94

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. Gollnick, 885-1460

Introductory Note
SI PAR 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 202 F 0.5
Psychology of Religion in Historical Perspective
Historical perspective on the relationship between the psyche and the spiritual dimension of reality. After a survey of ancient and classical views, consideration is given to the theories of Sigmund Freud, Carl Jung, Eric Fromm, William James, and Abraham Maslow.

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.

SIPAR 270
Psychology of Religion
This course examines theories about the psychological nature of religious experience, the source of religious belief, and the religious significance of psychological phenomena. Attention will be given to the role of introspective, psychoanalytic, experimental, humanistic, and transpersonal methods in the psychology of religion.

SIPAR 271
Personality and Religion
This course studies the various "developmental tasks" of the human life cycle in order to discover what psychological and religious needs should be satisfied at each stage of a person's life. The course also seeks to develop students' self-awareness in order to sensitize them to the processes of their own growth and development.

SIPAR 302
Selected Topics in Psychology and Religion
A seminar for senior students in the Honours Minor who have taken the other core courses. The subject for study will be determined by the common interest of the students registered in the course.

SIPAR 378
Aging as Spiritual Journey
The following existential issues related to the aging process are examined from the perspective of the psychology of religion: identity, belief, actualization, existential anxiety, conversion, individuation and spirituality.

SIPAR 380
Carl Jung's Theory of Religion
Jung's analysis of the development of the personality through its life cycle, and of the central place which religion holds within the process of maturation. This includes a study of the unconscious, the collective unconscious, dreams, myths, symbols and archetypes; and the implications of Jung's theories for religious thought and therapy.
Personnel Studies

Associate Professor, Program Director
T.J. Downey, HH 306, ext. 2900

PERST 200  F.S  2L  0.5
Basic Personnel Administration
Examines the major area of Personnel Administration including recruiting, salary administration, labour relations, benefit administration, employee relations, labour law, and organizational behaviour. Reviews the role of Personnel Administration in all organizations and the manner in which Personnel executives contribute to the well being of a total enterprise.
Prereq: Enrollment 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.R. Abbott, HH 326, ext. 2660

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 the courses which will actually be offered in the next academic year, including special subject courses, are available at prerogistration 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.

Course Descriptions
Personnel Studies
Philosophy

PHIL 100  F.W,S  3C  0.5
Introduction to Philosophy
What can we know? What is real? Are moral choices and politics based on reason? Are human beings really just machines? Does God exist? The goal of the course is to promote critical reasoning about these issues which touch your beliefs and lives.
Prereq: No prerequisite

PHIL 101J  F.W  3C  0.5
Introduction to Philosophy
A broad selection of the main problems in philosophy will be considered. For example: How can we know whether anything is right or wrong? How can we know about things we cannot directly observe? Can we know whether there is a God? Is mind in any sense distinct from matter?

PHIL 102A  3C  0.5
Introduction: Knowledge and Reality
Discussion of the nature of reality. Rival theories concerning mind, matter, freedom, the existence of God, and the place of experience and reason in human knowledge are considered.

PHIL 102B  3C  0.5
Introduction to Social and Political Philosophy
An introduction to basic concepts and principles in classic and contemporary social and political philosophy. Differing views on basic questions are examined, with applications to such issues as capital punishment, welfare provisions, taxation, natural resource ownership, and terrorism.

PHIL 102C  3C  0.5
Philosophy of Life
"Who am I?" "What can I hope for after death?" "How can I tell what to do?" "What can I know?" are questions that have led many to philosophize. The course will examine what lifestyles and attitudes major philosophers, stoics, skeptics, pleasure-seekers, mystics, pragmatists, etc., have promoted, and why.

PHIL 103  F  3C  0.5
The Moral Life
An examination of the importance of virtue in general and of the cardinal virtues in particular for the development of character and the enjoyment of the good life.

PHIL 104  F  3C  0.5
Philosophy of Life and Death
A study of what some of the great philosophers have said about the meaning of life and death and the transition from life to death. Students are urged to raise questions and help direct discussion.

PHIL 105  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 140M  F  3C  0.5
Logic
The same as PHIL 140 using examples from algebra and calculus.
Recommended to students of MATH 135 and 137.
Antireq: PHIL 140

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.
Taught in French in the Fall term.

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 200 J F 3C 0.5
Intentional Logic
An introduction to the understanding of how words are used, the formation of propositions, the construction of arguments and the examination of fallacies to help the student argue with order, facility and without error.

PHIL 201 3C 0.5
Love
A philosophical analysis of different forms and functions of love. Among the topics to be considered: love and sexuality, religious love, love and knowledge. Classical and contemporary sources will be treated.

PHIL 202 3C 0.5
Philosophy of Women and Men
A study of issues arising from current relations between men and women: masculinity, femininity and androgyny; love; marriage and its alternatives; sexuality, parenthood, abortion, pornography, rape.

PHIL 204 J W 3C 0.5
Philosophy and Culture
An analysis of the philosophical assumptions of Western popular culture as reflected in various mass media and in current models of production and consumption.

PHIL 205 J F 3C 0.5
Philosophy of Nature
An examination of ancient and modern accounts of the natural world. Problems include whether matter alone can account for change, whether there is more than one cause, whether nature operates by purpose or chance.

PHIL 206 J 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 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 209 3C 0.5
Philosophy in Literature
Philosophical themes (such as alienation, freedom and responsibility) will be explored through appropriate literary works (for example, works by Aeschylus, Dostoevsky, Kafka, and Twain).

PHIL 210 J F 3C 0.5
Philosophy of Human Nature
What is a human being? What is the place of humans among other creatures? Are human beings accidents of evolution? What are the major theories of human nature? How are love and sex aspects of human life?

PHIL 215 F,W 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 218 J W 3C 0.5
Ethical Theory
The search to establish a basis for ethics grounded in the dignity of the human person. Consideration will be given to various ethical theories as well as to the ethical conflicts arising between the notions of ‘the person’ and ‘the individual’ as defined in contemporary culture.

PHIL 219 J F 3C 0.5
Practical Ethics
This course will discuss the applications of general ethics to more specific areas of human endeavour. Among the topics discussed will be abortion, contraception, sex, obscenity, violence, drugs, egoism, dishonesty, and various forms of human exploitation.

PHIL 220 F 3C 0.5
Moral Issues
The aim of this course is to improve the student’s understanding of ethical ideas and principles by careful discussion of selected concrete moral issues, such as abortion, euthanasia, capital punishment, and violence. Choice of issues is partly determined by student interest.

PHIL 221 F 3C 0.5
Ethics 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
Humankind and Nature
A philosophical study of the relationship between humankind and nature: historical and current philosophies of the natural world, including the place and responsibilities of human beings; problems of ecological imbalance and collapse.

PHIL 226 G F 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, behaviour control (e.g. psychosurgery, behaviour modification and psychotherapy), human experimentation (including “informed consent” and fetal research) and genetic engineering.

PHIL 230 J W 3C 0.5
God and Philosophy
An investigation of several aspects concerning the meaning and existence of God. Is God-talk possible? Can faith and reason be reconciled? Is religious experience a meaningful argument? A wide range of different views will be considered.

PHIL 238 3C 0.5
Magic, Mysticism, and the Occult
A critical philosophical discussion of reports of several kinds of extraordinary experiences, such as magic, extrasensory perception, mysticism, and divination will lead us to discussion of such concepts as insanity, irrationality, the supernatural, and the miraculous.
Course Descriptions

Philosophy

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 the 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 the instructor

PHIL 243 3C 0.5
Conflict, Contract and Choice
Basic concepts of game and decision theory are introduced and applied to ethical theory and problems in social philosophy.
Prereq: PHIL 140, 145 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 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 285 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 a view to 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 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 F 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.
Prereq: PHIL 327A or consent of the instructor

PHIL 329 3C 0.5
War, Peace and Justice
An intensive study of the moral issues involved in war and armed revolution. Critical evaluation of "just war" theories and international rules of warfare is pursued as well as the moral arguments for and against pacifism and conscientious objection.
Prereq: PHIL 102B or 322 or consent of instructor
Offered at Conrad Grebel College

PHIL 331 3C 0.5
Aesthetics
Philosophical consideration of works of art and the problems of beauty using selected readings to enable the student to recognize and formulate her/his own views in a philosophic manner.
Prereq: Two term courses in Philosophy or consent of instructor

PHIL 350 3C 0.5
Epistemology 1
An examination of such problems as meaning criteria, primary data, and the importance of certainty to knowledge.
Prereq: Two term courses in philosophy

PHIL 351 3C 0.5
Epistemology 2
An examination of the problem of defining knowledge, of naturalized epistemology, and of such problems as a priori knowledge and the existence of other minds.
Prereq: Two term courses in philosophy
PHIL 359 3C 0.5
Philosophy of the Formal Sciences
A study of philosophical problems concerning mathematics. Topics discussed include formalism, intuitionism, logicism, the mathematical paradoxes, and other topics in foundations and metamathematics.
Prerequisite: At least second-year standing or consent of instructor

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.
Cross-listed as SOC 371

PHIL 378 3C 0.5
American Philosophy
A survey of the leading ideas of classical American philosophers, including Peirce, James, Royce, Santayana, Dewey, and Mead. Attention will be paid to certain common themes, such as the pragmatic theory of truth, and the concept of democratic community. An effort will also be made to determine what makes these views distinctively American.
Prerequisite: One term course in Philosophy or consent of instructor

PHIL 380 F 3C 0.5
History of Ancient Philosophy 1
From the beginnings to Plato.
Prerequisite: One term course in Philosophy or consent of instructor
Cross-listed as CLAS 361
Offered at St. Jerome's College

PHIL 381 W 3C 0.5
History of Ancient Philosophy 2
From Aristotle to the close of classical antiquity.
Prerequisite: One term course in Philosophy or consent of instructor
Cross-listed as CLAS 362
Offered at St. Jerome's College

PHIL 382 3C 0.5
Medieval Philosophy 1
The early period to the 13th century. Among those considered will be: Augustine, Boethius, Anselm and Abaillard.
Prerequisite: One term course in Philosophy or consent of instructor

PHIL 383 3C 0.5
Medieval Philosophy 2
The later period from the 13th century. Among those considered will be: Bonaventure, Aquinas, Scotus, and Ockham.
Prerequisite: One term course in Philosophy or consent of instructor

PHIL 384 F 3C 0.5
History of Modern Philosophy 1
Earlier period beginning with Descartes.
Prerequisite: One term course in Philosophy or consent of instructor

PHIL 385 W 3C 0.5
History of Modern Philosophy 2
Later period including Hume and Kant.
Prerequisite: One term course in Philosophy or consent of instructor

PHIL 386 3C 0.5
19th Century Philosophy
The 19th century Philosophers covered may include Hegel, Mill, Schopenhauer, James and Kierkegaard.
Prerequisite: One term course in Philosophy or consent of instructor

PHIL 387 3C 0.5
20th Century Philosophy
A study of major themes of 20th century philosophy through representative works of Russell, Moore, Carnap, Wittgenstein, Husserl and others.
Prerequisite: One term course in Philosophy or consent of instructor

PHIL 402 3C 0.5
Modern Feminism
A critical examination of contemporary feminist thought in philosophy, focusing on topics of current concern to feminist writers and to the class.
Prerequisite: Consent of Instructor

PHIL 420/421 3C 0.5
Studies in Ethics
Special topics in ethics, as announced by the Department.
Prerequisite: At least one term course in ethics

PHIL 422 3C 0.5
Political Philosophy 1
Philosophical analysis of central concepts in political theory and its relation to moral and metaphysical problems of various periods.
Prerequisite: At least one term course in ethics

PHIL 423 3C 0.5
Political Philosophy 2
A detailed discussion of contemporary theories.
Prerequisite: At least one term course in ethics

PHIL 435/436 3C 0.5
Studies in Philosophy of Religion
A study of a particular philosopher or problem, as announced by the Department.
Prerequisite: Consent of instructor

PHIL 440/441 3C 0.5
Logical Theory
A rigorous and general development of the propositional and predicate calculus within which alternative calculi are examined.
Study of such concepts as completeness, consistency, extensionality, and modality from both formal and philosophical points of view. Intended primarily for those interested in philosophical issues connected with logic.
Prerequisite: At least one term course in formal logic, or consent of instructor

PHIL 442 3C 0.5
Logical Theory
The second part of PHIL 440.

PHIL 443
Creative Thinking, Problem Solving and Decision Making
Problem solving, including Assessment of Risk, Uncertainty and Value form one part of the course. Other subjects include Individual and Group Process for Finding and Weighing Alternatives; Organization of Data, its Presentation and Analysis.
Prerequisite: ACC 443

PHIL 450 F 3C 0.5
Being and Existence
A discussion of the notions of reality, being, essence, existence, analogy, etc. The techniques of linguistic analysis will be employed. Also, the very possibility of any kind of metaphysics will be discussed.
Prerequisite: Third-year standing or consent of instructor

PHIL 451 J 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.
Prerequisite: 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.
Prerequisite: 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 464 3C 0.5
Philosophy as Linguistic Analysis
A consideration of ordinary language analysis as a method for solving philosophical problems, and a comparison of it with structural linguistics.
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, Nietzsche, Heidegger, Sartre, Camus, Marcel, Jaspers, Crepe 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/G 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 this group.
A letter grade for PHIL 499A will be submitted only after the completion of PHIL 499B or 499G.

Course Descriptions

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 the 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 Correspondence 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 W 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.
Pre req: MATH 107
For Kinesiology students
Lab alternate weeks, optional tutorial

PHYS 105 F 3C,3L,2T 0.5
Electrical Science
Basic electricity, magnetism and electronics. An introduction to the physical principles required for an understanding of the electrical measurements and instrumentation used in Kinesiology.
Pre req: 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 further studies in biology, dentistry, medicine and paramedicine; includes particle kinematics and dynamics, energy and momentum conservation, gravitation, rotational mechanics, properties of liquids, temperature and heat.

Pre req: 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.

Pre req: PHYS 111 or 121

PHYS 112L W,S 3L 0.25
Physics 2 Laboratory
For students taking PHYS 112.
Lab alternate weeks

PHYS 115 F 3C,2T 0.5
Mechanics

For students in Year One Engineering

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.

Pre req: OAC Calculus and at least one other OAC math. OAC Physics recommended.

PHYS 121 F 3C,1T 0.5
Mechanics, Wave Motion and Heat 1
An introduction to the physical principles required for an understanding of the
Physics Courses Descriptions

PHYS 121 F 3L 0.25
Mechanics, Wave Motion and Heat 1 Laboratory
For students taking PHYS 121.
Lab alternate weeks
Coreq: PHYS 121 for Science students

PHYS 122 W,S 3C,1T 0.5
Mechanics, Wave Motion and Heat 2
This course is a continuation of PHYS 121; includes oscillating systems, wave motion, gravitation, fluid mechanics, heat and thermodynamics.
Prereq: PHYS 121
Antireq: PHYS 112
Science students must take 122L with this course

PHYS 122L W,S 3L 0.25
Mechanics, Wave Motion and Heat 2 Laboratory
For students taking PHYS 122.
Lab alternate weeks
Coreq: PHYS 122 for Science students

PHYS 123 F 3C 0.5
Digital Computation
Introduction to computer applications in physics. Numerical solution of problems in classical mechanics. Storage, analysis, and display of experimental data. Graphical techniques for constructing field plots. Extension of the numerical techniques to other areas in physics.
For Co-op Physics students or students intending to major in Physics
Antireq: CS 102

PHYS 125 W.S 3C,2T 0.5
Physics for Engineers
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
Not for students in the Honours Physics Program

PHYS 224L F 3L 0.25
Electricity and Geometrical Optics Laboratory
For students taking both PHYS 222 and 226.
Lab alternate weeks

PHYS 225L W 3L 0.25
Magnetism and Physical Optics Laboratory
For students taking both PHYS 223 and 246.
Lab alternate weeks

PHYS 226 F 2C,1T 0.5
Geometrical Optics
Fermat's principle, reflection and refraction at plane and spherical surfaces, thin and thick lenses, optical instruments such as magnifiers, microscopes, telescopes, spectrometers, normal magnification.
Prereq: First year physics and calculus
Not for students in the Honours Physics Program

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.
Prereq: First year physics and calculus, MATH 216
Antireq: CHEM 256

PHYS 246 W 3C,1T 0.5
Physical Optics
Prereq: First year physics and calculus

PHYS 246L W 3L 0.25
Physical Optics Laboratory
For students taking PHYS 246.
Lab alternate weeks

PHYS 252 F 3C 0.5
Electricity and Magnetism 1
Coulomb's law, electric fields, Gauss' law, potential, capacitance, properties of dielectrics, current, resistance, electromagnetic force, D.C. circuits, A.C. circuits, instrumentation.
Prereq: First year physics and calculus Coreq: PHYS 252L

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, induction, introduction to Maxwell's equations and electromagnetic waves.
Prereq: PHYS 252, MATH 216
Antireq: MATH 213B, PHYS 253L

PHYS 256 F 3C 0.5
Geometrical and Physical Optics
Prereq: First year physics and calculus
Recommended for students in Honours programs

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 week 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 234, MATH 213A/B

PHYS 352 F,S 3C 0.5
Analog e Electronics
p and n materials, pn diodes, junction and FET transistors. Transistor amplifiers and their equivalent circuits. Operational amplifiers. Oscillators and power supplies.
Prereq: Knowledge of determinants, elementary calculus and elementary electricity
Coreq: 352L

PHYS 352L F,S 3L 0.25
Analog e Electronics Laboratory
For students taking PHYS 352
Lab alternate weeks

PHYS 353 W 3C 0.5
Digital Electronics
Logic gates, flip-flops and shift registers. Binary numbers and Boolean algebra. An introduction to microprocessors is discussed based on the 8080. 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 353L W 3L 0.25
Digital Electronics Laboratory
For students taking PHYS 353
Lab alternate weeks

PHYS 355 W 3C 0.5
Nuclear Physics
Prereq: PHYS 326 or 334

PHYS 358 F,S 3C 0.5
Thermodynamics
Prereq: PHYS 122, MATH 213A/B and 216

PHYS 359 W 3C 0.5
Statistical Mechanics
Prereq: PHYS 358

PHYS 360 A F,S 3L 0.25
Intermediate Laboratory
Selected experiments in mechanics, optics, electronics, atomic, molecular, nuclear and solid state physics.
Prereq: PHYS 121L, 122L and two second year Physics labs
18 hours of experiments

PHYS 360B W 3L 0.25
Intermediate Laboratory
Continuation of 360A.
Prereq: PHYS 263, MATH 213A/B
18 hours of experiments

PHYS 364 F,S 3C 0.5
Mathematical Physics 1
Prereq: MATH 213A/B and 216
Primarily intended for Honours Physics students

PHYS 365 W 3C 0.5
Mathematical Physics 2
Prereq: MATH 213A/B and 216
Primarily intended for Honours Physics students

PHYS 371A F,S 3L 0.25
Intermediate Laboratory
Further experiments in mechanics, optics, electronics, atomic, molecular, nuclear and solid state physics.
18 hours of experiments

PHYS 371B W 3L 0.25
Intermediate Laboratory
Continuation of 371A. For honours students who are taking PHYS 360B.
18 hours of experiments

PHYS 375 W 3C 0.5
Astrophysics 2 – Stars and Stellar Evolution
Observational techniques, spectral classification, stellar motions and distances, open clusters, globular clusters, stellar populations, theory of the structure, atmosphere, formation and evolution of stars.
Prereq: Years One and Two Physics and Calculus, and some familiarity with programme and stellar terminology.

PHYS 380 W 3C 0.5
Molecular Biophysics
Behaviour of biological macromolecules, protein structure and function, weak interactions, physical techniques for determination of macromolecular structure, structure and function of nucleic acids, protein synthesis, energy in biological systems, molecular growth and evolution.
Prereq: Year One Physics and Chemistry, or consent of instructor
PHYS 381 F 3C 0.5
Cellular Biophysics
Structure and function of cellular membranes, membrane lipid and protein structure and dynamics, membrane potential and ion transport, nerve conduction, vision and interaction of light with membranes, muscle contraction and energy transduction.
Prereq: Year One Physics and Chemistry, or consent of instructor

PHYS 432 W 3C 0.5
Physics of Solid State Devices
The theories of solid state physics are applied to explain the operation and use of several modern electronic devices, including the p-n junction, transistors, tunnel diodes, field effect devices, opto-electronic devices, etc.
Prereq: PHYS 435

PHYS 434 F 3C 0.5
Quantum Physics 3
Prereq: PHYS 334, 364 and 365

PHYS 435 F 3C 0.5
Solid State Physics
Prereq: Completion of Year Three Honours Physics

PHYS 437A F,W P 0.5
Research Project
A research project in any area of Physics approved by the course co-ordinator(s). The student is required to present a summary of the project orally or by poster and to submit a written report in a style suitable for publication.
Prereq: Completion of PHYS 437A and approval of the course coordinator(s)

PHYS 441A F 3C 0.5
Electrostatics and Electrodynamics
The student is required to present a summary of the project orally or by poster and to submit a written report in a style suitable for publication.
Prereq: Completion of PHYS 437A and approval of the course coordinator(s)

PHYS 441B W 3C 0.5
Electromagnetic Theory
Prereq: PHYS 441A

PHYS 444 W 3C 0.5
Modern Particle Physics
Prereq: PHYS 334, 364/365 or equivalent

PHYS 445 W 3C 0.5
Modern Optics
Basic electromagnetic wave theory. Polarization, reflection, refraction, and dispersion. Temporal coherence and spectra. Spatial coherence and diffraction. Spatial filtering. Lasers, modes and beam propagation. Special topics may include crystal optics and nonlinear effects, holography, fibre optics and communications.
Prereq: PHYS 256

PHYS 454 W 3C 0.5
Quantum Physics 4
Scattering theory. Relativistic wave equation. 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, Greens functions and complex analysis.
Prereq: PHYS 364/365

PHYS 476 F 3C 0.5
Astrophysics 3 - Galaxies and Cosmology
Properties and origin of galaxies, quasars, clusters of galaxies, observational cosmology, the big-bang theory, introduction to general relativity and Riemannian geometry, the origin and fate of the Universe.
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, temperatures 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 1993-94
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 444 Continuum Mechanics
PHYS 455 Advanced Analogue Electronics
PHYS 465 Mathematical Physics 4
Planning, Urban and Regional

Undergraduate Officer
M.J. Bauer, ES1 310, ext. 3619

Courses not offered in the current academic year are listed at the end of this section.

PLANNING CONCEPTS AND TECHNIQUES 1
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

PLANNING CONCEPTS AND TECHNIQUES 2
Continuation of PLAN 100A.
Prereq: PLAN 100A, Planning students only
Estimated additional cost to student: $30

PARTICIPATORY PLANNING
An introduction to types of participatory planning initiated either by planners or by citizens' groups and directed toward changing built and natural environments. Concepts such as individualism, class, family, ethnicity and community are introduced in order to show how they relate to environmental attitudes and behaviour.

Prereq: Planning students only

INTRODUCTION TO URBAN AND REGIONAL PLANNING
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.)
Use of Social Research in Planning Practice

Preparticipation observation, content analysis, and historical-comparative research. Techniques for selecting a method, structuring a research project and analysing data will be covered. The purposes of social inquiry, the development of theories, the use of social research in policy-making, and the ethical issues associated with social research provide the context for discussing the details of research methods.

Prereq: Planning students or consent of instructor

PLAN 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 278 or consent of instructor

Cross-listed as GEOG 316

PLAN 317 W 3C 0.5 Nonparametric Statistics

The theory and application of nonparametric statistics, with particular emphasis upon social science problems.

Prereq: ENV S 278 or consent of instructor

Cross-listed as GEOG 317

PLAN 319 F 2C.1L 0.5 Economic and Social Techniques for Regional Planning

Critical appraisal of a selection of descriptive and evaluative regional analysis techniques. Economic considerations of regional development. Reliability and applicability of data; input-output analysis; cost-benefit analysis; planning, programming and budgeting systems; and social area analysis.

Prereq: ECON 101, 102 or consent of instructor

Cross-listed as GEOG 319

Students may receive credit for only one of PLAN 319 and GEOG 319

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.
Course Descriptions
Planning, Urban and Regional

PLAN 368 F 3C 0.5
Conservation/Resource Management of the Built Environment
Consideration of the constraints and guidelines that an application of the principles of ecology place on the planning and management of resources within urban spaces and the implications for urban design. The theory and history of this subject will be discussed together with urban ecomanagement, the management of waste, urban open space and parks, rehabilitated sites, and environmentally sensitive areas.
Prereq: ENV S 200
Cross-listed as GEOG 368
Lab fee $20
Students receive credit for only one of PLAN 368 and GEOG 368

PLAN 370 F 2C 0.5
Land Development Planning
An examination of planning issues related to the economics and financing of public and private development projects including shopping plazas, residential subdivisions, and new towns. The course focuses on sources of financing, financial programming, effects of planning decisions on land values, and techniques of project evaluation.

PLAN 380 S (Oxford) 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, a study of development of U.K. planning from mid-eighteenth century to present with reference to new town and urban redevelopment.
Prereq: Third year planning students. Students register on a Letter of Permission. Additional course fee.

PLAN 390 W,S 3C No credit weighing
Senior Honours Essay Proposal
A training course for developing a research proposal for the Senior Honours Essay. Students will develop a research proposal under direction of a faculty member. Types of research which can be employed in the development will be discussed as well as the methods available. Students will present proposals as a mode for evaluating their participation.
Prereq: Third year planning students only

PLAN 402 W 3C,1.5S 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: ENV S 201
Estimated additional cost to student: $40

PLAN 414 F 2C 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

PLAN 420 W 2C 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: $40

PLAN 425 W 2C,2std 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 256A/B
Estimated additional cost to student: $60

PLAN 435 W 2C 0.5
Continuation of PLAN 434

PLAN 445 W 2S 0.5
Political and Administrative Processes in Urban and Regional Planning 1
Political and administrative frameworks for planning and the formulation of urban/regional policy in an intergovernmental setting. Study of the process and substance of planning in relation to: politics, administration, policy, decision-making, legislation, plan preparation and implementation in Canada.
Prereq: Fourth-year Planning students only

PLAN 446A F,W 3C 0.5
Political and Administrative Processes in Urban and Regional Planning 2
Continuation of PLAN 446A.
Prereq: PLAN 446A

PLAN 470 W 2S 0.5
International Winter City Development
A multidisciplinary approach which explores and analyzes case studies of human settlements situated in cold-climate regions. The focus is directed toward Canada, USA, Norway, Sweden, Finland and Iceland, although other countries such as Japan, USSR, China may be included.
Prereq: Third- or fourth-year Planning or Environmental Studies students only

PLAN 475A-Z F,W,S 3R 0.5 each
Projects, Problems and Readings in Planning
Special planning projects and problems chosen in consultation with instructor.
Prereq: Consent of instructor
A 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.
**POLISH**

For courses in Polish see Germanic and Slavic Languages and Literatures.

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**Political Science**

**Undergraduate Officer**
Richard Nutbrown, HH 309, ext. 6567

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 3 contending models in 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 approximately one hundred million. This course will describe and evaluate various theories of political violence.

**PSCI 102M** W,S 0.5
*Contemporary Issues in Canadian Public Policy*
An evaluation of various public policy responses to some contemporary Canadian social, cultural, economic, environmental, and political problems 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.

**PSCI 225** F 2C,1T 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.

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**Plan 480A** F,W 3S 0.5
*The Philosophy and Methodology of Urban and Regional Planning 1*
A seminar course on some current and changing social philosophies, the image of humans, the notions of ethics, morality, authority, equity, etc., and the related perceptions and perspectives and conceptions of social and environmental realities and their relevance to planning, its human information base, processes and procedures.

**Prereq:** Fourth-year Planning students only

**Plan 480B** F,W 3S 0.5
*The Philosophy and Methodology of Urban and Regional Planning 2*
Continuation as outlined in Part 1 with the focus on the theories or foundations for the development of an environmental ethic and the implications of the notions discussed in Part 1 as the philosophical base for planning.

**Prereq.:** Plan 480A

**Plan 490A** F,W 0.5
*Senior Honours Essay 1*
Practical experience in the identification of a problem in the planning field. Conduct of individual research into this problem and presentation of the results in a form that meets both professional and academic standards, as further elaborated in a policy statement available from the undergraduate officer.

**Prereq.:** Fourth-year Planning students only

**Plan 490B** F,W 1.0
*Senior Honours Essay 2*
Completion of essay.

**Prereq.:** Plan 490A

**Courses not offered 1993-94**

- PLAN 318: Spatial Analysis
- PLAN 325: Special Topics in Development Planning in the Third World
- PLAN 344: Recreation Planning
- PLAN 430: Social Policy Planning

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**List of Courses**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Title</th>
<th>Units</th>
<th>Prerequisites</th>
</tr>
</thead>
<tbody>
<tr>
<td>PSCI 101A</td>
<td>Introduction to Politics 1</td>
<td>0.5</td>
<td></td>
</tr>
<tr>
<td>PSCI 101B</td>
<td>Introduction to Public Policy</td>
<td>0.5</td>
<td></td>
</tr>
<tr>
<td>PSCI 102</td>
<td>Political Rights and Obligations</td>
<td>0.5</td>
<td></td>
</tr>
<tr>
<td>PSCI 102F</td>
<td>Introduction to Third World Politics</td>
<td>0.5</td>
<td></td>
</tr>
<tr>
<td>PSCI 102K</td>
<td>Mass Political Violence</td>
<td>0.5</td>
<td></td>
</tr>
<tr>
<td>PSCI 102M</td>
<td>Contemporary Issues in Canadian Public Policy</td>
<td>0.5</td>
<td></td>
</tr>
<tr>
<td>PSCI 102N</td>
<td>The Politics of Nationalism and Ethnicity</td>
<td>0.5</td>
<td></td>
</tr>
<tr>
<td>PSCI 214</td>
<td>Quantitative Analysis</td>
<td>0.5</td>
<td></td>
</tr>
<tr>
<td>PSCI 225</td>
<td>The History of Political Theory 1</td>
<td>0.5</td>
<td></td>
</tr>
</tbody>
</table>
Course Descriptions
Political Science

PSCI 226 W 2C,1T 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 F,W 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 conditioned by government intervention and interaction with the private sector.
Prereq: Second-year standing

PSCI 255 F,W 0.5
The Politics of Western Industrial Nations
A systematic introduction to the political processes of industrial countries. The central focus will be on Western Europe and North America. Some attention, however, will be devoted to the Antipodes, Mediterranean countries, South Africa and Japan.
Prereq: Second-year standing

PSCI 260A F,S 2C,1D 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: PSCI 260A or consent of instructor

PSCI 260B W,S 2C,1D 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 and above

PSCI 266 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 and above

PSCI 271 F 2C,1L 0.5
Political Behaviour 1
Empirical approaches to the study of politics are examined in light of their assumptions, aspirations, and criticisms.
Prereq: Second-year standing

PSCI 272 W 0.5
Political Behaviour 2
An examination of the political attitudes and behaviour of men and women in different political systems.
Prereq: Second-year standing

PSCI 278 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

PSCI 281 F 2C 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: Open to all students in the second year and above

PSCI 291 F,S 3C 0.5
issues in Canadian Criminal Law
Rational principles and concepts applicable to current emotional criminal issues are analyzed by a practising crown attorney, for example, abortion, euthanasia, pornography, seat belts, homosexuality, marijuana, police power, civil rights, criminal trials, jury, capital punishment, prisons, etc.
Prereq: Open to all students in the second year and above

PSCI 295 F 0.5
Public Sector Management
This course examines the functions of management with major emphasis placed on employee relations, values, communication, motivation and team management.
Prereq: Second-year or consent of instructor

PSCI 306 F,W 0.5
Research Design in Political Science
Introduction to the logic and limitations of experimental and non-experimental research designs. Selected studies of political phenomena are examined to demonstrate how plausible threats to validity may be overstated.
Prereq: PSCI 214 or consent of instructor

PSCI 307 F 2L 0.5
Marxist Theory
A basic introduction to the political and social thought of Karl Marx from the early writings to Das Capital.
Prereq: None

PSCI 321 W 2L 0.5
Marxism after Marx
A selective study of developments in Marxist theory and political movements after Marx.
Prereq: None

PSCI 323 0.5
Ancient Political Philosophy
A selective examination of political philosophy during the classical period in Greece.
Prereq: Consent of the instructor

PSCI 324 0.5
Modern Political Philosophy
A selective examination of political philosophy in the modern period.
Prereq: Consent of instructor
<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Credits</th>
<th>Prerequisites</th>
</tr>
</thead>
<tbody>
<tr>
<td>PSCI 331 F 2C 0.5</td>
<td>Public Administration 1</td>
<td></td>
<td>An introduction to the principles of public administration illustrated by the study of Canadian institutions largely at the federal level, but including provincial and municipal examples. Prereq: PSCI 260A and 260B or consent of instructor</td>
</tr>
<tr>
<td>PSCI 332 W,S 2S 0.5</td>
<td>Public Administration 2</td>
<td></td>
<td>Analysis of problems and issues in administration and management applying the knowledge gained in PSCI 331. Prereq: PSCI 331 or consent of instructor</td>
</tr>
<tr>
<td>PSCI 333 W 0.5</td>
<td>Administrative Law</td>
<td></td>
<td>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</td>
</tr>
<tr>
<td>PSCI 341 F 2C,15,1L 0.5</td>
<td>Provincial Politics</td>
<td></td>
<td>A comparative analysis of the political systems of the Canadian provinces. Prereq: PSCI 260</td>
</tr>
<tr>
<td>PSCI 342 W 2C 0.5</td>
<td>Politics in Quebec</td>
<td></td>
<td>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</td>
</tr>
<tr>
<td>PSCI 343 F 2C 0.5</td>
<td>Canadian Municipal Government</td>
<td></td>
<td>A study of the assumptions, structures and performance of municipal government in Canada with reference to metropolitan and regional structural innovations (particularly in Ontario). Open to students in the third year and above with at least 1 previous course in Political science. Prereq: PSCI 343 or consent of instructor</td>
</tr>
<tr>
<td>PSCI 344 W 2C,1T 0.5</td>
<td>The Politics of Local Government</td>
<td></td>
<td>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</td>
</tr>
<tr>
<td>PSCI 350A F 2C 0.5</td>
<td>The Politics of the Developing Areas 1</td>
<td></td>
<td>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. No prereq for students in the third year and above.</td>
</tr>
<tr>
<td>PSCI 350B W 2C 0.5</td>
<td>The Politics of the Developing Areas 2</td>
<td></td>
<td>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. No prereq for students in the third year and above.</td>
</tr>
<tr>
<td>PSCI 351 F 2S 0.5</td>
<td>Federal and Consociational Political Systems</td>
<td></td>
<td>Federal and Consociational Political Systems are examined with emphasis on processes of political integration, patterns of conflict resolution, and the impact of modernization on political development. Prereq: Consent of the Instructor</td>
</tr>
<tr>
<td>PSCI 363 F 0.5</td>
<td>Canadian Constitutional Law</td>
<td></td>
<td>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. Loading cases will be examined. Prereq: PSCI 260A and 260B or 260A and consent of instructor</td>
</tr>
<tr>
<td>PSCI 365A F 0.5</td>
<td>Politics in the Soviet Successor States 1</td>
<td></td>
<td>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)</td>
</tr>
<tr>
<td>PSCI 365B W 0.5</td>
<td>Politics in the Soviet Successor States 2</td>
<td></td>
<td>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)</td>
</tr>
<tr>
<td>PSCI 372 W 0.5</td>
<td>Political Parties and Interest Groups</td>
<td></td>
<td>An examination of the role of interest groups and political parties in influencing government policy. The origins, tactics, structures and impacts of these two avenues of political participation will be compared. Discussion will focus on Canadian examples. Prereq: Third-year standing or consent of instructor</td>
</tr>
<tr>
<td>PSCI 375 W 0.5</td>
<td>The Politics of Self-Management</td>
<td></td>
<td>An examination of the participation of citizens in decision making, both at work and in politics. The self-management system of Yugoslav will be studied in detail. Prereq: Second year standing or above</td>
</tr>
<tr>
<td>PSCI 380A F 0.5</td>
<td>World Politics 1</td>
<td></td>
<td>An examination of the structure of the world capitalist system concentrating upon warfare between core states during 1815-1945 and assessing the impact of the nuclear revolution. A number of classic theories of imperialism are considered. Prereq: Open only to students in the third year and above</td>
</tr>
<tr>
<td>PSCI 380B W 0.5</td>
<td>World Politics 2</td>
<td></td>
<td>An examination of the allocation of misery in the world capitalist system. The focus is on core/periphery relations and a number of theories of imperialism are considered. Prereq: Open only to students in the third year and above</td>
</tr>
<tr>
<td>PSCI 381 W 0.5</td>
<td>Foreign Policies of South Asian States</td>
<td></td>
<td>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.</td>
</tr>
<tr>
<td>PSCI 382 W 0.5</td>
<td>Politics of Canadian Foreign Policy</td>
<td></td>
<td>An examination of issues and the foreign policy-making process in Canada. Special attention is paid to the domestic context of foreign policy.</td>
</tr>
<tr>
<td>PSCI 390-398 0.5</td>
<td>Special Studies</td>
<td></td>
<td>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.</td>
</tr>
</tbody>
</table>
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 428  0.5  
Selected Subjects in Political Philosophy
A selective treatment of basic themes in political philosophy in the modern and pre-modern times.
Prereq: PSCI 225, 226, 323, or 324, or consent of instructor

PSCI 427 F  0.5  
Special Topics in Political Philosophy
A selective examination of basic problems in political philosophy in the modern and pre-modern periods.
Prereq: PSCI 225, 226, 323, or 324 or consent of instructor

PSCI 428 F  0.5  
State and Economic Life
An analytical and comparative study of the growth of government intervention in the economic process, and of the development of the welfare state.
Prereq: Consent of the 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 433  0.5  
Public Policy and Underdevelopment in the Third World
An examination of industrial strategies, agricultural programs and energy policies of selected third world countries focussing upon the political obstacles, both domestic and foreign, to the achievement of the long term integrated planning required for the alleviation of poverty in the Third World.
Prereq: Fourth-year standing 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 W  2S  0.5  
The Politics of Canadian Resource Development
A seminar focusing on the strategies of resource development policies, with an emphasis on the economic, political, environmental and cultural implications of oil, natural gas, and mineral exploitation.
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 260 or consent of instructor

PSCI 451 F  0.5  
Comparative Political Systems: Eastern Europe
A comparative examination of political institutions and processes in the states of Eastern Europe.
Prereq: Fourth-year standing or consent of instructor

PSCI 452 F  0.5  
Comparative Civil-Military Relations — Soviet Union and Eastern Europe
A seminar on the military and politics in the Soviet Union and Eastern Europe since World War II; how the military system affects and, in turn, is affected by the political system and society.
Prereq: Fourth-year standing or consent of instructor

PSCI 453 F  3S  0.5  
Comparative Politics of Latin America
The course examines the politics of Latin America focussing upon the interplay between external ties and internal processes. Topics include comparative studies of class alliances, the establishment of bureaucratic authoritarian regimes and revolutionary movements.
Prereq: Fourth-year standing or consent of instructor

PSCI 454 W  3S  0.5  
Rural Politics and Development
An analysis of causes and political implications of rural poverty in the Third World with the focus on alternative strategies of rural development.
Prereq: Fourth-year standing or consent of instructor

PSCI 461 F  2C.1S  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 473 2S  0.5  
Voting Behaviour
Prereq: PSCI 214 or consent of instructor

PSCI 475 F  2S  0.5  
Political Socialization
A study of the processes and agents of political socialization and their effects on political stability or change in liberal-democratic societies.
Prereq: Consent of the instructor

PSCI 476 W  0.6  
Research Seminar in Political Behaviour
A research-oriented seminar on selected theoretical works in political behaviour, with an emphasis on the development of research projects dealing with Canadian topics.
Prereq: Consent of the instructor
Course Descriptions

Psychology

COURSES NOT OFFERED 1993-94

PSCI 102E Political Rights and Obligations
PSCI 271 Political Behaviour 1
PSCI 272 Political Behaviour 2
PSCI 375 Politics of Self-Management
PSCI 422 Conflict of Political Ideas in Canada
PSCI 433 Public Policy and Underdevelopment in the Third World
PSCI 443 Politics in Western Canada
PSCI 471 Public Opinion and Propaganda
PSCI 473 Voting Behaviour
PSCI 475 Political Socialization

Psychology

Undergraduate Office
H. Smith, PAS 4028, ext. 2819

Introductory Note
See departmental course listing for specific terms of the various course offerings in 1993-94.

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.

Students may receive credit for only one of PSYCH 101 or PSYCH 120R
Also offered at St. Jerome's College

PSYCH 102 (A-Z) W 3C 0.5
Introductory Psychology Special Topics
A study in greater depth of selected topics. Previous topics included: Applied Psychology; Culture's Influence on Behaviour; Psychological Intervention; Social Psychology and Sport. Topics will be announced each year in time for pre-registration.

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 correlational procedures in measuring intelligence, achievement, aptitudes, interests and personality.

Also offered at St. Jerome's College

PSCI 102E Political Rights and Obligations
PSCI 271 Political Behaviour 1
PSCI 272 Political Behaviour 2
PSCI 375 Politics of Self-Management
PSCI 422 Conflict of Political Ideas in Canada
PSCI 433 Public Policy and Underdevelopment in the Third World
PSCI 443 Politics in Western Canada
PSCI 471 Public Opinion and Propaganda
PSCI 473 Voting Behaviour
PSCI 475 Political Socialization

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

PSYCH 206 3C 0.5
Perceptual Processes
An examination of data and theory concerning perceptual processes. Topics will include the perception of form and space, perceptual learning and a consideration of the effect of personality variables in perception.

Prereq: PSYCH 101
Priority enrolment for Psychology majors

PSYCH 207 3C 0.5
Cognitive Processes
An examination and evaluation of selected topics dealing with human learning, thinking, concept formation, memory and language.

Prereq: PSYCH 101
Priority enrolment for Psychology majors

PSYCH 211 F.W.S 3C 0.5
Developmental Psychology
An examination of the process and factors of human development.

Prereq: PSYCH 101
Priority enrolment for Psychology majors

Also offered at St. Jerome's College

PSYCH 212 F.W.S 3C 0.5
Educational Psychology
A consideration of the main variables affecting learning in the classroom with special focus upon the conditions essential to efficient learning.

Prereq: PSYCH 101
Also offered at St. Jerome's College

PSCI 473 2S 0.5
Senior Research Seminar: Violence in the Political Process
Politics can be brutal. This seminar deals with violence in the political process. The focus on the relationships between the society and the coercive apparatus of the state.

Prereq: Third- or fourth-year standing

PSCI 481 2S 0.5
Research Seminar on World Politics
An examination of research on the causes and consequences of interstate warfare.

Prereq: PSCI 380 or consent of instructor

PSCI 483 F 3S 0.5
Power Politics and World Order Studies
This theory course examines the evolution of the international system; the capacity of the system of states to cope with the demands on it; meanings of international and regional power and order.

Prereq: Fourth-year standing or consent of instructor

PSCI 484 W 3S 0.5
Contemporary Strategies: Theories and Policies
The course examines strategic studies and their premises, the evolution of strategic thinking, the role of national policies of military power. Strategic concepts are studied with specific reference to military policies of regional powers.

Prereq: Fourth-year standing or consent of instructor

PSCI 485 W 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 foreign investment.

PSCI 490-498 0.5 each

Special Subjects
From time to time courses of special study may be added to the program at the fourth year level. Students wishing to add such courses should consult the Department's Undergraduate Officer.

PSCI 499A/B F.W. 0.5/0.5
Special Honours Essay
Students wishing to undertake a senior honours essay in their fourth year should consult the Department's Undergraduate Officer.

A letter grade for PSCI 499A will be submitted only after the completion of PSCI 499B.
PSYCH 213 3C 0.5
Exceptional Children
Educational problems associated with mental retardation, emotional distur-
banes, 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

PSYCH 218 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 the instructor
Offered at St. Jerome's College

PSYCH 235 3C 0.5
Psychological Perspectives on Gender and Sex
The course focuses on the existence of and bases for sex and gender differences with emphasis on biological, psychological and cultural issues.
Prereq: PSYCH 101 (PSYCH 211 is recommended)

PSYCH 236 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 3C 0.5
Social Psychology
An introduction to the scientific study of social behavior 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.
Students may receive credit for only one of PSYCH 253 or PSYCH 220R.
Prereq: PSYCH 101

Course Descriptions
Psychology

PSYCH 254 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.
Students may receive credit for only one of PSYCH 254 or PSYCH 221R
Prereq: PSYCH 253
Cross-listed as PSYCH 221R

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 261 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

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

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.
PSYCH 314 F 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

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
Formerly PSYCH 214
Also offered at St. Jerome's College

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
Offered at St. Jerome's College

PSYCH 334 F,W,S 3C 0.5
Theories of Individual Counselling
Psychology
An introduction to the methods, theories and problems in individual Counselling Psychology.
Prereq: PSYCH 101
Also offered at Renison College and St. Jerome's College
Priority in Renison College section will be given to Social Development Studies majors

PSYCH 335 3C 0.5
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, compensations systems.
Prereq: PSYCH 101

PSYCH 336 3C 0.5
Organizational Psychology
Survey of organizational, group, and individual processes involved in work motivation, group dynamics, leadership, organizational climate and organizational culture.
Prereq: PSYCH 101
Antireq: M SCI 211

PSYCH 338 3C 0.5
Theories of Group Counselling
Contemporary theories on the therapeutic application of group processes. Issues such as group development, leader skills and training, selection of members, problems encountered in both process and outcome research will be examined.
Prereq: PSYCH 101
Offered at St. Jerome's College

PSYCH 339 3C 0.5
Personality Theory
An examination and evaluation of some of the outstanding theories of personality.
Students may receive credit for only one of PSYCH 355 or PSYCH 322R
Prereq: PSYCH 101
Priority enrollment for Psychology majors.
Cross-listed as PSYCH 322R

PSYCH 355 3C 0.5
Personality Theory
The nature and origin of deviant behaviour.
Students may receive credit for only one of PSYCH 356 or PSYCH 323R
Prereq: PSYCH 101
Priority enrollment for Psychology majors.
Cross-listed as PSYCH 323R
Also offered at St. Jerome's College

PSYCH 356 (A-Z) 3C 0.5
Psychopathology
The nature and origin of deviant behaviour.
Students may receive credit for only one of PSYCH 356 or PSYCH 323R
Prereq: PSYCH 101
Priority enrollment for Psychology majors.
Cross-listed as PSYCH 323R

PSYCH 361 (A-Z) 3C 0.5
Special Topics in Advanced Physiological Psychology
This course continues and extends PSYCH 261. Departmental listings of topics should be consulted.
Prereq: PSYCH 261 or permission of the instructor

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 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 2S,2L 0.5
Research in Developmental Psychology
Open only to students in a Psychology Honours Program.
Prereq: PSYCH 211 and 391
(acceptable as a corequisite)

PSYCH 394 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
(acceptable as a corequisite)

PSYCH 395 2S,2L 0.5
Research in Social Psychology
Open only to students in a Psychology Honours Program.
Prereq: PSYCH 253 and 391
(acceptable as a corequisite)

PSYCH 396 2S,2L 0.5
Research in Biopsychology
Open only to students in a Psychology Honours Program.
Prereq: PSYCH 261 and 391
(acceptable as a corequisite)

PSYCH 397 2S,2L 0.5
Research in Personality and Psychopathology
Open only to students in a Psychology Honours Program.
Prereq: PSYCH 355 or 357 and 391
(acceptable as a corequisite)

PSYCH 398 2S,2L 0.5
Research in Learning and Motivation
Open only to students in a Psychology Honours Program.
Prereq: PSYCH 203 or 271 and 391
(acceptable as a corequisite)
Course Descriptions

Psychology

Pure Mathematics

The following courses are administered by Renison College. 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 120 R F 3C 0.5
Introductory Psychology

PSYCH 121 R W 3C 0.5
Introductory Psychology (Special Topics)

PSYCH 220 R 3C 0.5
Social Psychology

Cross-listed as PSYCH 253

PSYCH 221 R 3C 0.5
Interpersonal Interaction

Cross-listed as PSYCH 254

PSYCH 322 R F 3C 0.5
Personality Theory

Cross-listed as PSYCH 355

PSYCH 323 R W 3C 0.5
Abnormal Psychology

Cross-listed as PSYCH 357

PSYCH 367R-369R
Special Topics in Psychology

PSYCH 398R/399R S,F,W R 0.5
Independent Study

Open to senior Social Development Studies majors only.

Pure Mathematics

Undergraduate Office
S. Burris, MC 5066, Ext 4067

Introductory Note
More detailed course descriptions and availability information may be obtained upon request from the Pure Mathematics Department.

PMATH 330 F,W,S 3C 0.5
Introduction to Mathematical Logic


This course will be of interest to all math students.
PMATH 331 F,W 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.
Prereq: MATH 237
Antireq: PMATH 351
Cross-listed as AM 331
For students in programs outside of Pure Mathematics.
Not available for credit to students in Honours Pure Mathematics programs.

PMATH 332 W,S 3C 0.5
Complex Analysis
Complex numbers; continuity, differentiability, analyticity of functions; the Cauchy-Riemann equations; solution of Laplace's equation; conformal mapping by elementary functions, and applications; contour integration, the Cauchy and allied theorems; Taylor and Laurent expansions, uniform convergence and power series; the residue calculus, and applications.
Prereq: MATH 237
Antireq: PMATH 352
Cross-listed as AM 332
Not available for credit to students in Honours Pure Mathematics programs.

PMATH 334 W,S 3C 0.5
Introduction to Rings and Fields
Rings, ideals, factor rings, homomorphisms, finite and infinite fields, polynomials and roots, field extensions, algebraic numbers, and applications, for example, to Latin squares, finite geometries, geometrical constructions, error-correcting codes.
Prereq: MATH 135, 235
Antireq: PMATH 344
For students in programs outside of Pure Mathematics.
Not available for credit to students in Honours Pure Mathematics programs.

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.
Prereq: MATH 135, 235
Antireq: PMATH 343

PMATH 340 W 3C 0.5
Elementary Number Theory
An elementary approach to the theory of numbers; the Euclidean algorithm, congruence equations, multiplicative functions, solutions to Diophantine equations, continued fractions, and rational approximations to real numbers.
Prereq: MATH 126
Antireq: PMATH 440
This course will be of interest to all math students.

PMATH 343 F,W 3C 0.5
Abstract Algebra 1
Groups: examples of groups, permutation groups, groups of low order, homomorphisms, subgroups and normal subgroups, factor groups, Lagrange's theorem, Cayley's theorem, Abelian groups, direct products, the structure of finitely generated Abelian groups, applications.
Rings: ideals, quotient rings, homomorphisms, domains, primes, maximal ideals and fields, field of fractions, Euclidean domains, principal ideal domains, unique factorization, polynomial extensions of unique factorization domains, applications.
Prereq: MATH 235
Antireq: PMATH 336
PMATH 343 may be substituted for PMATH 356 whenever the latter is a requirement in an Honours program.

PMATH 344 F,S 3C 0.5
Abstract Algebra 2
Field theory, examples of fields, field of fractions, algebraic extensions, construction of roots, separable extensions, splitting fields, classification of finite fields. Finite non-Abelian groups, Sylow theorems. Introduction to Galois theory.
Prereq: PMATH 343 or 336 with consent of instructor
Antireq: PMATH 334
PMATH 344 may be substituted for PMATH 334 whenever the latter is a requirement in an Honours program.

PMATH 345 F,S 3C 0.5
Real Analysis
Metric spaces, compactness, completeness, continuity, convergence, integration, function spaces.
Prereq: MATH 237, or consent of instructor
Antireq: AM 331, PMATH 331
PMATH 351 may be substituted for AM/PMATH 331 whenever this is a requirement in an Honours program.

PMATH 352 F,S 3C 0.5
Complex Analysis
Analytic functions, Cauchy's theorem, Laurent series, the residue theorem, integral evaluation, Möbius and other conformal maps.
Prereq: MATH 237, or consent of instructor
Antireq: AM/PMATH 332
PMATH 352 may be substituted for AM/PMATH 332 whenever the latter is a requirement in an Honours program.

PMATH 353 W 3C 0.5
Fourier Analysis
Fourier analysis: A descriptive introduction to L^p spaces, inner products and Hilbert spaces, Fourier series on the circle, convergence theorems, the Fourier transform. Other topics: The heat equation, the Dirichlet problem on the disk, approximation theory and orthogonal polynomials.
Prereq: PMATH 351 or AM/PMATH 331 with consent of instructor

PMATH 354 F 3C 0.5
Elementary Differential Geometry and Tensor Analysis
Curves in Euclidean 3-space (E^3) and the Serret-Frenet formulae; surfaces in E^3 and their intrinsic geometry, Gaussian curvature and the Gauss-Bonnet theorem. Coordinate transformations and tensors in n-dimensions; n-dimensional Riemannian spaces, covariant differentiation, geodesics, the curvature, Ricci and Einstein tensors. Applications of tensors in Relativity and Continuum Mechanics.
Prereq: AM 231 or consent of instructor
Cross-listed as AM 333

PMATH 355 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 359
Readings in Pure Mathematics

PMATH 432 F 3C 0.5
Mathematical Logic
First order languages and theories.

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
Antireq: PMATH 340
Next offered in Winter 1994, and each alternate Winter thereafter.
PMATH 441 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 Winter 1995, and each alternate Winter thereafter.

PMATH 443 3C 0.5
Multilinear Algebra
Continuation of linear algebra. Main topics: representations of endomorphisms, structure of bilinear forms, multilinear products.
Prereq: MATH 235
Not offered every year.

PMATH 444 3C 0.5
Non-Commutative Algebra
Prereq: PMATH 344
Next offered in Fall 1994.

PMATH 448 3C 0.5
Group Theory
Permutations, Cayley Theorem, Sylow Theorem, Jordan-Hölder Theorem, nilpotent and solvable groups, direct and semidirect products, free groups.
Prereq: PMATH 334 or 344

PMATH 449 W 3C 0.5
Topics in Complex Analysis
The Riemann mapping theorem and several topics such as analytic continuation, harmonic functions, elliptic functions, entire functions, univalent functions, special functions.
Prereq: PMATH 352

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

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 $\mathbb{R}^n$, induced Riemannian metrics, extrinsic and intrinsic curvatures, Gauss-Codazzi equations. Local Lie groups of transformations on $\mathbb{R}^n$, 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

PMATH 467 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

PMATH 499 Readings in Pure Mathematics

COURSES NOT OFFERED 1993-94
PMATH 380A Introduction to Information Theory
PMATH 380B Applications of Information Theory
PMATH 445 Ring Theory

Recruitment 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.
Prereq: PSYCH 101

REC 200 F 3C 0.5
Theories of Play
A critical analysis of definitions, concepts and assumptions of classical, recent and modern theories of play with implications for research strategies, programming and planning for play.
Prereq: PSYCH 101

REC 201 W 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 204 3C 0.5
Leisure and Recreation in Historical Perspective
Analysis of socio-cultural determinants which have influenced Canadian Leisure behaviour.
Prereq: REC 100 or consent of instructor

REC 205 S 3C.1L 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
Course Descriptions
Recreation and Leisure Studies

REC 209 F.S. 2C. 21. 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: CS 100 or consent of instructor, REC 100, and second-year standing
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 220 W.S 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.
Prereq: REC 201 or 205 or consent of instructor

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 consideration 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

REC 280 F 3C 0.5
Travel and Tourism
The scope and nature of travel and tourism as contemporary leisure experiences is examined along with economic, political and social ramifications, research strategies employed and implications for the future.

REC 300 F.S. 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

REC 304 F 3C 0.5
Community and Cultural Development
A study of major issues of Canadian cultural policy from a socio-historical, political and sociological perspective. Students will examine the role and organizational structure of the arts and major cultural agencies, and discuss social, economic and administrative aspects of professional, amateur, commercial and public art organizations and services.
Prereq: REC 201 or 205 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 determine whether or not the idea is feasible. The course emphasizes marketing research, organizational structure, short and long range planning, financial analysis and promotions.
Prereq: REC 210, BUS 121 and third-year standing

REC 321-329 0.5
Selected Topics in Recreation and Leisure Studies
See department scheduling board for these experimental courses.

REC 331 2C. 1L 0.5
Outdoor Education
The present status of outdoor education in modern society; government functions and policies related to outdoor education services; the planning and administration of outdoor education activities are discussed.
Prereq: REC 230

REC 333 W 3C 0.5
Recreation Geography
The environmental implications of existing and potential recreational demands. Recreation travel, site capability, economic and ecological impact models will be considered as well as the behavioural aspects of amenity resources.
Prereq: REC 230
Cross-listed as GEOG 333

REC 334 W 3C. 1 L 0.5
Park Management
Basic administrative procedures in park management. Operational techniques are examined together with general policies of acquisition, operation and development.
Prereq: GEOG 102 and BIOL 250 or ENV S 200
Cross-listed as ENV S 334

REC 350 W 3C 0.5
Principles and Procedures of Therapeutic Recreation
This course is designed to examine techniques, tools, knowledge and skills required to design, plan, develop and facilitate therapeutic recreation programs in a variety of settings for individuals and groups.
Prereq: REC 251 or consent of instructor
Course Descriptions
Recreation and Leisure Studies

REC 355 F 3C 0.5
Issues and Problems in Therapeutic Recreation
This course is designed to explore and examine problems and issues associated with the delivery of therapeutic recreation services. Current issues and trends with regard to professionalization of therapeutic recreation, service delivery models, and administration of services will be covered.
Prereq: REC 251 and REC 350 or consent of instructor

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 services. Various issues such as poverty, ethnicity, and disability will be addressed. Major areas of discussion will include organizational sources of community and individual effort, leadership, participation, stresses, strains and strategies of social action.
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, management and leadership skills and techniques necessary in the assumption of the direction of programs of recreation, leisure and cultural services of all kinds. Specific emphasis is placed on public sector community services and resources.
Prereq: Third-year standing or consent of instructor

REC 370 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 readings. A faculty member must approve a student's project prior to registration. Students may take only two directed studies courses for undergraduate degree. See REC 475.
Prereq: Faculty approval

REC 371 W 2C,1T 0.5
Statistical Techniques Applied to Leisure Studies
An introduction to descriptive and inferential statistics and the interpretation of data. A major consideration of the course is the use of statistics in the solution of problems in recreation and leisure.
Prereq: REC 270 and third-year standing

REC 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 relevant 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 operational 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 3C 0.5
Perspectives on International Tourism
The character, problems of and prospects for tourism are examined through consideration of tourism in a variety of countries and regions, both developed and developing. Topics include the nature and significance of tourism; economic, environmental and social impacts of tourism; and costs and benefits of tourism to destination areas.
Prereq: GEOG 202, REC 230 or consent of instructor
Cross-listed as GEOG 323

REC 401 F 3C 0.5
The Economics of Recreation
This course provides the student with a chance to critically examine the application of basic micro-economic concepts to the study of recreation. Special attention is given to demand analysis and its use in non-market valuation problems. Price and income elasticity, the travel cost method, the contingent valuation method, and benefit-cost analysis are also examined.
Course content emphasizes public sector issues and equity concerns more than private sector issues.
Prereq: ECON 101 and third-year standing or consent of instructor

REC 402 W 3C 0.5
Colloquium on Religion and Leisure
Theological notions as they relate to theories of leisure. Contemporary trends and behaviour which affect organized religion their subsequent attitudes toward leisure.
Prereq: GEOG 102 or BIOL 250 or ENV S 200

REC 406A/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.

REC 409 W 3C,1L 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.
Prereq: GS 100 and REC 250 or equivalent and third- or fourth-year standing

REC 410 W,S 1C,2L 0.5
Planning of Recreation Facilities
A course to introduce the students to the planning, design and management of recreation areas and facilities.
Prereq: GEOG 102 and BIOL 250 or ENV S 200, third-year standing

REC 413 W 3C 0.5
Advanced Seminar in Leisure Service Management
This course is designed to allow students to combine their business/public administration courses, job experiences and leisure service management issues in a small group setting. Managerial problems are identified and alternative solutions are generated by examining the problems from both a research perspective and a practitioner's perspective.
Prereq: Fourth-year standing, Business Option or Public Administration Option

REC 416 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 agencies; and selected recreation planning issues.
Prereq: GEOG 102 and BIOL 250 or ENV S 200

REC 425 W 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.
Course Descriptions

Recreation and Leisure Studies

Religious Studies

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.

Prereq: REC 394/ENV S 334
Cross-listed as ENV S 433

REC 434 W 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.

Prereq: REC 334/ENV S 334
Cross-listed as ENV S 434

REC 436 W,S 3C 0.5

Marine Recreation and Conservation
Analysis of current issues, management concepts and processes related to recreational use and conservation of coastal and offshore areas. International examples will be used to highlight approaches to planning and management issues.

Prereq: REC 334 or equivalent

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.

Prereq: REC 355, 356 and fourth year standing

REC 471 F,W,S 3C 1.0

Honours Thesis
An independent research project on an approved topic supervised by a faculty member.

REC 470 includes an approved design and completion of the first segment of the paper.

Prereq: REC 270, 371
REC 471 requires the completion of the project begun in REC 470.

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 two directed studies courses for undergraduate degree. See REC 370.

Prereq: 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.

Prereq: REC 280

COURSES NOT OFFERED IN 1993-94

REC 204 Leisure and Recreation in Historical Perspective

REC 300 Philosophy of Leisure

Religious Studies

Undergraduate Officer
A.F. Thompson, MH 324, ext. 2153

Courses not offered in the current academic year are listed at the end of this section.

Introductory Note
Numbers below the course description indicate the area of Religious Studies to which the course belongs. Explanation is provided in the Arts program section.

RS 100A-K

Introduction to Religion
An introduction to Religion, religious phenomena, beliefs, ideas, practices and experience through the study of material and examples from the various fields in Religious Studies.

RS 100A F,W 3C 0.5

Religions of the East
An introduction to the religious traditions of the East: history, religious beliefs and practices of Hinduism, Buddhism, Confucianism, Taoism and Shinto.

Area 1

RS 100B F 3C 0.5

Religions of the West
Encounter with Judaism, Christianity and Islam: the characteristics and interaction of the 3 major religious traditions originating in the Middle East that have shaped the image of the Western World.

Area 1

RS 100C F 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 0.5

Introduction to Christian Ethics

Area 4

RS 100E F,W,S 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,W,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 laity, 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, consummation and the end of history.
Course Descriptions
Religious Studies

RS 106A F 3C 0.5
Elementary Biblical Hebrew
An introductory course designed to tender a reading knowledge of Biblical Hebrew: the sounds and forms of the language followed by the reading of selected texts from the Hebrew Bible.
Cross-listed as RE 140-3C
Taught at WLU

RS 105B W 3C 0.5
Elementary Biblical Hebrew
A continuation of the introduction to Biblical Hebrew.
Cross-listed as RE 140-3C
Taught at WLU

RS 106A F 3C 0.5
New Testament Greek
An introduction to Greek grammar with appropriate grammatical exercises and development of vocabulary.
RS 106A and GRK 100A may not both be taken for credit.
Area 3

RS 106B W 3C 0.5
New Testament Greek
A continuation of the study of Greek grammar with an exegesis study of some texts from the Gospel of Mark.
Area 3

RS 200 F 3C 0.5
The Study of Religion
An exploration of the nature of religion through: 1) the history of the study of religion, 2) exposure to varying methods and ways of approaching religious phenomena, and 3) consideration of accounts of religious experience.
Area 3

RS 201 F 3C 0.5
New Testament Greek
A continuation and completion of the study of the Greek Grammar of the New Testament, with appropriate exercises and a number of readings of the Greek New Testament and the Didache.
Area 3

RS 205 F 3C 0.5
The Hebrew Prophets
A study of the prophetic movement from Amos to Malachi in the historical, social, and religious context of Israel and the ancient Near East.
Area 3

RS 206 W 3C 0.5
Jesus: Life and Legacy
The life, teachings, and significance of Jesus of Nazareth as experienced and interpreted by his followers, and as recorded by the writers of the New Testament. Attention is given to traditions of virgin birth, crucifixion, resurrection, and divinity, and to Jesus’ contemporary importance.
Area 3

RS 209 W.S 3C 0.5
Paul: Life and Letters
The career and thought of a pioneer of Christian religion as seen in his writings, with attention to issues such as spirit, grace and law, freedom and slavery, Christ and church, women and men.
Area 3

RS 214 W 3C 0.5
Buddhism
An introduction to the unifying beliefs and philosophical presuppositions of the Buddhist world-view, and an overview of the diverse forms of Buddhism in South and South-East Asia, Tibet, China and Japan.
Area 1

RS 215 F 3C 0.5
Islam
An introduction to the Islamic faith and practice, with a review of the development, achievements and impact of the Muslim community from Muhammad the Prophet to the present day.
Area 1

RS 217 W 3C 0.5
 Judaism
An introduction to the religious tradition of the Jews, in terms of beliefs, practices, ideals and institutions from the beginning to the present time.
Area 1

RS 221 W 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 SOC 263
Area 5

RS 230 F,W 3C 0.5
History of Christianity
The development of Christianity in its Roman Catholic, Eastern Orthodox and Protestant traditions from the time of Christ to the present.
Cross-listed as HIST 235
Area 2

RS 231 F 3C 0.5
History of Christian Thought
An analysis of the major theological developments in the Christian traditions from the apostolic era to the present.
Area 4

RS 236 F,W 2C,1D 0.5
Human Sexuality and Christian Morality
An investigation of the moral implications of an evolving sexual consciousness in the Christian tradition.
Prereq: Second year standing or consent of instructor
Area 4

RS 256 F,W 3C 0.5
Current Ethical Issues
An examination of specific current individual and social problems such as human sexuality, social justice, urban decay, and human rights, in the light of Christian moral consciousness.
Area 4

RS 261 W 3C 0.5
Women and the Great Religions
Through a review of the teachings of the great religious traditions about women, this course aims to arrive at a global view of the situation of women in the world of religion. On the basis of the evidence gathered, it will attempt an estimation of the role of religion as an intimate and important influence on human development.
Area 5

RS 266 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.
Cross-listed as FINE 252
Area 5
RS 257 W 2C.1D 0.5
Film and the Quest for Meaning 2
A consideration of selected themes—death, evil, guilt, fate, alienation, courage, love, redemption—in the films of several of today's leading directors. Emphasis upon a variety of directors from divergent cultural backgrounds.
Cross-listed as FINE 253
Area 5

RS 269 W 3C 0.5
The Religions Art of India
An approach to understanding the myths, symbols and spirituality of Indian religion through a study of representative art, architecture and folk literature of Hinduism, Jainism, and Indian Buddhism.
Cross-listed as FINE 218A
Area 5

RS 270 F 3C 0.5
Psychology of Religion
A study of theories of the psychological nature of religious experience, the sources of religious belief and the religious significance of psychological phenomena. Topics include faith, doubt, evangelism, conversion, faith healing, mysticism, drugs and religious experience, tongues-speaking.
Area 5

RS 271 W 3C 0.5
Personality and Religion
A study of the psychology of personality in its relationship between personality and religious thought, experience and behaviour.
Area 5

RS 272 W 3C 0.5
Sacred Places
From Mecca to Benares, Stonehenge to Chartres—a consideration of sacred cities, shrines, rivers, mountains, worship centres and other places which have inspired the spiritual imagination of individuals and communities within various religious traditions.
Area 5

RS 291 A-D
Studies in the History of Religion
Consult Department for offerings 1993-94.

RS 293A F 3C 0.5
Religious Experience of the Young
A multi-faceted examination of the religious development of the pre-adult, including such considerations as the moral, psychological, philosophical, sociological, sacramental and spiritual aspects.
Area 5

RS 294 J 1.0
Religion in the Canadian Context
This course will consist of a multi-disciplinary examination of some of the rich and complex factors that constitute the Canadian religious mosaic—social, historical, artistic, and political—with the intention of working toward a uniquely Canadian theology or religious vision.

RS 298
Directed Reading in Special Subjects

RS 299
Modern Study of Jesus
An examination of recent approaches to the study of Jesus of Nazareth to determine his significance for the beginnings of the Christian Church and for modern humankind.
Prereq: RS 100 F or consent of instructor
Area 3

RS 305A F 3C 0.5
Intermediate New Testament Greek
Prereq: RS 106 or consent of instructor
Area 3

RS 305B W 3C 0.5
Intermediate New Testament Greek
Prereq: RS 106 or consent of instructor
Area 3

RS 306A F 3C 0.5
Intermediate Biblical Hebrew
Reading and grammatical analysis of selected prose and poetic portions of the Hebrew Bible.
Cross-listed as R&C 206
Taught at WLU

RS 306B W 3C 0.5
Intermediate Biblical Hebrew
Continuation of RS 306A.
Cross-listed as R&C 256
Taught at WLU

RS 307A A-D
Selected Topics in Biblical Studies
Special topics will be offered in the Winter, 1993-94. Consult Department.

RS 308 F 3C 0.5
Old Testament Themes
An analysis and discussion of selected ethical, ritual, sociological and theological issues recurrent in Hebrew Scriptures, with attention to their historical meanings and contemporary relevance.
Area 3

RS 313 W 3S 0.5
Tradition and Change in Modern India
This course will examine, in the context of modern Indian history, intellectual and social issues in which a dialectic of change and continuity is revealed: e.g., Hindu nationalism and universalism, caste, untouchability, and the role of women.
Prereq: RS 102A or RS 213 or RS 269/FINE 218A, or consent of instructor
Area 1

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.
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 W 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 327 F 3C 0.5
Evangelical and Anabaptist Christianity
An historical and theological analysis of contemporary Christianity shaped by the Anabaptist/Baptist, Reformed, and Wesleyan tradition, with special focus on such issues as Biblical authority, the church, salvation, and ethics.
Area 4
Course Descriptions
Religious Studies

RS 331A W 3C 0.5
The Church in the Modern World
A study of the recent transformation of the
Roman Catholic Church through the
events, movements, personalities, and
historical realities of the past fifty years.
Area 2

RS 334 W 3C 0.5
Islamic Theology, Philosophy and
Mysticism
A survey of the development of Islamic
theology and philosophy from the begin-
ning of sectarianism to the dawn of the
20th century, and with a study of the con-
tribution of the mystics (sufis) to Islamic
thought. The course will introduce for
study various texts from representative
figures and schools of thought.
Prereq: RS 100A or 216, or consent of
instructor
Area 4

RS 351 W 3C 0.5
Religious Perspectives on the
Environmental Crisis
An examination of religious perspectives
on the environmental crisis, including an
analysis of what the various religious tradi-
tions have taught about caring for the cre-
ated universe. Special attention will be
given to the views of the native peoples of
Canada on responsibility for the creation,
and to religious resources for developing
an ethical stance on environmental issues
and a respect for nature.
Prereq: RS 100A, or RS 100B, or
consent of instructor
Area 4

RS 353 W 3C 0.5
The Bible and Peace
An examination of the unity and diversity of
biblical views of peace with attention to
their relevance for the various dimensions
of the contemporary quest for peace.
Prereq: RS 100E or 100F or consent of
instructor
Area 4

RS 369A-F
Study-Travel Seminar in Religion
Consult Department for offerings 1993-94

RS 369E S 1.0
Understanding the Middle East
This course introduces students to the
complex problems of living together in the
Middle East. It combines old and new by
dealing with points of special historical
interest and contemporary interactions
between Jews, Christians and Muslims.
Lectures abroad will be given by
specialists in their areas.
Prereq: RS 100B or equivalent, or
consent of instructor
Area 1

RS 370 F 3C 0.5
Dreams in Religious Experience
The course examines the place of dreams
in religious experience from ancient to
modern times. Present day advances in
understanding dream symbols will be
explored, as well as the possibility of
incorporating the use of dreams in one's
personal religious growth and
development.
Prereq: RS 271 or consent of instructor
Area 5

RS 371 W 3C 0.5
Religion and Suicidal Behaviour
A study of self-destructive behaviour and
its relation to relevant religious concepts.
The range of experience from illness to
suicide will be explored and related to the
concepts of guilt, hope and meaning in the
Christian faith.
Prereq: RS 271 or consent of instructor
Area 5

RS 372 W 3C 0.5
Theology of Marriage
A study of the development of the
theology of marriage in the Christian tradi-
tion.
Prereq: RS 236/256 or 281/282 or
consent of instructor
Area 4

RS 384 3C 0.5
Christian Hymnody
The origins and development of the
Christian hymn (including contemporary
hymn styles) considered as the dogmatic,
poetic, musical, cultural and spiritual
expression, and the use of hymns in a
variety of worship settings.
Prereq: MUSIC 100 or consent of
instructor
Cross-listed as MUSIC 363
Area 5

RS 390A-D 0.5
Studies In Religion
See Department for offerings 1993-94.

RS 398A-D F.W.S 0.5
Directed Reading in Special Subjects

RS 400A-H
Special Topics in Religious Studies
Special topics will be offered in 1993-94.
Consult Department.

RS 400A 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.
Prereq: Fourth-year standing and
consent of the Undergraduate Officer

RS 490B F.W 0.5
Honours Seminar
A continuation of the above.

RS 501-507 F.W R 0.5
Directed Research in Special Subjects

RS 598-599 W.S R 0.5
Directed Reading In Special Subjects

COURSES NOT OFFERED 1993-94
RS 208 The Parables of Jesus
RS 213 Hinduism
RS 229 The Cult of Mary
RS 257 Approaches to Peacemaking
RS 263 Justice, Peace and Development
RS 268A Religious Perspectives in
Contemporary Literature
RS 268B Religious Perspectives in
Contemporary Canadian Literature
RS 270 Psychology of Religion
RS 274 Religious Approaches to
Personal Crises
RS 281 Theology of Worship and
Sacrament
RS 282 New Perspectives in Sacramental
Theology
RS 290B The Just Society
RS 290C Gospel and Liberation
RS 2929 Women in the Church
RS 302 The Gospel of John
RS 309 Unity and Diversity in the New
Testament
RS 310 The Sacred Book of Islam
RS 311 Hindu Scriptures
RS 315 The Narrative Expression of
Canadian Native Religions
RS 316 Canadian Native Religious
Traditions
RS 318 Islam and Christiandom
RS 329 Mothers of the Church
RS 335 Modern Christian Thought
RS 336 Contemporary Theology
RS 339 Luther and Calvin: Reformation in
Theological Outline
RS 354 War and Peace in Christian
Theology
RS 355 Interreligious Encounter and
Dialogue
RS 356 Bioethics and Religious Values
RS 360 Religion and the Arts
RS 373 Folk Religion: Custom, Belief and
Ritual
RS 383 Shapers of the Roman Catholic
Tradition
RS 450A Study Term Abroad
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 of the Science 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.
Prereq: At least one year of Secondary School Physics

SCI 219 F 2C 0.5
Chemistry in Modern Society
The impact of chemistry on the environment and modern society will be discussed under such topics as carcinogens, lead pollution, chemical warfare, food additives, pesticides, contraception, ozone layer, "social" (marijuana, cocaine) and sport drugs. Topics vary from year to year.
Prereq: At least one year of Secondary School Chemistry

SCI 220 W,S 0.5
Chemistry of Pollution
A study of the chemistry involved in pollution problems encountered with consumer products and in selected industries. Progress on overcoming the pollution will be discussed with emphasis on the Chemistry. (Open to all interested students.)
Prereq: At least one year of Secondary School Chemistry
Available by Correspondence 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
Prereq: SCI 238

SCI 238 W,S 3C 0.5
Descriptive 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
Prereq: SCI 238 (SCI 237 is a more quantitative version of SCI 238.)

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
Prereq: 100-level Earth Sciences, Geological Engineering, or Physical Geography courses

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 F 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.

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SCIENCE

SCI 268 A-Z
Experimental Course
Occasional courses, for example taught by a visiting faculty member, or under development for future permanent status.
Liberal Science Core Course

SCI 270 W 3C 0.5
Nuclear Science
A non-mathematical general treatment of the following areas of nuclear Science: historical development and discovery of new fundamental particles; artificial transmutation of elements; nuclear sources of energy; biological effects of radiation and use of radioisotopes in industry, medicine and agriculture. The impact of nuclear science on social, economic and political systems will be discussed.
Prereq: At least one year Secondary School Chemistry or Physics

SCI 351 F,W,S 0.5
Human Biology 1
An introduction to selected topics in human physiology: the nervous system; sensation; muscles; the heart and circulatory system; blood; respiration.
Prereq: BIOL 273
Offered by Correspondence only

SCI 352 F,W,S 0.5
Human Biology 2
An introduction to selected topics in human physiology. Attention will be given to the areas of homeostasis, nutrition, digestion, reproduction and the endocrine hormones.
Prereq: BIOL 273
Offered by Correspondence only

SCI 355 F 2C 0.5
Biology of Cancer
An introduction to cell and developmental biology in relation to cancer in the human body.
Students whose major field is Biology may not take this course for credit.
Offered in 1992 and alternate years thereafter.

SCI 410 0.5
Technical Report
(For Students in all Co-op programs in Science)
Technical reports covering work-term assignments are submitted by all Co-op Science students. These will be carefully evaluated for technical content and writing ability. Students admitted to a Co-op program with advanced standing should consult with the Department of Co-operative Education regarding sequence of work terms and satisfaction of work report requirements. A word Grading system will be used and will range from Excellent to Unsatisfactory. This course will be added to the student's transcript at the completion of Year 4 and will be given 0.5 course credit; this credit is to be in addition to the regularly required number of course credits shown in the program listings.

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 which inhabit them.
Students whose major field is Biology may not take this course for credit.
Prereq: BIOL 450

SCI 454 W 2C 0.5
Biology 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.
Prereq: BIOL 451

SCI 462 F 3C 0.5
Biology of Food Production
A survey of world food production from the biologist’s viewpoint. Topics: nutrition; food chains; origins of agriculture; basic plants and animal food crops; primitive and modern scientific agricultural practices and the environmental implications of each.

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 201 A/B F,W 3C 0.5
Introduction to Sexuality and Sex Education
A multidisciplinary examination of human sexuality and sex education.
Offered at St. Jerome’s College
(Formerly ARTS 249A/B)

SMF 201A W 3C 0.5
Introduction to Sexuality and Sex Education 1
A broad multidisciplinary overview of perspectives on human sexuality.
(Formerly ARTS 249A)
Prereq: PSYCH 236 or consent of the instructor

SMF 201B W 3C 0.5
Introduction to Sexuality and Sex Education 2
A multidisciplinary examination of selected topics in human sexuality. The significant principles of sex education and some of its most relevant methods and programs will be discussed as well.
(Formerly ARTS 249B)
Prereq: SMF 201A or PSYCH 236 or consent of the instructor

SMF 202 A/B F,W 3C 0.5/0.5
Introduction to Marriage and the Family 1
A multidisciplinary examination of marriage and the family.
Offered at St. Jerome’s College
(Formerly ARTS 250A/B)

SMF 202A F 3C 0.5
Introduction to Marriage and the Family 1
A broad multidisciplinary overview of perspectives on marriage and the family.
(Formerly ARTS 250A)

SMF 202B W 3C 0.5
Introduction to Marriage and the Family 2
A multidisciplinary examination of selected topics exploring dynamics within marriage and the family.
(Formerly ARTS 250B)
Prereq: SMF 202A or consent of the instructor

SMF 301 A/B F,W 3C 0.5/0.5
Advanced Study of Sexuality and Sex Education 1 & 2
A multidisciplinary and detailed analysis of human sexuality and sex education.
Offered at St. Jerome’s College
(Formerly ARTS 349A/B)

SMF 301A F 3C 0.5
Advanced Study of Sexuality and Sex Education 1
A detailed analysis of various disciplinary perspectives on human sexuality.
(Formerly ARTS 349A)
Prereq: SMF 201A or PSYCH 236 or consent of the instructor
SMF 301B 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.
(Formerly ARTS 349B)
Prereq: SMF 301A or consent of the instructor

SMF 302A/B F,W 3C 0.5/0.5
Advanced Study of Marriage and the Family
An interdisciplinary and detailed analysis of marriage and the family.
Offered at St. Jerome's College
(Formerly ARTS 350A/B)

SMF 302A F 3C 0.5
Advanced Study of Marriage and the Family 1
A detailed analysis of various disciplinary perspectives on marriage and the family.
(Formerly ARTS 350A)
Prereq: SMF 202A or consent of the instructor

SMF 302B 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.
(Formerly ARTS 350B)
Prereq: SMF 302A or consent of the instructor

SMF 303A/B F,W 3C 0.5/0.5
Introduction to Marriage and Family Therapy
An introductory course in clinical intervention in marriage and the family.
Offered at St. Jerome's College

SMF 303A 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 202A or consent of the instructor

SMF 303B W 3C 0.5
Introduction to Marriage and Family Therapy 2
Starting from the theoretical basis established in SMF 303A, this course will give students an idea of the practice of marriage and family therapy by having them observe (through viewing videotapes and films) clinical interventions in families and having them role-play strategies for such interventions.
Prereq: SMF 303A or consent of the instructor

SMF 402 F 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 301B or consent of the instructor

SMF 403 W 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 302B or consent of the instructor

ISS 131R W 3C 0.5
Social Work, Social Policy and Politics I
A practical 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.
Prereq: SMF 302A or consent of the instructor

ISS 150R F,W 3C 0.5
LifeSpan Processes: The Normal Events
An examination of the significant psychosocial events during the lifespan with consideration of the impact of crises. Topics may include attachment, loss, stress, identity crisis, role change, mid-life transition.

ISS 220R F,S 3C 0.5
Changing Concepts of Childhood
Childhood has changed as a social and cultural concept. This course will trace these changes, examining sociological, psychological, cross-cultural, historical and political factors. Art and literature will also be used to reflect attitudes about childhood.

ISS 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.
Prereq: Second year standing and at least two term courses in the social sciences or consent of the instructor
See overlapping content note (Grading Systems, item 7) on page 9/7
Course Descriptions
Social Development Studies

ISS 251R W 3C 0.5
Social Research
Introduction to the philosophy and methodology of applied social science research including treatment of the problems and strategies of research design and execution.
Prereq: Second year standing and at least two term courses in the social sciences or consent of the instructor
ISS 250R or its equivalent also recommended.
See overlapping content note (Grading Systems, Item 7) on page 9:7

ISS 320R F 3C 0.5
Critical Encounter with Human Nature
An attempt to increase students' understanding of human nature and deepen their awareness of some fundamental issues in 20th-century life. The approach is interdisciplinary with emphasis on such themes as the meaning of self-knowledge, loneliness and anxiety, freedom and purpose in human life, and the nature of human happiness.
Prereq: Courses in at least one of the Social Sciences or Philosophy, or consent of instructor

ISS 350D W 3C 0.5
Adult Life Crises and Events
A study of normal events occurring during the adult years, why they happen and how we cope with them. Relying on research, popular literature, and life experiences, students examine social change, the future, adult development and adjustment.
Prereq: ISS 150R or consent of instructor

ISS 350E 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.
Prereq: Second-year standing

ISS 35JH S 3C 0.5
Values and the Contemporary Family
An exploration of how religious, economic, political and other social institutions shape values in our society, and what impact society's changing values are having upon marriage and the family.
Prereq: At least two social science courses
Cross-listed as SOCWK 350H

ISS 398R/399R F,W,S R 0.5/0.5
Independent Study
Interdisciplinary focus, in greater depth than is available in other courses. On a selected area of concern to the student. Available to individuals or small groups of third or fourth year Social Development Studies students and arranged with one of the program's faculty members.
Prereq: Permission of Undergraduate Office

ISS 499A/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.
Prereq: Open to senior honours students only
A letter grade for ISS 499A will be submitted only after the completion of ISS 499B

PSYCHOLOGY

PSYCH 120R F 3C 0.5
Introductory Psychology
Basic concepts and techniques of modern psychology as a behavioural science, with special emphasis on social aspects of behaviour. Topics may include the nervous system, perception, learning, memory, cognition, motivation, emotion, development, personality, social influences, psychopathology and psychotherapy.
Students may receive credit for only one of PSYCH 120R or PSYCH 101

PSYCH 121R W 3C 0.5
Introductory Psychology (Special Topics)
A continuation of PSYCH 120R with in-depth study of some selected topics.
Prereq: PSYCH 120R

PSYCH 322R F 3C 0.5
Personality Theory
An examination of the major theories of personality including consideration of the psychoanalytic, dispositional, humanistic, and behaviouristic models.
Prereq: An introductory Psychology course
Cross-listed as PSYCH 355
Students may receive credit for only one of PSYCH 322R or 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 357
Students may receive credit for only one of PSYCH 323R or 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 398R/399R F,W,S R 0.5/0.5
Independent Study
An independent in-depth study of a selected area of concern to the student within the discipline of 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 Undergraduate Office

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. Historic development of Social Work and its influence on contemporary practice is reviewed.
SOCWK 220R  F.S  3C  0.5
Social Casework 1
A presentation of some of the theoretical constructs necessary for an understanding of the individual in the casework relationship, as well as an introduction to some appropriate casework interventions. Emphasis in the course will be theoretical.
Prereq: SOCWK 120R or consent of instructor

SOCWK 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,W,S  3C  0.5
Community Organization 1
An examination of social work practice as it relates to functional and geographical communities. The course will explore the theoretical foundations of organization practice as well as a variety of models.
Prereq: SOCWK 120R or consent of instructor

SOCWK 240R  F  3C  0.5
Palliative Care
An introduction to the concepts and practices in palliative care. Topics include historical and philosophical background, the hospice movement, current approaches in palliative care, the multi-discipline team, stress factors, suicide and cross-cultural beliefs of death, illness and loss as they affect the terminally ill and their families.
Prereq: SOCWK 120R or consent of instructor

SOCWK 320R  W  3C  0.5
Social Casework 2
Considers some of the intellectual components of the social work skills necessary for working with individuals. Social work theories of the individual will be examined in order for the student to learn some clinical applications relevant to the casework relationship.
Prereq: SOCWK 220R or consent of instructor

SOCWK 321R  F,W,S  3C  0.5
Social Work with Families
Presentation of some of the theoretical constructs necessary for an understanding of the family in the social work relationship as well as an introduction to methodology and interventions.
Prereq: SOCWK 120R or consent of instructor

SOCWK 322R  W  3C  0.5
Community Organization 2
An investigation of methods and models of social work intervention used in the process of change as it affects functional and geographic communities. Canadian examples of organizational processes and collective action of citizen groups, neighbourhoods, welfare recipients, ethnic minorities, employees, political parties and public housing tenants.
Prereq: SOCWK 222R

SOCWK 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 or consent of instructor

SOCWK 350D  F  3C  0.5
Social Casework 3
Casework treatment issues categorized according to the character styles of clients will be examined in depth. The client's mode of functioning and symptom presentation and appropriate treatment strategies will be assessed through readings, clinical example and process recordings.
Prereq: SOCWK 320R and consent of instructor

SOCWK 350E  F  3C  0.5
Social Casework Techniques
Theoretical and practical consideration of conceptual and interpersonal techniques relevant to the practice of clinical social work. Topics may include formation and use of case histories, interviewing, treatment plans, therapist-client contracts, process-recording, client disengagement.
Social Work Diploma students only

SOCWK 350F  F  3C  0.5
School Social Work
The history, theory and practice of school social work in North America, particularly in Ontario. Applying theories to cases, students learn how the school social worker helps children confront problems like family breakdown and school phobia.
Prereq: SOCWK 120R

SOCWK 350H  S  3C  0.5
Values and the Contemporary Family
An exploration of how religious, economic, political and other social institutions shape values in our society, and what impact society's changing values are having upon marriage and the family.
Prereq: At least two social science courses
Cross-listed as ISS 350H

SOCWK 355R  FJ  3C  0.5
Child Maltreatment: Identification and Prevention
The objectives of this course are to provide an understanding of the dimensions and causes of child maltreatment, to develop skills identifying cases of this social problem and to explore current methods of management and treatment of persons involved in child maltreatment situations.
Prereq: SOCWK 120R or consent of instructor

SOCWK 356R  F  3C  0.5
Mental Retardation and the Family
A critical application of social work theory to real situations involving the social, emotional and physical functioning of the family that has a mentally retarded member. Will also include consideration of the impact of current social policies.
Prereq: SOCWK 120R or consent of instructor

SOCWK 357R  W.J  3C  0.5
Family Violence
An application of the principles and models of medical, psychogenic, and sociogenic adjustment to an understanding of family violence. The treatment of victims of family violence, the prevention of such violence, and social policies affecting family welfare are considered.
Prereq: SOCWK 120R or consent of instructor

SOCWK 358R  W  3C  0.5
Social Development Studies
A critical analysis of the development of societal organizations, policies, values and beliefs as they affect functional and geographical communities. Examination of the role of groups in social change and their relationships to political and social institutions.

SOCWK 359R  WJ  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/J 3C/3C 0.5
Family Violence: An Advanced Seminar
Social Work concepts and practices introduced in preceding family violence courses will be considered in depth. Over the course of two terms a seminar format will be used to explore etiological and intervention issues pertaining to the various forms of family violence.
Prereq: SOCWK 355R and 357R or consent of instructor
A letter grade for SOCWK 390A will be submitted only after the completion of SOCWK 390B

SOCWK 398R/399R F,W,S R 0.5/0.5
Independent Study
An independent in-depth study of a selected area of concern to the student within the discipline of Social Work. Available to individuals or small groups of third or fourth year Social Development Studies students and arranged with one of the faculty members from the program.
Prereq: Permission of Undergraduate Officer

SOC 120R W 3C 0.5
Fundamentals of Sociology
An examination of the fundamental concepts of Sociology and their application in seeking to understand the changing patterns and life-styles taking place specifically in Canada, and in general, within North American society.

SOC 223 S.F. 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 367R F 3C 0.5
The Sociology of Disability
Examination of the social adaptations of the disabled. Particular attention is given to the theoretical traditions which considers disability as a form of involuntary deviance which stigmatizes the individual.
Prereq: An introductory Sociology course

SOC 368R W 3C 0.5
The Sociology of Spoiled Identity
Spoiled identity resulting from deviant status inhibits if not prevents acceptance and social mobility. Consequences of spoiled identity, lowered status positions and deviant criminal and "social" adaptations are examined from a symbolic interactionist perspective.
Prereq: An introductory Sociology course

SOC 369R F 3C 0.5
Custodial and Rehabilitative Institutions
"Total institutions" are concerned with resocialization of "inmates". This course considers the structure of maximum security prisons, mental hospitals, isolated work environments and concentration camps, emphasizing their philosophies, their organization, their goals, and their effectiveness in modifying and controlling behaviour.
Prereq: An introductory Sociology course

SOC 398R/399R F,W,S R 0.5/0.5
Independent Study
An independent in-depth study of a selected area of concern to the student within the discipline of 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 Undergraduate Officer

COURSES NOT OFFERED 1993-94
ISS 221R Social Ideas, Social Policy and Political Practice 2
ISS 240R Art and Society
ISS 350F Values in the Social Sciences
ISS 350L Individualism and the Family Life Cycle
PSYCH 222R Social Psychology
PSYCH 221R Interpersonal Interaction
PSYCH 369R Advanced Topics in Counselling Psychology
SOC 222R The Individual, Society and Religion
SOC 221R Master Trends in Modern Society
SOC 327R Minority Status in Canadian Society
SOC 328R Canadian Ethnic and Cultural Minorities
SOCWK 121R 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.

Society, Technology and Values

Undergraduate Officer
S.C. Lerner, 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
COURSE NOT OFFERED 1993-94

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, third-world issues, approaches to management and environmental issues. The overriding purpose of the course is to develop critical thinking skills and awareness about design as something involving societal and value concerns rather than a purely technical matter.
Prereq: None

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

STV 402 W 0.5
Technology and Canadian Society
Technology is presented as a fundamental part of Canadian and Canadian society from the years predating sustained European contact to the present. Through an appreciation of the roles of technology and engineering in defining and expressing 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.
Prereq: None
Intended for third- and fourth-year students

STV 200 Society, Technology and Values: Group Projects

Course Descriptions
Society, Technology and Values
Sociology

Sociology

Undergraduate Officer
F. Fasick, PAS 2065, ext. 2109
Introductory Note
Not all courses listed in this section are available. Please consult the 1993-94 Course Offerings List or the Department for current course information.

Courses not offered in the current academic year are listed at the end of this section.

SOC 101 2C 0.5
Introduction to Sociology
An introduction to the basic concepts and frames of reference of sociological investigation and interpretation. Topics for analysis will include communities, associations and institutions, classes and status groups, crowds and publics, social processes, and social change. Special attention is given to Canadian society.
Prereq: SOC 101 or consent of instructor

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

SOC 201 2C 0.5
Victims and Society
The course will examine the substance of victimization: the scientific study of victims, the process, etiology and consequences of victimization. Topics will include victims and politics, the victims movement, "Victim-preparation", the victimization of women and family violence.
Prereq: SOC 101 or consent of instructor

SOC 202 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 203 2C 0.5
Sociology of Education
Attention will be focused on the concepts and theories of sociology as they apply especially to the educational system. This course is designed for Co-op and Regular students who plan to enter the teaching field.
Prereq: SOC 101 or consent of instructor

SOC 204 2C 0.5
Sociology of Family
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 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 Family
Attention will be focused on the concepts and theories of sociology as they apply especially to the educational system. This course is designed for Co-op and Regular students who plan to enter the teaching field.
Prereq: SOC 101 or consent of instructor

SOC 209 2C 0.5
Family Origin and Personal Identity
This course focuses on the intersection of biography and social structure within the family. Application of sociological theory and methods to students' own family backgrounds will be used to illustrate the social bases of identity.
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
Also offered at Renison College

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

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 225 2C 0.5
Juvenile Justice
An examination of theories of juvenile justice, juvenile law, and the structure and operations of juvenile systems, especially in Canada.
Prereq: SOC 222 or consent of instructor

SOC 227 2C 0.5
Criminology
An analysis and criticism of the major theories of criminal behaviour. Emphasis is given to the relationship between social structure and criminal behaviour; types of criminal behaviour such as drug addiction, burglary and homicide in contemporary society. Special attention is given to Canadian data.
Prereq: SOC 101 or consent of instructor
Offered at St. Jerome's College

SOC 228 2C 0.5
Sociology of Corrections
Decisions to process offenders and the role of social factors in the Canadian criminal justice system are critically examined. Focal issues include police discretion, the legal profession and prison systems.
Prereq: SOC 101
Offered at St. Jerome's College

SOC 231 2C 0.5
Sociology of Science
An examination of the social character of the development of science and the production of scientific knowledge. Specific topics will include defining science, cultural influences on the rise of science, the social nature of scientific institutions, selective bias in scientific procedures, and the social "construction" of scientific "facts."
Prereq: SOC 101 or consent of the instructor

SOC 232 2C 0.5
Technology and Social Change
This course relates the prospect of social change to issues such as the division of labour, automation, technology and sociology. "Post-industrial" society, small scale technology, workers' control and the domination of nature.
Prereq: SOC 101

SOC 233 2C 0.5
Social Psychology of Beliefs and Attitudes
Examines the sources, organization and distribution of beliefs and attitudes and their significance for the individual and society.
Prereq: SOC 101 or PSYCH 101 or consent of instructor

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 236 2C 0.5
Social Movements
The analysis of varieties of social movements and their relationships to social organization and social change.
Prereq: SOC 101 or consent of instructor

SOC 237 2C 0.5
Collective Behaviour
The sociological analysis of the behaviour of crowds, mobs, publics and related phenomena and their relationships to social organization and social change.
Prereq: SOC 101 or consent of instructor

SOC 238 2C 0.5
Sociology of Marketing and Sales
This course considers the (social) processes by which people "do business". Focusing on day to day exchanges, ongoing relationships within the business and consumer community are examined from an interactionist perspective.
Prereq: SOC 101 or consent of the 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

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 permission of the 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
Population in Canadian Society
Study of the basic demographic processes in the population of Canada. Demographic implications for selected social institutions. Use of Canadian enumeration and registration data.
Prereq: SOC 101 or consent of instructor

SOC 254 2C 0.5
Psychology 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 255 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 256 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 258 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 259 2C 0.5
Introductory Sociological Theory
An examination of the content 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 260 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 307 2C 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
Offered at Conrad Grebel College
### Course Descriptions

**Sociology**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Title</th>
<th>Prerequisites</th>
</tr>
</thead>
<tbody>
<tr>
<td>SOC 310</td>
<td>2S 0.5 Seminar in Group Dynamics</td>
<td>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</td>
</tr>
<tr>
<td>SOC 311</td>
<td>2C 0.5 Sociology of the Body</td>
<td>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</td>
</tr>
<tr>
<td>SOC 321</td>
<td>F,W C 0.5 Methods 1</td>
<td>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</td>
</tr>
<tr>
<td>SOC 322</td>
<td>2C 0.5 Methods 2</td>
<td>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</td>
</tr>
<tr>
<td>SOC 325</td>
<td>2C 0.5 Female Sexuality and the Law</td>
<td>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 the instructor</td>
</tr>
<tr>
<td>SOC 328</td>
<td>3C 0.5 Sentencing as a Social Process</td>
<td>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</td>
</tr>
<tr>
<td>SOC 329</td>
<td>2C 0.5 Crime as Business</td>
<td>Examines the inter-relatedness of crime and business, looking not only at the extent to which (1) crime represents business for its practitioners and (2) the criminal activities of legitimate business people, but also (3) the agencies regulating crime. Prereq: SOC 101 and 1 Sociology course in the 220 series</td>
</tr>
<tr>
<td>SOC 333</td>
<td>2C 0.5 Canadian Multiculturalism</td>
<td>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</td>
</tr>
<tr>
<td>SOC 336</td>
<td>2C 0.5 Sociology of Professions</td>
<td>An examination of the distinctive nature of professions; professional recruitment, socialization and identification; professional careers; the professionalization of occupations; relationship to government; professional specialization; status, power and mobility of professionals. Prereq: SOC 101 or consent of instructor</td>
</tr>
<tr>
<td>SOC 340</td>
<td>2C 0.5 Complex Organizations</td>
<td>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</td>
</tr>
<tr>
<td>SOC 342</td>
<td>2C 0.5 Sociology of Industrial Relations</td>
<td>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</td>
</tr>
<tr>
<td>SOC 344</td>
<td>3C 0.5 Sociology of Aging</td>
<td>An introduction to individual and population aging. Topics discussed include: aging from an historical and comparative perspective; aging in subcultures; aging and the social structure; aging and social processes: aging and the environment; work and retirement; and aging and leisure patterns. Prereq: SOC 101 and 1 other Sociology course Cross-listed as GERON 344/KIN 352</td>
</tr>
<tr>
<td>SOC 347</td>
<td>3C 0.5 Sociology of Leisure</td>
<td>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</td>
</tr>
<tr>
<td>SOC 364</td>
<td>2C 0.5 Social Change</td>
<td>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 Also offered at St. Jerome's College</td>
</tr>
<tr>
<td>SOC 366</td>
<td>2C 0.5 Urban Sociology</td>
<td>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</td>
</tr>
</tbody>
</table>
SOC 366 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. Local judges, lawyers and police officials are invited to discuss such issues as the jury system, police and violence, civil rights and mass media.  
Prereq: Third-year standing or by permission  
Offered at Conrad Grebel College

SOC 371 3C 0.5  
Philosophy of Social Science  
Problems about the fundamental methods and aims of the social sciences generally, the problems specific to Psychology, Sociology, Political Science, etc., and their relations to one another will be considered.  
Prereq: Some previous work in a Social Science or in Philosophy  
Cross-listed as PHIL 362

SOC 378 3C 0.5  
Sociology of Women  
An examination of the growing sociological literature on women's roles, experiences, realities, problems and challenges. Particular emphasis is placed on critiques of traditional sociological theory and methodology and the emergence of new theories and methodologies which better reflect women's experiences.  
Prereq: SOC 101 and 206, or consent of instructor

SOC 382 3C 0.5  
Survey Methodology  
The design of sample surveys. Survey procedures from the conceptual level through sampling, measurement, questionnaire design, administration and analysis of responses are illustrated within the context of practical examples and student projects.  
Prereq: SOC 321 or consent of instructor

SOC 401 2S 0.5  
Theoretical Perspectives on Gender  
An examination of sociological theories of gender and gender relations. Emphasis is placed on tracing historical changes in interpretations of gender, with a particular consideration of contemporary theoretical debates. Approaches to be considered include feminist theories as well as political economy and cultural studies.  
Prereq: SOC 101 and 206 or consent of instructor

SOC 404 2S 0.5  
Sociology of Knowledge  
The seminar undertakes to develop a general theory of the relation of social thought to social action, comparative value systems and the role of the scientist, artist and intellectual in society.  
Prereq: SOC 101 or consent of instructor; SOC 231 is recommended

SOC 405 2C 0.5  
The Development of Sociological Theory  
Analysis of selected original writings by the major figures in the classical sociological tradition of the 19th- and 20th-centuries; in particular, Marx, Durkheim and Weber. Also includes discussions of pertinent critical literature.  
Prereq: SOC 101 and 305

SOC 406 2C 0.5  
Contemporary Sociological Theory  
Development of sociological theory in the 20th-century. Included is discussion of current theoretical work.  
Prereq: SOC 305

SOC 407 2S 0.5  
Canadian Sociological Thought  
We examine the development of sociological theory in Canada by focusing on major historical and contemporary figures and theories representative of English-language sociology. We examine, in addition, sociologically important scholars and schools of thought in history and political economy as well as selected developments in French-language Canadian sociology.  
Prereq: SOC 305 or consent of instructor

SOC 408 2S 0.5  
Contemporary Debates in Sociological Theory  
Deals with recent controversies in sociological theory; e.g. Giddens' theories of structuration and the state; critical theory, including the works of Habermas on communicative action; postmodernist theory; the positivist/interpretive debate and varieties of psychoanalytic theory.  
Prereq: SOC 101 and 305

SOC 410 2C 0.5  
Qualitative Methods: Field Research  
An application of symbolic interactionist theory, this course examines the contingencies affecting data collection and analysis of ongoing group life. While doing field work, students have an opportunity to examine basic features of interactionist thought.  
Prereq: SOC 101

SOC 415 2C 0.5  
Social Networks  
A survey of applications of the concept of the network in studying social structures. Examples will be drawn from diverse areas, such as interpersonal relations, community studies, social support, inter-organizational relations, elites, deviant groups, etc.  
Prereq: SOC 101 or consent of instructor

SOC 421 2C 0.5  
Quantitative Methods  
Design and data analysis in contemporary sociological research, with an emphasis on the analysis of secondary data and computer applications.  
Prereq: SOC 280 and 321

SOC 430 2S 0.5  
Political Participation  
An examination of the social psychological foundations of Canadian participation, broadly conceived, in the political system.  
Prereq: Third- or fourth-year social science or consent of instructor

SOC 435 3S 0.5  
Environmental Sociology  
Inquiry into the relationship between the natural environment and society. Review of issues relating to technology, social change, politics of environmental reform, factors that contribute to environmental - resource conflict and policy.  
Prereq: SOC 280, plus third- or fourth-year standing or permission of the instructor

SOC 459 2S 0.5  
Sociology of Work and Occupations  
This seminar examines major theoretical perspectives and issues in the sociology of work.  
Prereq: One of SOC 228, 241, 242, 243, or 342

SOC 498A-X 0.5  
Directed Studies  
Selected study and assignments under the direction of a faculty member.  
Prereq: Fourth-year standing in Sociology
Spanish

Course Descriptions
Sociology
Spanish

Spanish

Undergraduate Officer
M. Gutiérrez, M.I, ext. 3658

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 I
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 101/151-40)

SPAN 102 W 3C,1L 0.5
Introduction to Spanish 2
A continuation of SPAN 101.
Prereq: SPAN 101 or consent of the Department
(WLU 101/152-40)

SPAN 201A F 3C,1L 0.5
Intermediate Spanish I
For students with some knowledge of Spanish. Seeks to reinforce the language, both oral and written, through selected texts and grammar review. Language laboratory also used to increase understanding and speaking skills.
Prereq: SPAN 102 or consent of the Department
(WLU 121/171-30)

SPAN 201B W 3C,1L 0.5
Intermediate Spanish 2
A continuation of SPAN 201A
Prereq: SPAN 201A or consent of the Department
(WLU 122/172-03)

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
Prereq: SPAN 201B
(WLU 205/255-30)

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
Prereq: SPAN 205
(WLU 209/256-03)

SPAN 217 F 3C 0.5
Latin American Civilization 1
A survey of the geography, history and problems of Latin America from pre-Columbian times to the present.
Taught in English
(WLU 223/282-03)

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 233/283-03)

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.
Prereq: SPAN 218
(WLU 208/258-30)

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 such renowned authors as Neruda, Borges and García 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.
Prereq: SPAN 227
(WLU 209/259-03)

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 skilfull translations.
Prereq: SPAN 201B or consent of the Department
(WLU 211/261-30)
SPAN 251 B  W  3C   0.5
Composition and Conversation 2
A continuation of SPAN 251A.
Prereq: SPAN 251A
(WLU 212/262-03)

SPAN 265 F  3C   0.5
The Spanish Short Story
Selected stories from outstanding writers in Spain, primarily of the 20th century. The chosen authors are representative of the most significant literary movements of the 19th and 20th centuries. Among the authors studied are V. Blasco Ibáñez, Miguel de Unamuno, Pio Baroja, Azorín, Gabriel Miró, Camilo José Cela, Carmen Laforet, Miguel Delibes, Ignacio Aldecoa, Ana María Matute, Carmen Martín Gaite, Max Aub.
(WLU 204/254-3)

SPAN 266 W  3C   0.5
The Latin American Short Story
A study of selected stories by Latin American writers. The chosen stories are part of a literature in which the themes of "magical-realism", exile, national identity, history, metaphysical fantasy and social struggle never stop flourishing. Some of the authors studied in this course are Juan Rulfo, Jorge L. Borges, Carlos Fuentes, G. García Márquez, Isabel Allende.
(WLU 214/264-03)

SPAN 232 F  2C   0.5
The Generation of '38: Fiction
A study of selected works of Valle Inclán, Azorín, Baroja and Unamuno.
Prereq: SPAN 206
(WLU 322/372)

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 308/358)

SPAN 344 FW  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 317/467-20)

Course Descriptions
Spanish
Statistics

SPAN 351 A  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 251 B
(WLU 212/262-03)

SPAN 351 B W  2C   0.5
Advanced Composition and Conversation 2
A continuation of SPAN 351A.
Prereq: SPAN 351 A
(WLU 302/352-02)

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 228 or consent of Department
(WLU 329/479-20)

COURSES NOT OFFERED 1993-94
SPAN 304 Romance in Spain
SPAN 305 The Spanish Realist Novel
SPAN 311 A Applied Spanish Stylistics 1
SPAN 311 B Applied Spanish Stylistics 2
SPAN 324 Contemporary Spanish Theatre and Poetry
SPAN 325 Contemporary Spanish Novel
SPAN 326 The Spanish Golden Age: Theatre and Poetry
SPAN 331 Contemporary Spanish Essay
SPAN 333 Modern Latin American Poetry
SPAN 387 Latin American Women Writers
SPAN 388 Contemporary Spanish American Theatre
SPAN 445 History of the Spanish Language
SPAN 495 The Novel in México

Statistics

Undergraduate Officer
J.C. Robinson, MC 6030, ext. 4493

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  2C,1L  0.5
Elementary Statistics for Biologists
Elementary probability, populations, samples and distributions with biological examples. Methods for data summary and presentation, estimation, hypothesis testing, two-sample techniques and paired comparisons, regression, correlation.
For Science students only

STAT 204 F  2C,1L  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
Anrereq: 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 3C,1T 0.5
Statistics
Estimation, tests of significance, probability plots. Contingency tables, normal distribution theory, simple linear regression.
Prereq: MATH 237, and STAT 230
Antireq: STAT 221, 241
Also offered at St. Jerome's College in the Winter term

STAT 240 F 3C 0.5
Probability
STAT 240 is an advanced-level enriched version of STAT 230.
Prereq: MATH 138
Antireq: STAT 220, 230

STAT 241 W,S 3C 0.5
Statistics
STAT 241 is an advanced-level enriched version of STAT 231.
Prereq: MATH 237, and STAT 230
Antireq: STAT 221, 231

STAT 304 W 3C,1L 0.5
Statistics for the Physical Sciences 2
Linear regression. Introduction to the design of experiments. Completely randomized and randomized block designs. Analysis of variance.
Prereq: STAT 202 or 204
For Science students only

STAT 311 F,W 3C,1T 0.5
Regression and Forecasting for Accounting
Prereq: STAT 211
Open only to students from the School of Accountancy

STAT 321 W 3C,1T 0.5
Applied Regression Analysis
Prereq: STAT 221
Not open to Honours Mathematics students
Antireq: STAT 331

STAT 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 332

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 321

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 221 or equivalent
Antireq: STAT 332

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 the 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 queuing 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. Contouring and fractional replication. Selected topics.
Prereq: STAT 331 or consent of instructor

STAT 431 W 3C 0.5
Advanced Regression Models and their Application
Review of the normal linear model and maximum likelihood estimation; regression models for binomial, Poisson and multinomial data; generalized linear models; and other topics in regression modelling.
Prereq: STAT 331 or consent of instructor

STAT 433 F 3C 0.5
Stochastic Processes
Point processes. Renewal theory. Stationary processes. Selected topics.
Prereq: STAT 333 or consent of instructor

STAT 440 F 3C 0.5
Statistical Computing
Problems associated with the analysis of stochastic systems and statistical data by computer; simulation techniques, numerical algorithms, programming for statistical problems and statistical packages.
Prereq: STAT 331
Course Descriptions
Systems Design Engineering

STAT 443 W 3C 0.5
Forecasting
Prereq: STAT 331 or consent of instructor

STAT 450 W 3C 0.5
Estimation and Hypothesis Testing
Discussion of general inference problems under the headings of point and interval estimation, hypothesis testing and decision theory. Large sample normal likelihoods, maximum likelihood estimation, theory of UMV estimation, least squares, Neyman-Pearson theory of hypothesis testing.
Prereq: STAT 330

STAT 464 0.5
Topics in Probability Theory
Prereq: STAT 333 or consent of instructor
May not be offered 1993-94

STAT 466 0.5
Topics in Statistics 1
Prereq: STAT 330 and 331, or consent of instructor
May not be offered 1993-94

COURSES NOT OFFERED 1993-94

STAT 444 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

5 physical systems
6 the design of engineering systems
7 communication and information systems
8 engineering sciences
9 laboratories
c) The number in the 100's place generally refers to the year in the program in which the student will encounter the course.

2. The majority of Systems Design courses are given on the basis of 3 formal lectures and 1 tutorial hour each week. The department endeavours to ensure that the formal course schedule remains below 30 hours per week in each term. Beyond this, other, less formally scheduled, meetings between students and faculty are required. It is expected that the average student will spend, in total, between 45 and 55 hours per week on her/his studies.

SY DE 101/102 FS 1C 0.0
Tutorial
Systems Design first year students will meet with a faculty member designated as their class professor. Performance in assignments, conceptual difficulties with courses, interaction of coursework, later work and engineering practice will be discussed. Non-credit courses.

SY DE 111 F 3C,1T 0.5
Calculus 1
The limit, continuity, and inverse functions. Integral calculus: fundamental theorems, integral as an area, indefinite integrals, methods of integration. Areas, volume, work, impulse and energy; polar coordinates; sequences, series and convergence.

SY DE 112 S 3C,1T 0.5
Calculus 2
Intermediate and mean value theorems, L'Hôpital's rule, Taylor/Maclaurin and other power series, convergence and applications. Functions of two variables, partial derivatives. Jacobian, gradient, extremum, series.

SY DE 114 S 3C,1T 0.5
Linear Algebra

SY DE 121 F 3C,1T 0.5
Digital Computation
Computer systems, problem solving, data and programs, structured programming, arrays, matrices and pointers, correct and efficient algorithms, data structures.

SY DE 142 S 3C,1T,3L (alt. weeks) 0.5

SY DE 161 F 3C,1T,3L 0.5
Introduction to Systems Design Engineering

SY DE 181 F 3C,1T 0.5
Physics 1 (Statics)

SY DE 182 S 3C,1T 0.5
Physics 2 (Dynamics)

SY DE 183 F 3C,1T 0.5
Chemistry

SY DE 192 S 3C,1T,2L 0.5
Digital Systems
Digital technology, combinatorial logic, binary arithmetic, synchronous sequential circuits, design methodology, algorithmic state machines, microcomputer interfacing.

SY DE 201/202 W,F 1C 0.0
Tutorial
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.

Systems Design Engineering

Undergraduate Officer
M.E. Jemigan, ext. 4646

Introductory Notes
1. The numbering of Systems Design Engineering courses is as follows:
a) If the course is given in the "A" term, the number in the units place is odd; otherwise, it is even.
b) The number in the 10’s place refers to the field of the subject matter of the course, according to the following codes:
   1 topics in applied mathematics
   2 computer systems
   3 socio-economic systems
   4 human systems
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 231 W 3C,1T 0.5
Engineering Economics
This course is designed to satisfy Engineering Economics requirements of the Canadian Engineering Accreditation Board. Price and output decisions. Choosing among alternative inputs and production processes. Evaluating alternative investments, equipment service life, and new products.

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 (Electrostatics, 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 S,W 1C 0.0
Tutorial
Systems Design third year students will meet with a faculty member designated as their class professor. Performance in assignments, conceptual difficulties with courses, internation of coursework, later work and engineering practice will be discussed. Non-credit courses.

SY DE 311 S 3C,1T 0.5
Engineering Optimization

SY DE 312 W 3C,1T 0.5
Numerical Methods
Introduction to numerical techniques for engineering problems. Topics covered include: source of computational errors, 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 321 S 3C,1L 0.5
Software Engineering
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 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 334 W 3C 0.5
Applied Statistics
Multiple regression analysis. Assumptions, use of indicator variables, variable selection techniques, analysis of variance. Introduction to experimental design, including block designs, factorial arrangements of treatments.

SY DE 342 W 3C,1L 0.5
Industrial Ergonomics
Introduction to Control Systems

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.

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.


Introduction to Pattern Recognition
Pattern recognition as a process of data analysis. Pattern features as components in a random vector representation. Classification techniques: distance measures in feature space, probabilistic (Bayesian) decision theory, linear discriminants. Clustering and feature extraction. Applications: optical character recognition, speech recognition, industrial robot vision, medical diagnosis, remote sensing and satellite image analysis, fault detection and diagnosis in complex systems such as nuclear reactors.

Thermodynamics
An introductory course in engineering thermodynamics structured for students in Systems Design. Classical thermodynamics is presented as the systematic study of energy; its use, degradation, and waste. Applications focus on problems of energy and environment. The concepts of statistical thermodynamics are introduced briefly and their connections with information theory are described.

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.

Introduction to the understanding of random processes and their analysis. Pattern features as components in a random vector representation. Classification techniques: distance measures in feature space, probabilistic (Bayesian) decision theory, linear discriminants. Clustering and feature extraction. Applications: optical character recognition, speech recognition, industrial robot vision, medical diagnosis, remote sensing and satellite image analysis, fault detection and diagnosis in complex systems such as nuclear reactors.

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.

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.

Occupational and Environmental Systems Safety
SY DE 446 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 current clinically used medical imaging techniques are covered.

The major physiological systems covered include the neuromuscular, cardiovascular and respiratory systems. Imaging techniques analyzed include X-ray, CT Scan, ultrasound, magnetic resonance imaging and positive emission tomography.

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, multipport 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 components; 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 theoretic 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 574 W 3C,1T 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

Women's Studies

Undergraduate Officer
H.D. Lyons, PAS 3017, ext. 2860

W S 200
Introduction to Women's Studies
An interdisciplinary survey introducing students to the questions which have been posed concerning the nature, roles, problems and accomplishments of women. The diversity as well as the commonalities of women's experience in Canada and elsewhere will be explored. Special attention will be given to changes in women's roles and expectations and the reflection of these changes in scholarship and the creative arts. Students will be introduced to the theoretical frameworks, methodologies and resources available for research in Women's Studies.
Prereq: none
W S 200 is the core course of the Joint Option.

W S 300
Developments in Canadian Feminism
An issues-oriented interdisciplinary seminar course which examines the conditions of Canadian women's existence from feminist perspectives. Topics covered in past courses include old and new feminisms, homemaking and motherhood, work, sexuality, violation of women and possibilities for political change.
Prereq: W S 200 or W S Co-ordinator's consent

W S 365A-D
Special Topics Course
A reading course permitting a student to work with any member of the faculty participating in Women's Studies at UW. To be arranged with the W S Director and the respective W S Faculty member.
Prereq: W S 200 or consent of Director

W S 475A-D
Directed Readings In Women's Studies
This course would offer the opportunity for independent study of specialized areas, theory and methodology, texts, discourses and writers of interest in the context of women's history, status and condition. The students would be under tutorial guidance by a faculty member(s) involved in the Women's Studies Option.
Prereq: W S 200 or consent of Director
Women's Studies approved courses are listed in the Interdisciplinary Options, Chapter 15.

Ukrainian

For courses in Ukrainian see Germanic and Slavic Languages and Literatures.
University Faculty

Individual attention in a Biology lab.
### 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>Department of Statistics and Actuarial Science</td>
<td>Mathematics</td>
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<tr>
<td>Anthropology</td>
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<tr>
<td>Applied Mathematics</td>
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<tr>
<td>Chemical Engineering</td>
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</table>
University Faculty
Accounting - Applied Mathematics

Assistant Professors
S. Bandyopadhyay, BTech (Indian Inst. Technology, India), MBA (Indian Inst. Management, Calcutta), PhD (Iowa)
J.J. Barnett, BComm (Queen's), CA
S.P. Gunz, BA, LLB, MA (Sydney), MBA (Manchester)
J.D. Hanna, BA, MAcc (Waterloo), PhD (Cornell), CMA, CA
J.L. Kao, BComm (Alberta), PhD (UBC), CA
D.B. Kennedy, BMath (Waterloo), MBA (McMaster), MS, PhD (Cornell), CMA
A. Macnaughton, BA (Wilfrid Laurier), PhD (British Columbia)
F.C. Shen, BA, MA, PhD (Simon Fraser)
K.R. Vetzel, BA, MA, PhD (Toronto)
G. Zhang, BEng (Shanghai, Jiaotong), MBA, PhD (UBC)

Lecturer
I.D. McKillop, BIS (Waterloo), DiplBA (Wilfrid Laurier), MASC (Waterloo)

Adjunct Faculty
R.P. Bish, BA (Waterloo), CA
P.A. Lubka, BBA, MBA (Wilfrid Laurier), CMA

Faculty Member of Accounting holding cross appointment to:
1 Statistics

Accounting Advisory Council
The Accounting Advisory Council was established in 1983 to provide liaison between the School of Accountancy and senior representatives in business, government and public accounting practice. Current Council Members are:

J.L. Cowperthwaite, FCA, Ernst & Young
D.W. Dodds, FCMA, Schnaider Corporation
M.F. Gawey, FCA, Price Waterhouse
R.G. Harris, FCA, Deloitte & Touche
P. Held, FCA, BDO Dunwoody Ward Mallette
B. Hendley, University of Waterloo
E.J. Lang, RJR-Macdonald Inc.
P.L. O'Malley, FCA, Peat Marwick Thorne
J.S. Saloman, FCA, Coopers & Lybrand
M. Sternberg, FCA, Arthur Andersen & Co.
W.R. Walker, FCA, Peat Marwick Thorne
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
D.A. Counts, BS (SW Texas State University), MA (Kentucky), PhD (Southern Illinois)
S.M. Weaver, BA, MA, PhD (Toronto)

Associate Professors
T.S. Abler, BA (Northwestern), MS (Wisconsin, Milwaukee), PhD (Toronto)
M.H. Hill, BA (Washington), MA (Washington State), PhD (Southern Illinois)
H.D. Lyons1, BA (Barnard), MLitt, DPhil (Oxford)

Adjunct Faculty
D.G. Willms, BA (Waterloo), MA (McMaster), PhD (British Columbia)

Faculty Member holding joint appointment with:
1 Women's Studies

Applied Mathematics

Professor, Department Chair
F.O. Goodman,2 BSc, PhD, DSc (London), CMath, CPhys, FinstP, FAIP, FIMA

Associate Professor, Associate Chair, Undergraduate Officer
D. Siegel, BA (California, Los Angeles), PhD (Stanford)

Associate Professor, Associate Chair, Graduate Officer
E.R. Vrecay, BSc, MMath, PhD (Waterloo)

Professors
R.H. Bartels, BS, MS (Michigan), PhD (Stanford)
### Adjunct Faculty

- W.F. Ames, MS (Wisconsin)
- A.T. Amos, BSc (London), DIC (Imperial College), PhD (London)
- J. Caminattil, BSc (Victoria), MSc (Melbourne), PhD (Victoria)
- H.F. Davis, SB, SM, PhD (Massachusetts Institute of Technology)
- M.A. Donelan, PhD (British Columbia)
- W.F. Langford, PhD (California)
- M.A. McKiernan, MA (Loyola), PhD (Illinois Institute of Technology)
- C. Rogers, BA (Oxon), MEd (Toronto), MSc, PhD (Waterloo)

Faculty Members of Applied Mathematics holding cross appointments to:

1. Chemistry
2. Physics
3. Mechanical Engineering
4. Computer Science
5. Civil Engineering
6. Chemistry
7. Physics

### Architecture

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<th>Associate Professor, Director, The School of Architecture</th>
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<td>E.R.M. Haldenby, BES, BArch (Waterloo), Recipient of the Distinguished Teacher Award</td>
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<td>B.R. Hunt, AA Dip (London), RIBA, OAA, MRAIC</td>
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<th>Assistant Professor, Associate Director (Rome)</th>
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<tr>
<td>L. Pignatti, BArch (Rome), MArch (Toronto)</td>
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<tr>
<td>A. Baneji, BArch (Calcutta), MArch (North Dakota State)</td>
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<td>L.A. Cummings, AB (Washington), AM (Missouri), PhD (Washington), Recipient of the OCLIF (Ontario) Teaching Award</td>
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<td>L.W. Richards, BArch (Miami, Ohio), MArch (Yale), OAA, MRAIC</td>
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<tr>
<td>R.M. Schuster, BS, MS (North Dakota State), PhD (Iowa State), PEng</td>
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<td>F. Thompson, BArch, MArch (Toronto), OAA, MRAIC</td>
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<td>M. Elmitt, National Diploma in Design (High Wycombe)</td>
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<td>D.B. McIntyre, BArch (Toronto), MRAIC</td>
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<td>R.J. van Pelt, Cand.Lit., Drs.Lit., D.Lit. (Leiden)</td>
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<td>T. Seebomh, BEng, MEng, PhD (McGill), MArch (California, Berkeley), OAA, PEng</td>
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<td>R. Wilier, BA (Waterloo), MA (Ottawa)</td>
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<td>R. Andighetti, BES, BArch (Waterloo)</td>
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<td>T. Meyer Boake, BES, BArch (Waterloo), MArch (Toronto)</td>
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<td>M.L. Lobsinger, BES, BArch (Waterloo)</td>
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<td>M.P. Macdonald, BArch (TUNS), DESS (Paris VIII), OAA</td>
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<td>D. Revington, AA Dip (London)</td>
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<td>V. Rynnimeri, BES, BArch (Waterloo)</td>
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<td>R. Sliwka, DipArch Assoc Arch (Huddersfield), MArch and U Design (Washington), RIBA</td>
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<td>S. Arnold, BA (S. Illinois)</td>
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<tr>
<td>J. Ferguson, MASc (Waterloo), PEng</td>
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<td>W. Gastmeier, BSc, MASc (Waterloo), PEng</td>
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<td>W. Lamb, BArch (McGill), FRAIC</td>
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<td>A. Levitt, AA Dip (London), RIBA</td>
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<td>S. Mannell, BES, BArch (Waterloo), OAA</td>
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<td>A. McKenzie, BA, BArch (Toronto), OAA</td>
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<td>L. Rapoport, BES, BArch (Waterloo)</td>
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<td>P. Syme, BArch (Toronto), OAA</td>
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<td>P. Westbrook, BTech (Ryerson)</td>
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Faculty Members of Architecture holding cross or joint appointments to:

1. English
2. Civil Engineering
3. Fine Arts

### Guest Critics and Lecturers in the School of Architecture January 1 - November 30, 1992

- Nils Adler
- Cheryl Atkinson
- Aldo Aymonino
- George Baird
- Barry Bell
- Michael Benedikt
- John Blake
- Timothy Boyd
- Martin Bressani
- James Brown
- Andrew Clarke
- Peggy Deamer
- Paolo Desideri
- Barbara Feldman
- Andrew Fox
- Steven Fox
- Sandra Franke
- Ursula Franklin
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, BSA, MSA (Toronto), PhD
(Michigan State)

Associate Professors, Undergraduate Officers
D.R. Barlow, BA (Ohio Wesleyan), MSc (Akron), PhD (Waterloo)
M. Globus, BSc, MSc (McGill), PhD (Toronto)
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)

Associate Professors, Graduate Officers
J.J. Hakkinen, BSc, MSc, PhD (Toronto)
W.D. Taylor, BSc, PhD (Toronto)

Professor Emeritus
H.B.N. Hynes, BSc, PhD, DSc (London),
DSc (Waterloo), ARCS, FRSC

Professor, NSERC/Alliex Industrial Research Chair in Microbial Biotechnology
O.P. Ward, BSc, PhD (Dublin)

Professors
N.C. Bola, BSc (Simon Fraser), MSc (British Columbia), PhD (Toronto),
Recipient of the Distinguished Teacher Award
J.C. Carlson, BSc, MSc, PhD (Massachusetts)
R.G.H. Downer, BSc, MSc (Queen’s, Belfast), PhD (Western Ontario), DSc (Belfast), FRSC, Recipient of the Distinguished Teacher Award
E.B. Dumbroff, BSc, MForestry, PhD (Georgia)
H. Duthee, BSc, PhD (Wales)
C.H. Fernando, BSc (Ceylon), DPhil (Oxford)
B.R. Glick, BSc (City College of New York), MSc, PhD (Waterloo)
W.B. Kendrick, BSc, PhD, DSc (Liverpool), FRSC
J.Kruy, BSc, MSc (Waterloo), PhD (Western Ontario)
J.R. Lepock, BS, MS (West Virginia),
PhD (Pennsylvania State)
C.I. Mayfield, BSc, PhD (Liverpool)
J.K. Morton, BSc, PhD (Durham), DSc (Newcastle-upon-Tyne), FLS

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 (Tulsa), MA, PhD
(Washington University, St. Louis)
J. Sivak, LScO (Montreal), MS (Indiana),
PhD (Cornell, OD (Pennsylvania College of Optometry)
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)
S.M. Smith, BSc, MSc (McMaster), PhD (Manitoba), Recipient of the Distinguished Teacher Award
S. Vethamany-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. Zachariash, BSc (Madras), BA Honors (Oxford), MA, PhD (Princeton)

Assistant Professors
G.W. Roddick, BSc, MSc, PhD (Manitoba)
B.M. Greenberg, BSc (California, Berkeley), PhD (Colorado)
M. Griffith, BA (Mount Holyoke), MFS (Yale), PhD (Minnesota)
K.M. Kovacs, BSc (York), MSc (Lakehead), PhD (Guelph)
R.L. Legge, BSc (Calgary), PhD (Waterloo), NSERC Research Fellow
B.A. Moffatt, BSc (Guelph), PhD (Toronto)
R.J. O’Hara Hines, BSc (New Brunswick), MA (Queen’s), MMath, PhD (Waterloo)

Research Professor
N.R. Tumkur, BSc (Mysore), MSc (Banaras), PhD (Waterloo)

Adjunct Faculty
R. Aloni, BSc, MSc, PhD (Tel Aviv University)
B. Baum, MSc, PhD (Hebrew University)
R. Castañeda, Lic (Havana University)
P.A. Catton, MD (Ottawa), LMCC, FRCP(C)
H.R.N. Eydt, BSc, MSc, PhD (McMaster)
A.D. Harrison, BSc, MSc, BEd, PhD (Cape Town)
P.V. Hodson, BSc (McGill), MSc (New Brunswick), PhD (Guelph), Canada Centre for Inland Waters
K. Munkittrick, BSc, MSc, (Guelph), PhD (Waterloo)
University Faculty
Biology - Chemical Engineering

University Faculty

V.C. Naevis, BSc, MSc (Carleton), PhD (British Columbia), Great Lakes Forestry Centre
R. Playle, BSc (McMaster), MSc (Manitoba), PhD (McMaster)
R. Rutledge, BSc, MSc, PhD (Carleton)
M.R. Sarvos, BSc, MSc (Guelph), PhD (Manitoba)
G.G. Stewart, BSc (Wales), PhD (Bath)
The Labatt Brewing Company, London
J.T. Trevors, BSc, MSc (Acadia), PhD (Waterloo)
B. Wolff, BSc, MSc, PhD (Waterloo)

Instructors
J.F. Brookfield, BA, BEd, BSc, MSc (Dalhousie)
L. Fashamak, 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. Environment and Resource Studies
3. Gerontology
4. Chemical Engineering

Faculty Members holding cross appointments to Biology from:
5. Physics
6. Optometry
7. Chemistry
8. Chemical Engineering
9. Civil Engineering
10. Geography
11. Statistics and Actuarial Science
12. Health Studies

Canadian Studies

Associate Professor, Director of the Program
W.R. Needham, BComm (Carleton), MA, PhD (Queen's)

Professors, Members of the Program Board
J.E. Karsell, BA, MA (Queen's), PhD (London)
W.L. Mitchinson, BA, MA, PhD (York)

Associate Professors, Members of the Program Board
T.S. Abier, BA (Northwestern), MS (Wisconsin, Milwaukee), PhD (Toronto)
E.E. Bunting, BA (York), MA (Western), PhD (Toronto)
P. Filion, BA, MA (Laval), PhD (Kent)

R.D. Leggo, BA (Transylvania), STB (Harvard), PhD (McMaster)

Assistant Professors, Member of the Program Board
M. Jones, BA, MA (Western), PhD (York)
R. Helmes-Hayes, BA/BAHE, MA (Queen's), PhD (Toronto)
G.O. Michalenko, BA, PhD (Saskatchewan)
A.M. Miraglia, BA, MA, PhD (Toronto)

Participating Faculty

Professors
G. Cuthbert Brandt, BA (Toronto), MA (Carleton), PhD (York), Principal, R
J.E. Curtis, BA (Sir George Williams), MA (Central Michigan), MA (Cornell)
J.R. English, BA (Waterloo), AM, PhD (Harvard), FRSC
R.L. Haworth, BA (Rutgers), MA, PhD (Illinois), FRSC
W. Klassen, BA (Goshen), BD (Goshen Seminary), PhD (Princeton Theological Seminary), Principal, St. Paul's College
R.D. Lambert, BA, MA (McMaster), PhD (Michigan)
K.M. McLaughlin, BA (Waterloo), MA (Dalhousie), PhD (Toronto), J
J.M. Wilson, BA, MA (Toronto)

Associate Professors
N.R. Ball, BA (McMaster), MA, PhD (Toronto)
S.D. Burt, BA, MA (Waterloo), PhD (York)
J.H. Miller, BA, BLS (McGill), MA, MPhil (Waterloo), PhD (York), R
P.G. Sockan, BA (Toronto), MA (Iowa), PhD (Toronto)

Assistant Professor
D.J. Horton, BA (Waterloo Lutheran), MA (Waterloo), PhD (McGill)

Lecturers
L. Kenyon, BA, MA (Waterloo)
E.G. Muir, BA (Queen's), HRP Dip (Harvard), B Th, PhD (McGill)
M.J. Smith, BA (Mount Allison), MA (St. Mary's), PhD (Memorial)
J. Yardley, BA, MA (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. Rampel, BSc, PhD (British Columbia), FCIC, FRSC

Professor, Associate Chair Undergraduate Studies
I.F. Macdonald, BEng (Technical University of Nova Scotia), PhD (Wisconsin)

Associate Professor, Associate Chair Graduate Studies
P.L. Douglas, BASc, MASc, PhD (Waterloo), PEng

Professors Emeriti
P.M. Reilly, BASc (Toronto), DIC, PhD (London), FCIC, 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. Moo-Young, BASc (London), MASc (Toronto), PhD (London), PEng

Professors
C.M. Burns, BASc, MASc (Toronto), PhD (Polytechnic Institute, Brooklyn), PEng
J.J. Byerley, BASc, MASc (Toronto), PhD (British Columbia)
F.A.L. Dullien, Dipl Ing (Budapest Technical University) MASc, PhD (British Columbia), PEng
T.Z. Fahidy, BSc, MASc (Queen's), PhD (Illinois), PEng
G.J. Farquhar, BASc (Waterloo), PhD (Wisconsin), PEng, Recipient of the Distinguished Teacher Award
B.R. Glick, BASc (City College of New York), MSc, PhD (Waterloo)
R.Y-M. Huang, BASc (National Taiwan University), MASc, PhD (Toronto), PEng
R.R. Hudgins, BASc, MASc (Toronto), MA, PhD (Princeton), PEng
K.F. O'Driscol, BChE (Pratt Institute), MA, PhD (Princeton), (Retired)
C.W. Robinson, BASc (British Columbia), PhD (California, Berkeley)
P.L. Silvestro, BS, MS (Massachusetts Institute of Technology), Dr Ing (Munich), PEng
J.R. Wynnyckyj, BEng (McGill), MASc, PhD (Toronto), PEng

Associate Professors
L.E. Bodnar, BA, MA (Saskatchewan), PhD (McMaster)
Assistant Professors

W.A. Anderson, BASc, MASc, PhD
(Northwestern), PEng

M.D. Pritzker, BEng (McGill), MSc
(California, Berkeley), PhD (Virginia
Polytechnic Institute), NSERC
University Research Fellow

R. Pal, BTech (Indian Institute
of Technology, Kanpur), PhD (Waterloo)

Adjunct Faculty

A. Rudin, BSc (Alberta), PhD
(Northwestern), PEng

G.R. Sullivan, BASc (Waterloo), DIC, PhD
(Imperial College, London), PEng

Faculty Members of Chemical
Engineering holding cross appointments to:

Professor, Department Chair
F.R.W. McCourt, BSc, PhD (British
Columbia)

Professor, Associate Department Chair
R.G. Woolford, MSc (Western Ontario),
PhD (Illinois), FCIC

Associate Professors, Undergraduate
Officers
G.F. Atkinson, MA, PhD (Toronto),
CCChem, FRSC(UK), FCIC
M.F. Tchir, BSc (Alberta), PhD (Western
Ontario), Recipient of the Distinguished
Teacher Award
G.E. Toogood, BSc, PhD (Nottingham),
CCChem, FRSC(UK), FCIC

Associate Professors, Graduate Officers
D. Mackay, BSc, PhD (Aberdeen)
J. Pawliszyn, BSc, MS (Technical
University of Gdansk, Poland), PhD
(Southern Illinois, Carbondale)

Professors Emeriti
F.W. Karasek, BS (Elmhurst), PhD
(Oregon State), FCIC
W.A.E. McLay, MA (Toronto), PhD
(Virginia), FCIC
W.B. Pearson, DFC, MA, DSc (Oxford),
DSc (Waterloo), FRSC, FCIC
A. Rudin, BSc (Alberta), PhD
(Northwestern)

Professor, NSERC/Monsanto Industrial
Research Chair in Chemical Synthesis
and Biomolecular Design
V.A. Snieckus, BSc (Alberta), MS
(California), PhD (Oregon), FCIC

Professors
P.F. Bernath, BSc (Waterloo), PhD
(Massachusetts Institute of Technology), FRSC,
FCIC
A.J. Carty, BSc, PhD (Nottingham), FRSC,
FCIC
P.C. Chieh, BSc (Nat. Taiwan), MSc (Nat.
Tsing Hua), PhD (British Columbia)
J. Cizek, RNDr (Charles University,
Prague), CSc (Czechoslovak Academy
of Sciences, Prague), FRSC
R.G.H. Dower, BSc, MSc (Queen's,
Belfast), PhD (Western Ontario), DSc
(Belfast), Recipient of the Distinguished
Teacher Award
J.W. Hagbhum, BSc (Waterloo), PhD
(Toronto), NSERC University Research
Fellow
D.E. Irish, BSc (Western Ontario), MSc
(McMaster), PhD (Chicago), FCIC, Recipient of the Distinguished Teacher
Award, OCUSA Teaching Award

R.J. LeRoy, BSc, MSc (Toronto), PhD
(Wisconsin)
W.K. Liu, BSc, MS, PhD (Illinois)
T.R. McMahon, BSc (Alberta), PhD
(California Institute of Technology)
J.B. Moffat, BA, PhD (Toronto), FCIC
J. Paldus, RNDr (Charles University,
Prague), CSc (Czechoslovak Academy
of Sciences, Prague), FRSC
L.W. Reeves, BSc, PhD, DSc (Bristol),
FRSC, FCIC
G.L. Rempel, BSc, PhD (British
Columbia), FCIC
J.J. Skan, BSc, PhD (Queen's)
J.E. Thompson, MSc (Toronto), PhD
(Alberta)
T. Viswanatha, MSc, PhD (Mysore),
Recipient of the Distinguished Teacher
Award

Associate Professors

L.J. Brubaker, BA (Goshen College,
Indiana), PhD (Northwestern)
M.J. Chong, BSc, PhD (British Columbia),
NSERC University Research Fellow
S. Collins, BSc, PhD (Calgary)
G.I. Dmitrienko, BSc, PhD (Toronto)
H.J. Friesen, BSc, MSc (Manitoba)
J.F. Honke, BSc, PhD (McGill)
G.A. Lajoie, BSc (Sherbrooke), PhD
(McGill)
K.T. Leung, BSc, PhD (British Columbia)
T.B. Marder, BSc (Massachusetts Institute
of Technology), PhD (California, Los
Angeles)
L.F. Nazar, BSc (British Columbia), PhD
(Toronto)
A. Penikidis, Dipl Eng (Thessaloniki), PhD
(McMaster), PEng
Civil Engineering

Professor, Department Chair
B.G. Hutchinson, BE (Sydney), MSc (Queen’s), PhD (Waterloo), PEng, FRSC, FCAE, The Norman Green, BSc (Eng) (Calcutta), BSc, MSc, PhD (Waterloo), PEng

Professor, Associate Chair, Undergraduate Studies
G.M. McNeice, BASc (Waterloo), PhD (London), PEng

Professor, Associate Chair, Graduate Studies
K.N. Smith, BASc (Toronto), MSc (Illinois), PhD (Waterloo), PEng

Professors Emeriti
N.C. Lind, MSc (Technical University of Denmark), PhD (Illinois), PEng, FRSC, FCAE, The Norman Green, BSc (Eng) (Calcutta), BSc, MSc, PhD (Waterloo), PEng
J.T. Pinder, MSc (Warsaw and Lodz), PhD (Polish Academy of Science, Warsaw), DSc (Cracow), PEng, FCSME, FSEM

Professors
S.T. Akiarathnam, BSc (Ceylon), BSc, MSc (London), PhD (Cambridge)
E.F.P. Burnett, BSc (Capetown), DSc, MSc, PhD (London), PEng
M.Z. Cohn, CSc (Bucharest), PEng
M.B. Dusseault, BSc, MSc, PhD (Alberta), PEng
G.J. Farquhar, BASc, MASc (Waterloo), PhD (Wisconsin), PEng, Recipient of the Distinguished Teacher Award
G.M.L. Gladwell, BSc, PhD, DSc (London)
R. Green, BSc (Eng) (London), MSc (Queen’s), MSc (Waterloo), PhD (Texas), PEng
D.E. Grierson, BASc, MASc, PhD (Waterloo), PEng
R.C.G. Haas, BSc, MSc (Alberta), PhD (Waterloo), PEng, FCAE, The Norman Green, BSc (Eng) (Calcutta), BSc, MSc, PhD (Waterloo), PEng
V.K. Handa, BSc (Calcutta), BSc (Eng) (London), MSc (Queen’s), MASc, PhD (Waterloo), PEng
P.M. Huck, BASc, MASc, PhD (Waterloo), PEng, NSERC Industrial Research Chair in Water Treatment
K. Kouwen, BASc, PhD (Waterloo), PEng
W.C. Lennox, BASc, MSc (Waterloo), PhD (Lehigh), PEng
E.L. Matyas, BSc (Toronto), DSc, PhD (London), PEng
A.A. McBean, BASc (British Columbia), SM, CE, PhD (MIT), PEng
W.A. McLaughlin, BSc (Saskatchewan), MSc, PhD (Purdue) PEng, (Retired)*

Assistant Professors
G.W. Brodland, BASc, MSc, PhD (Manitoba), PEng
R.A. McKim, BEng (Memorial), MASc, PhD (Waterloo), PEng
M.A. Polak, BASc, MSc (Tech Univ Cracow), PhD (Toronto)
E.D. Soulis, BASc (Waterloo), MEng (Memorial), PhD (Waterloo)
N.R. Thompson, BASc, MASc, PhD (Waterloo), PEng
W-C. Xie, BEng (Shanghai Jiao-Tong), MASc, PhD (Waterloo)
N. Yassin, BASc, PhD (London)

Adjunct Faculty
G.E. Cameron, BASc, MASc, PhD (Waterloo), PEng
J.P. Jolly, BASc (New Brunswick), MASc (Toronto), PhD (Colorado State), PEng
W.R. Pett, DipEng (Berlin), DEng (Waterloo), PEng
D.W. Schnurr, BASc (Toronto), LLB (Osgoode Hall), PEng
N.K. Srivastava, BSc (Patna), MASc (Toronto), PhD (Waterloo), PEng
C.J. Turkstra, BSc (Queen’s), MSc (Illinois), PhD (Waterloo), PEng
M.T. Yu, BSc (Siam Jaiuotung), MASc, PhD (Waterloo)

Civil Engineering

University Faculty
Chinese
Civil Engineering

H.G. McLeod, MA, PhD (Toronto), (Retired)
K.F. O’Driscol, BChE (Pratt Institute), MA, PhD (Princeton) FCIC
A.J. Paine, 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 (California), FCIC, (Retired)
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. Forsay, 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

Faculty Members holding cross appointments to Chemistry from:
3. Applied Mathematics
4. Chemical Engineering
5. Biology
6. Physics

Chinese

For faculty listing consult East Asian Studies.
### Combinatorics and Optimization

<table>
<thead>
<tr>
<th>Professor, Department Chair</th>
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<tbody>
<tr>
<td>I.P. Goulden, BMath, MMath, PhD (Waterloo)</td>
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<tr>
<th>Professor and Associate Chair for Undergraduate Affairs</th>
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<tr>
<td>C.J. Colbourn, BSc (Toronto), MMath (Waterloo), PhD (Toronto)</td>
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<tr>
<th>Professor and Associate Chair for Graduate Affairs</th>
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<tr>
<td>C.D. Godsil, BSc, MSc, PhD (Melbourne)</td>
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<tr>
<th>Lecturer, Associate Dean Faculty Programs</th>
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<tr>
<td>R.G. Dunkley, BA (Western Ontario)</td>
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<tr>
<th>Professor Emeritus</th>
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<tr>
<td>W.T. Tutte, BA, MA, PhD (Cambridge), DMath (Waterloo), FRS, FRSC</td>
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<tr>
<th>Professors</th>
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<tbody>
<tr>
<td>M.J. Best, BM Math, MMath (Waterloo), MSc, PhD (California, Berkeley)</td>
</tr>
<tr>
<td>J.A. Bondy, BA, DPhil (Oxford)</td>
</tr>
<tr>
<td>J. Borwein, BSc (Western), MSc, DPhil (Oxford)</td>
</tr>
<tr>
<td>L.J. Cummings, BSc (Roosevelt), MSc (de Paul), PhD (British Columbia)</td>
</tr>
<tr>
<td>W.H. Cunningham, BM Math, MMath, PhD (Waterloo)</td>
</tr>
<tr>
<td>D.M. Jackson, BA, MA, PhD (Cambridge)</td>
</tr>
<tr>
<td>R.C. Mullin, BA (Western Ontario), MA, PhD (Waterloo)</td>
</tr>
<tr>
<td>L.B. Richmond, BSc, MSc (Manitoba), PhD (Alberta)</td>
</tr>
<tr>
<td>P.J. Schellenberg, BSc, MA, PhD (Waterloo)</td>
</tr>
<tr>
<td>S.A. Vanstone, BM Math, MMath, PhD (Waterloo)</td>
</tr>
<tr>
<td>H. Wolkowicz, BSc, MSc, PhD (McGill)</td>
</tr>
<tr>
<td>D.H. Younger, AB, BS, MS, PhD (Columbia)</td>
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</tbody>
</table>

### Classical Studies

**Associate Professor, Department Chair**

<table>
<thead>
<tr>
<th>R.L. Fowler, BA, MA (Toronto), DPhil (Oxford)</th>
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</thead>
</table>

**Associate Professor and Undergraduate Officer**

<table>
<thead>
<tr>
<th>L.L. Neuru, BA (San Francisco), MA (Oregon), PhD (McMaster)</th>
</tr>
</thead>
</table>

**Professor**

<table>
<thead>
<tr>
<th>R.Y. Forth, AB (Mount Holyoke), MA, PhD (Toronto), Recipient of the Distinguished Teacher Award</th>
</tr>
</thead>
</table>

**Associate Professor**

<table>
<thead>
<tr>
<th>L.A. Curchin, BA (Western Ontario), MA (Toronto), MA (Carleton), PhD (Ottawa)</th>
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</thead>
</table>

**Assistant Professors**

<table>
<thead>
<tr>
<th>S.L. Ager, BA, MA (Queen's), PhD (Oxford)</th>
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<tbody>
<tr>
<td>R.A. Fabb, BA (McMaster), MA (Toronto)</td>
</tr>
<tr>
<td>S.B. Haag, BA, MA (Queen's), MA (Waterloo), MPhil (Toronto)</td>
</tr>
<tr>
<td>R.L. Porter, BA (McMaster), MA, PhD (Princeton)</td>
</tr>
</tbody>
</table>

**Participating faculty in Classics at Wilfrid Laurier University**

<table>
<thead>
<tr>
<th>J. Freed, BA (Goshen), MA, PhD (Alberta)</th>
</tr>
</thead>
<tbody>
<tr>
<td>H.A. Maclean, BA (Mount St. Vincent), MA, PhD (McMaster)</td>
</tr>
<tr>
<td>G.P. Schaus, BA, MA (Dalhousie), PhD (Pennsylvania)</td>
</tr>
<tr>
<td>C.J. Simpson, BA, MPhil (Nottingham), PhD (Alberta)</td>
</tr>
<tr>
<td>J. Zeyl, BA, MA (Toronto), PhD (McMaster)</td>
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</tbody>
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**Faculty Member of Classical Studies holding cross appointment to:**

1. Fine Arts
2. History

---

### Computer Science

**Professor, Department Chair**

<table>
<thead>
<tr>
<th>F.W. Tompa, ScB, ScM (Brown), PhD (Toronto)</th>
</tr>
</thead>
</table>

**Associate Professor and Associate Chair for Undergraduate Studies**

<table>
<thead>
<tr>
<th>W.P. Tang, BS (Fudan), MS, PhD (Stanford)</th>
</tr>
</thead>
</table>

**Associate Professor and Associate Chair for Graduate Studies**

<table>
<thead>
<tr>
<th>P.A. Forsyth, BSc (Western Ontario), MSc (Australian National), PhD (Western Ontario)</th>
</tr>
</thead>
</table>

---
University Faculty Computer Science - Dance

Professors

R.H. Bartels,1 BS, MS (Michigan), PhD (Stanford)
J.A. Brzozowski,2 BASc, MSc (Toronto), MA, PhD (Princeton)
C.J. Colbourn,3 BSc (Toronto), MMath (Waterloo), PhD (Toronto) (on leave)
D.D. Cowan, BASc (Toronto), MSc, PhD (Waterloo)
K.O. Geddes,1 BA (Saskatchewan), MSc (Toronto), PhD (Toronto)
J.A. George,1 BSc, MSc (Alberta), PhD (Stanford), FRSC, Fellow IEEE
J.W. Graham, MA, MA (Waterloo), NSERC University Award

Recipients of the Distinguished Teacher Award

P.-Á. Larson, BEcon, MBA, PhD (Abo Swedish University)
R.C. Mullin,4 BA (Western Ontario), MA, PhD (Waterloo)
J.L. Munro, BA (New Brunswick), MSc (British Columbia), PhD (Toronto)
R.B. Simpson,5 BSc, MASc (Toronto), PhD (Maryland)
P. Thagard,6 BA (Saskatchewan), BA, MA (Cambridge), MS (Michigan, Ann Arbor), MA, PhD (Toronto)
S.A. Vanslone,7 BMath, MMath, PhD (Waterloo), J
J.W. Wong,8 BS, MS, PhD (California, Los Angeles)

Associate Professors

J.C. Beatty, BA (Princeton), PhD (California, Berkeley) (on leave)
J.P. Black, BSc (Calgary), Dipl d'Ing (Grenoble), PhD (Waterloo)
F.J. Burkowski, BSc, MMath, PhD (Waterloo)
E.P.F. Chan, BSc, MSc, PhD (Toronto)
R. Cohen, BA (McGill), MSc, PhD (Toronto)
G.V. Cormack, BSc, MSc, PhD (Manitoba)
W.B. Cowan,9,10 BSc (Waterloo), PhD (McGill)
V.A. Dyck, BMath, MMath (Waterloo)
M. Li, MS (Wayne State), MS, PhD (Cornell)
F. Mavadatt, BSc (Teheran), Diploma-Degree Studies (Netherlands), PhD, DIC (Imperial College)
P.L. Ragde, BMath (Waterloo), PhD (California, Berkeley)
J.O. Shaltit, AB Math (Princeton), PhD (California, Berkeley)
D.J. Taylor, BSc (Saskatchewan), MMath, PhD (Waterloo)
A. Venelli,11 BSc, MSc (Concordia), PhD (Waterloo), NSERC University Research Fellow

Assistant Professors

J. Allee, BS (William and Mary), MS, PhD (Maryland)
F. Bacchus, BSc (Alberta), MSc (Toronto), PhD (Alberta)
P.A. Buhr, BSc, MSc, PhD (Manitoba)
J.F. Buss (California Institute of Technology), PhD (Massachusetts Institute of Technology)
M.H. Cotin, BSc (South Dakota), MS, PhD (Arizona)
C. DiMarco, BSc, MSc, PhD (Toronto)
D. Duggan, BComm, M.Eng, Sc (University College, Dublin), PhD (Maryland)
J.C. Ebergen, KANDIDAAT, MSc, PhD (Eindhoven)
F.N. Kazman, BA, MMath (Waterloo), MA (York), PhD (Carnegie-Mellon)
G. Labahn, BSc, MSc, PhD (Alberta)
A. Lubiw, BSc (Toronto), MMath (Waterloo), PhD (Toronto)
S. Mann, BA, BA (California, Berkeley), MS, PhD (Washington)
N. Nishimura, BS (Yale), MSc, PhD (Toronto)
J.H. Vellinga, BA (Western Ontario), MA (Waterloo) (part-time)
G.E. Weddell, BSc, MSc (British Columbia), PhD (Toronto)
Q. Yang, BS (Peking), MS, MS, PhD (Maryland)

Research Assistant Professor

N. Coburn, BMath, MMath, MMath, PhD (Waterloo), BEd (Western Ontario), ITRC

Lecturers

B.W. Becker, BA (Goshen College), MMath (Waterloo)
B.D. Pawlinsky, BSc, BEd (Toronto), MS (Utah) (part-time)
A.B. Pidduck, BSc, MSc (Waterloo), PEng

Adjunct Faculty

M.L. Benninger, BMath, MASc, MMath (Waterloo)
K.S. Booth, BS (California Institute of Technology), MA, PhD (California, Berkeley)
S. Christodoulakis, BSc (Athens), MSc (Queen's), PhD (Toronto) (on leave)
A.R. Conn, BSc (Imperial College), MSc (Manitoba), PhD (Waterloo)
W.M. Gentleman, BSc (McGill), MA, PhD (Princeton)
R.N. Goldman, BS (Massachusetts Institute of Technology), MA, PhD (Johns Hopkins)
G.H. Gonnet, CPR U (Uruguay), MMath, PhD (Waterloo)
J.H. Johnson, BMath, MMath, PhD (Waterloo)
J. Kreindler, BA (McGill), LLB (London), LLB (Ottawa)
J.L. Ophel, BSc (Hons), PhD (Australian National)
J.K. Pachl, RNDr (Prague), PhD (Waterloo)

A. Ryman, BSc (York), MSc (London), PhD (Oxford)
M.W. Sherk, BSc, MSc, PhD (Toronto) ITRC
H.P. Seidel, BS, MS, PhD (Habili) (Tübinger)
S. Safayani, BSc (Washington), MASc (Victoria)
J. Slonim, BSc, MSc (Western), PhD (Kansas State)
D.W. Swayne, BSc (Waterloo), MA (York), PhD (Waterloo)
P. van Arragon, BS (Calvin College), MMath, PhD (Waterloo)
M. Wein, BEng, MSc, PhD (McGill)
C.G. Webber, BA (York), LLB (Osgoode Hall)
D. Wood, BSc, PhD (Leeds)

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 Combinatorics and Optimization
6 Philosophy
7 Electrical and Computer Engineering

* refers to faculty members at St. Jerome's College

Croatian

For faculty listing consult Germanic and Slavic Languages and Literatures.

Dance

Department Chair
To be announced.

Associate Professor, Associate Chair Undergraduate Affairs
R. Priddle, BPHE (Toronto), MSc (Springfield), MA, PhD (Waterloo)

Associate Professors

R. Ryman, BA, MA (York), AI Chor (London)

Lecturer

L. Prada, BSc (Waterloo), ARAD (Adv. and ATC), (London)
Earth Sciences

Professor, Department Chair
R.W. Gillham, BSA (Toronto), MSc (Guelph), PhD (Illinois)

Associate Professor, Undergraduate Officer
R.G. Roberts, BA (Cambridge), MSc, PhD (McGill)

Associate Professor, Undergraduate Advisor
S. Schiff, BSc (McMaster), MA, MPhil, PhD (Guelph)

Assistant Professor, Undergraduate Advisor
D.L. Rudolph, BSc, MSc (Manitoba), MSc, PhD (Waterloo)

Associate Professor, Graduate Officer
D.E. Lawson, BSc, MSc (New Brunswick), PhD (Reading)

Professor, Chair in Regional Hydrogeology, Waterloo Centre for Groundwater Research
R.N. Farvolden, MSc (Alberta), PhD (Illinois)

Professors
J.A. Cherry, BE (Saskatchewan), MS (California, Berkeley), PhD (Illinois), PEng, FRSC

L.M. Dusseault,1 BSc, PhD (Alberta), PEng

E.O. Frind, BASc, MSc, PhD (Toronto), PEng

J.L. Gibson, BSc, PhD (Imperial College, London)

P.F. Karrow, BSc (Queen's), PhD (Illinois)

E.L. Matyas,2 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)

Associate Professors
E.C. Appleyard, BSc (Western Ontario), MSc (Queen's), PhD (Cambridge)

J.F. Barker, BSc, MSc (McMaster), PhD (Waterloo)

M. Coniglio, BSc (McGill), MSc (Manitoba), PhD (Memorial)

S.K. Frape, BSc, MSc, MSc (Queen's)

J.P. Greenhouse, BSc, MSc, MSc (British Columbia), PhD (California, San Diego), Recipient of the Distinguished Teacher Award

J.A. Legault, BSc, MSc (Ottawa), PhD (Ottawa)

L. Rothenburg,3 Dipl Phy (Moscow), PhD (Carleton), PEng

E.A. Sudicky, BSc, MSc, PhD (Waterloo), PEng

B.G. Warner,4 BES, MSc (Waterloo), PhD (Simon Fraser)

Assistant Professors
D.W. Blowes, BSc, MSc, PhD (Waterloo)

A.D. Bogobowicz5, MSc (Warsaw), PhD (Polish Academy Sciences)

T.W.D. Edwards, BSc, MSc (Queen's), PhD (Waterloo)

F.V. Nicholson, BSc (Concordia), MSc, PhD (Waterloo)

N. Yassir,6 BSc, PhD (London)

Research Professors
A.P. Annan, BASc, MSc (Toronto), PhD (Memorial) (Waterloo Centre for Groundwater Research)

J.A. Franklin,7 BSc (Eng) (London), MSc, DIC, PhD (Imperial College, London), PEng

Research Associate Professors
E.C. Jowett, BASc, MSc (Toronto), PEng, NSERC University Research Fellow

E. Lipczynska-Kochany, MSc, PhD (Warsaw Technical)

Research Assistant Professors
C.W. Mase, BSc (California, San Diego), MSc (Utah), PhD (British Columbia)

W.D. Robertson, BSc, MSc, PhD (Waterloo)

Adjunct Faculty
L.D. Delorme, BSc (Saskatchewan), MSc (Alberta), PhD (Saskatchewan)

D.E. Elrick, BSc (Guelph), MS, PhD (Wisconsin)

D. Elsworth, BSc (Portland Polytechnical College), MSc, DIC (Imperial College, London)

P. Fritz, DiplGeol, Dr. rer. nat. (Stuttgart)

F. Goodarzi, BSc (Tehran), MSc, PhD (Newcastle-upon-Tyne)

B.H. Kueper, BASc, PhD (Waterloo)

D.R. Lee, BSc, MSc, North Dakota, PhD (Virginia Polytechnical Institute)

D.L. Mackay, BS, MS, PhD (Stanford)

D.E. McWhorter, BSc (Colorado School of Mines), MS, PhD (Colorado State)

M.J. Melchin, BSc (Waterloo), PhD (Western Ontario)

D. Nokes, BSc, MSc, PhD (Toronto)

J.O. Nriagu, BSc (Ibadan), MSc (Wisconsin), PhD (Toronto)

R. Samson, BSc, MSc, PhD (Laval)

L.R. Snowden, BSc (Calgary), PhD (Houston)

R.L. Thomas, BSc, PhD, DS (Swansea)

G. van der Kamp, BSc, MSc (British Columbia), PhD (Amsterdam)

Drama and Speech Communication

Associate Professor, Chair
J.S. Greenberg, BA (Sir George Williams), BEd (Toronto)

Associate Professor, Undergraduate Officer
W.R. Chadwick, BA, MA (Toronto), PhD (London)

Assistant Professor, Co-ordinator, Speech Communication
J. Tomasson Goodwin, BA (British Columbia), MA, PhD (Toronto)

Assistant Professors
M.G. van Dijk, BA, MA (Wellington), PhD (London)

M. Westley, BA (Bishop's), MA, PhD (Toronto), (part-time)

Lecturer, Technical Director
A. Anderson

Adjunct Lecturer, Arts Administration
William D. Poole, BA (Toronto), MBA (York), MSc (London)

Dutch

For faculty listing consult Germanic and Slavic Languages and Literatures.
Economics

Professor, Department Chair
J.R. Melvin, BSc (Manitoba), MA (Alberta), PhD (Minnesota)

Associate Professor, Associate Chair, Undergraduate Affairs
E. Cervatho, BA, MA, PhD (Waterloo)

Associate Professor, Associate Chair, Graduate Affairs
F.M. Naqib, BSc (Washington), MSc (Oregon), PhD (Queen's)

Professors
A.A. Andriopoulos, BA (Athens), MA (Wayne State), PhD (Southern California)
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. Stotery, BA (Southern California), MA, PhD (Queen's)
W.R. Thirsk, BS (British Columbia), MA, PhD (Yale)
D. Willton, BComm (McMaster), PhD (MIT)

Associate Professors
K.M. Bennett, BA, MA (Queen's), PhD (McGill)
R.W. Bodell, BSc (Sydney, Australia), MA, PhD (York)
W.M. Bossert, Diplom (Karlsruhe), MA (UBC), PhD (Karlsruhe)
J.A. Brox, BA (Toronto), MA, PhD (McMaster)
J.E. Cuencas, LIC (Madrid), MA (Western Michigan), PhD (Toronto)
L.P. Fletcher, BComm (Mount Allison), AM, PhD (Brown)
S.W. Kardasz, BA (Loyola), PhD (Queen's)
R.C. Kumar, BStat, MStat (Indian Statistical Institute), MA, PhD (Toronto)
W.R. Neetham, BComm (Carleton), MA, PhD (Queen's)
T.T. Nguyen, BSc, ChE (California, Berkeley), MA (Simon Fraser), PhD (Western Ontario)

Assistant Professors
D. Andriopoulos, BBA, MA (Simon Fraser)
L.A. Busch, BSc (Victoria), MA, PhD (Western Ontario)
D.J. Cox, BA (Western Ontario), PhD (Queen's)
W.M. Ho, BSc (Chinese University of Hong Kong), MA (Western Ontario)
G.M. Myers, BA (Queen's), MA, PhD (McMaster)

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Electrical and Computer Engineering

Professor, Department Chair
J.A. Field, BE (Saskatchewan), MASC, PhD (Toronto), PEng

Professor, Associate Chair for Undergraduate Affairs
J.D. Cross, BSc (Wales), MSc, PhD (Carleton), PEng

Professor, Associate Chair for Graduate Affairs
V.H. Quintana, BEng (Chile), MSc (Wisconsin), PhD (Toronto), PEng

Professor, BNR/NSERC Industrial Research Chair in Very Large Scale Integrated Circuits
M.I. Elmasry, BSc (Carlo), MASC, PhD (Ottawa), PEng, Fellow IEEE

Professor, NCR Microelectronics Research Fellowship
S.G. Chamberlain, MSc, PhD (Southampton), Fellow IEEE

Professors
J.D. Aplevich, BE (Saskatchewan), PhD (Imperial College, London), PEng
J.F. Blake, BSc, MSc (Queen's), MA, PhD (Princeton), PEng, Fellow IEEE
J.A. Brzozowski, BASC, MASC (Toronto), MA, PhD (Princeton)
S.K. Chaudhuri, BE (Hons), MTech (IIT/Delhi), MSc, PhD (Manitoba)
Y.L. Chow, BEng (McGill), MASC, PhD (Toronto), PEng
J.V. Hanson, BASc (Toronto), MSc, PhD (Imperial College, London), PEng

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East Asian Studies

Professor, Director
G. Cuthbert Brandt, BA (Toronto), MA (Carleton), PhD (York), R

Professor Emeritus
P. Swann, BA, MA (Oxford), LLB (Queen's), LLB (Brock), LLB (Willfird Laurier), LLB (Waterloo), R

Adjunct Assistant Professor
A. Maruoka, BA (Kyotits, Tokyo), MEd (OISE), R

Sessional Lecturers
K. Belair
M. Hunsberger, BA (Goshen), MA (Indiana), PhD (Temple)
Y. Kim, BA (Seoul), MA (Toronto), MEd (OISE), R
K. Niu, BA (Beijing Institute of Foreign Languages), MA (Peking), R

'R' refers to faculty members at Renison College

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
E. L. Hassenb, BSc, PhD (Imperial College, London), PEng
R. H. MacPhie, BASc (Toronto), MS, PhD (Illinois), Fellow IEEE
J. W. Mark, BASc (Toronto), MEng, PhD (McMaster), PEng, Fellow IEEE
R. S. Ramshaw, BSc, PhD (Nottingham), PEng
H. C. Ratz, BASc (Toronto), MS (Massachusetts Institute of Technology), PhD (Saskatchewan), PEng, (Retired)*
J. Reeve, BSc, MSC, PhD, DSc (Manchester), PEng, Fellow IEEE
D. J. Routaton, BSc (Belfast), PhD (Imperial College, London), CEng, PEng, Fellow IEEE
R. G. van Heewijk, Jr (Delft, Holland), PEng, Recipient of the Distinguished Teacher Award, (Retired)*
J. Vlach, Dipl Ing CSC (Technical University of Prague), Fellow IEEE, (Retired)*
L. A. K. Watt, BSc (Manitoba), MS (Chicago), PhD (Minnesota), (Retired)*
L. Y. Wei, BS (National Northwestern College, China), MSC, PhD (Illinois), (Retired)*
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), FAAAS, FAIAA, FASME
Associate Professors
G. B. Aghew, BASc, PhD (Waterloo), PEng
P. P. Dasiwicz, BSc, MSC, PhD, (Waterloo), PEng
I. Deng, RS (University of Science and Technology, China), MS, PhD (Wisconsin, Madison), Senior Member IEEE
A. J. Henry, BSc (Witwatersrand), MSC, PhD (Imperial College, London)
W. P. Huang, BS (Shandong, China), MS (University of Science and Technology, China), PhD (Massachusetts Institute of Technology)
W. M. Louchs, BASc (Waterloo), MSc, PhD (Toronto), PEng
M. M. A. Salama, BSc, MSC (Cairo), PhD (Waterloo)
R. E. Sevora, Dipl Ing (Czech Technical University), PhD (Toronto), PEng
A. Vannelli, 1 BSc, MSC (Concordia), PhD (Waterloo), NSERC University Research Fellow
Assistant Professors
J. Barby, BTech (Ryerson Polytechnical), MASC, PhD (Waterloo)
G. H. Freeman, BASc, PhD (Waterloo)
C. H. Gaboys, BASc, MASC (Toronto), PhD (Waterloo)
S. Jayaram, RE (Univ Eng, College, Bangalore), MSCEng (Indian Institute of Science, Bangalore), PhD (Waterloo), PEng
G. Kesidis, BASc (Waterloo), MS, PhD (California, Berkeley)
B. H. Leung, BS (New York), MS (California), PhD (California, Berkeley), PEng
D. E. Miller, BSc (New Brunswick), MASC, PhD (Toronto)
A. Nathan, BSc Hons (Leeds Polytechnic, UK), MSC, PhD (Alberta)
A. Opal, B.Tech (IIT/New Delhi), MASC, PhD (Waterloo)
G. K. H. Pang, BSc (London), PhD (Cambridge), PEng
B. R. Prusa, BASc, MASC, PhD (Toronto), PEng
C. R. Selvakumar, BE (Madras), MTech (IIT/Roparhay), PhD (IIT/Madras)
D. W. L. Wang, BE (Saskatchewan), MASC, PhD (Waterloo)
Research Assistant Professor
S. T. Chu, BSc (Wilfrid Laurier), MSc PhD (Waterloo)
Adjunct Faculty
W. Allegretto, BSc, PhD (British Columbia)
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. Chröstowski, MSc, PhD (Warsaw Univ. of Technology)
J. Kuefe, BASc (Windsor), MASC, PhD (Waterloo), PEng
J. Li, BSc, DipEd (Hong Kong), DSc (Laval)
B. N. W. Ma, BASc, MASC, PhD (Waterloo)
Laboratory Director
R. L. Wright, PEng
Faculty Member of Electrical and Computer Engineering holding cross appointment to:
1 Computer Science
Faculty Members holding cross appointment to Electrical and Computer Engineering from:
2 Computer Science
3 Physics, Wilfrid Laurier University
4 Mechanical Engineering
* Also has Adjunct appointment

University Faculty
Electrical and Computer Engineering
Engineering Undergraduate Office

Engineering Undergraduate Office

Professor, Associate Dean of Engineering
G. E. Schneider,1 BASc, MASC, PhD (Waterloo)

Directors
Professor, Director of General Studies
G. M. Bragg,1 BASc (Toronto), PhD (Cambridge), PEng
Professor, Director of Exchange Programs
H. C. Ratz,1 BASc (Toronto), MS (Massachusetts Institute of Technology), PEng (Saskatchewan)

Associate Professor, Director of Admissions
L. E. Bodnar,2 BA, MA (Saskatchewan), PhD (McMaster)

Associate Professor, Director of First-Year Engineering
J. D. Ford,2 BEng (McGill), MASC, PhD (Toronto), PEng

Demonstrators
D. A. Fraser, BASc, MASC, BEd (Toronto), PEng (Waterloo)

J. Lowe, BSc (Carleton), Recipient of the Distinguished Teacher Award

K. Riepert, BASc (Waterloo)

Adjunct Faculty
C. F. A. Beaumont, BA (McMaster), MA (Toronto), (Retired)
R. H. Grasley
R. G. R. Lawrence, LLB (Toronto)
D. W. Schnurr, LLB (Toronto)

Faculty Members holding administrative appointments in the Engineering Undergraduate Office from:
1 Mechanical Engineering
2 Chemical Engineering
3 Electrical and Computer Engineering
University Faculty

English

Associate Professor, Department Chair

G.E. Sletvag, BA (Pacific Lutheran, MA, PhD (Nebraska)

Professor, President of the University

J. Downay, BA, BEd, MA (Memorial), PhD (London), D.H.L. (Maine), D.Litt (Memorial), LLD (New Brunswick), (effective April, 1993)

Associate Professor, Associate Chair and Graduate Officer

M.A. Gerhardt, BA (Montana), MA, PhD (Iowa)

Associate Professor, Associate Chair and Undergraduate Officer

W.R. Martin, BA (Concordia, MA (Chicago), PhD (Johns Hopkins)

Associate Professor and Co-operative Education Officer

R.N. Gosse, BA (Kansas), MA, PhD (Colorado)

Professors

L.A. Cummings, AB (Washington, AM (Missouri), PhD (Washington), Recipient of the OCCUFA (Ontario) Teaching Award

S. Fogel, BA (Carleton, MA (British Columbia), PhD (Purdue), J

J. Gold, BA (Birmingham), PhD (Wisconsin)

K.L. Ledbetter, AB (Central College, Mo.), MA, PhD (Illinois), Recipient of the Distinguished Teacher Award

D.P. Letson, BA (Waterloo), MA (McMaster), PhD (Toronto), J, Recipient of the Distinguished Teacher Award

W.R. Macnaughton, BA (Toronto), MA, PhD (Wisconsin)

W.U. Ober, BA (Washington and Lee), PhD (Indiana), 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)

D.G. Goodwin, BA, MA, PhD (Toronto)

R. Harris, BA (Queen's), MA (Dalhousie), MSoi (Alberta), MSc, PhD (Rensselaer)

M.W. Higgins, BA (St. Francis Xavier), MA, PhD (York), J

P.M. Hitchcliff, BA (British Columbia), MA, PhD (Toronto), J

R. Lister, BA, MA, PhD (Toronto)

H.M. Logan, AB (Franklin and Marshall), PhD (Pennsylvania)

A.L. Magnusson, BA (Manitoba), MA, PhD (Toronto)

M.G. McArthur, BA (Manitoba), MA, PhD (Western Ontario)

E.P. McCormack, MA (Glasgow), PhD (Manitoba), J

C.E. McIegg, BA, MA, PhD (Toronto), J

J.H. Miller, BA, BLS (McGill), MA, MPH (Waterloo), PhD (York), R

J.S. North, MA, PhD (Brown), MA (British Columbia), PhD (Alberta)

N.F. Randell, BA (Guelph), MA (Waterloo), PhD (York)

E.F. Shields, AB (Chestnut Hill), MA (Villanova), PhD (Illinois)

H. Frosch, BA (Washington), MA, PhD (Alberta), G

Assistant Professors

B. Cantar, BA, MA (Carleton, PhD (Queen's)

L. Dorney, MA, MA (Louisville), J

F. Easton, BA (British Columbia), MA, PhD (Princeton)

R. Graves, BA, PhD (Waterloo), PhD (Ohio)

M. Jones, MA, MA, PhD (Western, PhD (York)

C. Schyr, BA (Toronto), MA, PhD (Louisville)

K. Weisman, BA (Waterloo), MA, PhD (Chicago)

Adjunct Faculty

H.B. Ellis, BA (Rairions), MA, PhD (Illinois)

W.R. Martin, BA, MA, PhD, D.Litt et Phil (South Africa), Recipient of the Distinguished Teacher Award

C.A. Redmond, MA (Queen's), MA (Waterloo)

P.H. Smith, Jr., BA (Harvard), PhD (Pennsylvania)

W.K. Thomas, MA, PhD (Toronto)

Faculty Members holding cross appointments to English from:

1 Architecture

2 Religious Studies

3 Also has Adjunct appointment

* refers to faculty members at Conrad Grebel College

3 refers to faculty members at St. Jerome's College

4 refers to faculty members at Renison College

Environment and Resource Studies

Associate Professor, Department Chair

J.E. Robinson, BSc (Waterloo), MSc (York), PhD (Michigan)

Associate Professor, Undergraduate Officer

S.C. Lerner, BA (Ohio State), MA, PhD (Columbia), Recipient of the Distinguished Teacher Award

Professors

M. Chandrasekhar, BTech (Indian Institute of Technology, Kanpur), MAsc, PhD (Waterloo), PEng

G.R. Francis, BA (Toronto), BA (McGill), MA (British Columbia), PhD (Michigan)

W.B. Kendrick, BSc, PhD, BSc (Liverpool), FRSC

S. Kumaar, BSc, MSc (Punjab), MA, PhD (Toronto)

Associate Professors

R.B. Gibson, BA (York), MA, PhD (Toronto)

P.A. Kay, BSc (Toronto), MS, PhD (Wisconsin-Madison)

R.F. Keith, BSA (Guelph), MA, PhD (Michigan State)

G.B. Priddle, BA, MA, PhD (Clark)

J.B. Robinson, BA (Toronto), MES (York), PhD (Toronto)

Assistant Professors

J.J. Kay, BSc (McGill), MAsc, PhD (Waterloo)

G.O. Michalenko, BA, PhD (Saskatchewan)

Adjunct Faculty

F. Grew, BA (Waterloo Lunar), BEd (Toronto), MScEd (Niagara), PhD (Columbia)

J. Jackson, BA (Windsor)

R. Knapton, BSc (Lakehead), MAsc (British Columbia), PhD (Manitoba)

B. Savan, BSc (Toronto), PhD (London)

Faculty Members of Environment and Resource Studies holding cross and/or joint appointments to:

1 Geography

2 Systems Design Engineering

Faculty Members holding cross and/or joint appointments to Environment and Resource Studies from:

3 Systems Design Engineering

4 Biology
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:

Professor
C.K. Knapper, BA Hons (Sheffield), PhD (Saskatchewan)

Associate Professors
E. Carvalho, BA, MA, PhD (Waterloo)
R.T. Newkirk, BA, MSc, PhD (Western Ontario)

Assistant Professors
M.C. Delfgaauw, BEcon (Amsterdam)

Adjunct Faculty
K. Elliott, Diploma Creative Arts
S. Garrod, BA (McMaster), LL.D, MES (York)
P. Pickfield, BA (Western Ontario), LLB (Queen’s), LLM (Casoode Hall)
C. Rubec, BSc (Queen’s), MSc (McMaster)
H. Sadar, BSc (Middle East Technical), MSc (Louisiana State), PhD (Saskatchewan)
L. Smith, BA, MA (Waterloo)
S. Snider, BES (Waterloo), LLB (Osgeoode Hall)

Faculty Members of Environmental Studies holding cross and/or joint appointments to:

1. Psychology
2. Planning

Faculty Members holding cross and/or joint appointments to Environmental Studies from:
3. Economics
4. Planning

Fine Arts

Associate Professor, Department Chair
D.I. MacKay, BFA (Mt. Allison), MFA (Cornell)

Assistant Professor, Undergraduate Officer
J.G. Buyers, BFA (York), MEd (Toronto)

Professors
V. Rumant, BS (Columbia), MA (California, Berkeley)
P.Y. Forsyth, AB (Mount Holyoke), MA, PhD (Toronto), Recipient of the Distinguished Teacher Award
A. Roberts, BA (Guelph), MA (Claremont)
A.M. Urquhart, BFA (Buffalo)

Associate Professors
M.S. Bird, BA, MA, PhD (Iowa), R
W.B. Cowan, BSc (Waterloo), PhD (McGill)
A.N. Green, BFA (Art Institute of Chicago), Recipient of the Distinguished Teacher Award
E. Kilman, MA, PhD (Toronto)
J. Uhde, MA (Masaryk University Brno), PhD (Waterloo)

Assistant Professors
T. Seebohm, BEng, MEng, PhD (McGill), MARch (California, Berkeley), OAA, PEng
S.B. Taylor, MFA (Rhode Island)

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

French

Professor, Department Chair
D.W. Russell, BA, MA, PhD (Toronto)

Associate Professor, Associate Chair
R.J. Fournier, BA, MA, PhD (Western Ontario)

Professor, Undergraduate Officer
A. Ages, BA (Carleton), MA, PhD (Ohio State)

Associate Professor, Graduate Officer
J.-P. Beaulieu, BA (Sherbrooke), MA (Waterloo), PhD (Ottawa)

Associate Professors
C.A. Abbott, BA, MA, PhD (Ohio State), J
P.H. Dubé, BA, MA (Toronto), PhD (Ohio State)
J.R. Dugan, BA (Toronto), PhD (Yale)
H.S. Fournier, BA (Toronto), MA, PhD (Western Ontario)
R.W. Ryan, BA, MA (Dalhousie), Doctorat de 3e cycle (Université de Provence)
P.G. Socken, BA (Toronto), MA (Iowa), PhD (Toronto)
W.D. Wilson, MA, PhD (Trinity College, Dublin)

Assistant Professors
M. Archambault, BA, License ès Lettres (Montréal), MA, PhD (Toronto)
A.M. Miraglia, BA, MA, PhD (Toronto)

Language Instructors
P. Aplevich, BA, MA (Waterloo)
C. Black, Licence ès lettres (Grenoble), MA (Waterloo)
H. McLennan, 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
French Language (Studies in the)

Associate Professor, Director
C.C. Abbott, B.A., M.A., Ph.D. (Ohio State)

Participating Faculty
Associate Professor, Director
C.G. Abbott, B.A., M.A., Ph.D. (Ohio State)

Associate Professor, Director
J-P. Beaulieu, B.A.

Participating Faculty
Assistant Professor
T. Sabaryn, Licence ès lettres (Toulouse), B.A.

Assistant Professor
R.J. Foumier, B.A., M.A.

Assistant Professor
P.H. Dubé, B.A., M.A., Ph.D. (Montreal), French

Assistant Professor
J.P. Barraclough, B.A. (Sherbrooke), M.A. (Waterloo), Ph.D. (Ottawa), French

Assistant Professor
B. Singer, B.A., M.A. (Toronto), Ph.D. (Washington), History

Language Instructors
C. Black, Licence ès lettres (Grenoble), M.A.

T. Sabaryn, Licence ès lettres (Toulouse), French

E.L. LeDrew, B.A. (Toronto), M.A., Ph.D. (Colorado)
G.R. McBoyle, B.Sc., Ph.D. (Aberdeen), Recipient of the Distinguished Teacher Award
A.G. McLeLLan, B.Sc., Ph.D. (Glasgow)
G.W. Mitchell, B.A. (British Columbia), Ph.D. (Liverpool)
G.G. Mulamoottil, B.Sc. (Mysore), M.Sc. (Bombay), Ph.D. (Delhi)
J.G. Alison, B.A. (McMaster), M.A. (Colorado), Ph.D. (Johns Hopkins)
R.E. Preston, B.A. (Central Washington), M.A. (Washington), Ph.D. (Clark)
S.L. Smith, B.A. (Wright State), M.A. (Ohio State), Ph.D. (Texas A&M)
J.B. Theberge, B.Sc., M.Sc. (Guelph), M.A. (London), M.A. (British Columbia)
G. Wall, B.A. (Leeds), M.A. (London), Ph.D. (Hull)

Geography

Associate Professor, Department Chair
R.A. Bullock, B.A. (Belfast), Ph.D. (London)

Associate Professor, Department Chair
R.A. Bullock, B.A. (Belfast), Ph.D. (London)

Assistant Professor, Associate Chair
B.C. Matthews, B.A. (Toronto), A.M. (Missouri), Ph.D. (Cornell), Ph.D. (Sherbrooke), LL.D., Ph.D. (Pittsburgh)

Assistant Professor, Associate Chair
P.J. Howarth, B.A. (Cambridge), M.A. (Glasgow)

Professor, Associate Chair
P.J. Howarth, B.A. (Cambridge), M.A. (Glasgow)

R. Rasure, B.A. (Wayne State), M.A. (Clark), M.A. (Michigan)

L.T. Guelke, B.Sc. (Capa Town), M.A. (York), Ph.D. (Toronto)

J. Kay, B.A. (Mount Holyoke College), M.S. (Boston), Ph.D. (Wisconsin-Madison)

Faculty Members of Geography holding cross and/or joint appointments to:
1. Planning
2. History
3. Recreation and Leisure Studies
4. Earth Sciences
5. Biology

Faculty Members holding cross and/or joint appointments to Geography from:
6. Recreation and Leisure Studies
7. Environment and Resource Studies
8. Planning

*Also has Adjunct appointment*

Geological Engineering

Associate Professor, Chair of the Geological Engineering Board
L. Rothenburg, B.Sc. (Moscow), Ph.D. (Carleton), P.Eng.

Members of the Board of Geological Engineering

Professor, Dean of the Faculty of Engineering, Department of Mechanical Engineering
D.J. Burns, B.Sc., Ph.D. (Bristol), P.Eng., C.Eng

Professor, Department of Civil Engineering Chair
B.G. Hutchinson, B.Sc., M.Eng. (Queen's), P.Eng.

Professor, Department of Earth Sciences Chair

Professors, Department of Civil Engineering
W.C. Lennox, B.A.Sc., M.Sc. (Waterloo), Ph.D. (Lehigh), P.Eng
E.L. Matyas, B.A.Sc. (Toronto), D.I.C. (London), P.Eng

Professors, Department of Earth Sciences
J.A. Cherry, B.E. (Saskatchewan), M.E. (Calgary, Washington), P.Eng
M.B. Dusseault, B.Sc., M.Sc. (Alberta), P.Eng
P.F. Karrow, B.Sc. (Queen's), Ph.D. (Illinois)

Associate Professor, Department of Earth Sciences
S.K. Frape, B.Sc., M.Sc. (Queen's)
Gerontology
Professor, Director of the Program
W.F. Forbes, BSc, PhD, DSc (London), DIC, ARCS

Committee Members
Assistant Professor, Undergraduate Officer
J.P. Hirdes, BSc, MA, Diploma in Gerontology, PhD (Waterloo), Gerontology

Professor, Graduate Officer
N.H. Charman, BA (McGill), MS, PhD (Carnegie-Mellon), Psychology, Gerontology

Professors
J.C. Carlson, BSc, MSc, PhD (Massachusetts), Biology
J.E. Curtis, BA (Sir George Williams), MA (Central Michigan), MA (Cornell), Sociology
D.A. Winter, BSc, MSc (Queen's), PhD (Dalhousie), PEng, Kinesiology

Associate Professor
P. Naus, BA, PhD (Nijmegen, Netherlands), J, Psychology

Clinical Faculty
R. Pace, OD (Waterloo), FAAO

Adjunct Faculty
H.S. Coblentz, BA (Hons) (Durham), MRP (North Carolina), FRTPi, AICP, FSS, MIES
J.F. Gentleman, BA, MS (Chicago), PhD (Waterloo)
J.A. Jackson, MA, MB, BChir (Cambridge)
B.D. McPherson, MA (Western Ontario), PhD (Wisconsin)

Faculty Member of Gerontology holding cross appointments to:
1. Health Studies, Recreation and Leisure Studies, Sociology, Statistics and Actuarial Science
2. Sociology
Faculty Members holding cross appointments to Gerontology from:
3. Psychology
4. Optometry
5. Kinesiology
6. Biology

J refers to faculty members at St. Jerome's College

Greek
For faculty listing consult Classical Studies.

Health Studies
Associate Professor, Department Chair
D.E. Mills, BS Ag (Purdue), PhD (Indiana), Recipient of the Distinguished Teacher Award

Associate Professor, Associate Chair, Undergraduate Affairs
R.S. McCain, BSc (McGill), PhD (Purdue)

Professor, Associate Chair, Graduate Affairs
L. Hoffman-Goetz, BA (SUNY, Binghamton), MA, PhD (Michigan)

Professors
A. Bonen, BA (Western Ontario), MSc, PhD (Illinois)
K.S. Brown, BMath, PhD (Waterloo)
V.T. Farewell, BMath, MMath (Waterloo), PhD (London)
W.F. Forbes, BSc, PhD, DSc (London), DIC, ARCS
M.E. Houston, BSc (Toronto), PhD (Waterloo)
M.P. Zanna, BA, PhD (Yale)

Associate Professors
A.J.R. Cameron, BA, MA, PhD (Waterloo)
A.M. Myers, BA (Winnipeg), MA, PhD (York)
K.M. Prakash, BA, MA, PhD (British Columbia)
M.T. Sharratt, BA, MA (Western Ontario), PhD (Wisconsin)
P. Wainwright, BSc (Rhodes, S.A.), MA, PhD (Waterloo)

Assistant Professor
J.A. Husted, BScN, MSc (British Columbia), PhD (Columbia)

Research Associate and Lecturer
R. Walker, BSc, MSc (Western Ontario)

Adjunct Faculty
S. Evans, BSc (Ottawa), MSc (Cornell), PhD (Western Ontario)
V. Huang, BSc (National Taiwan University), MSc (Notre Dame), PhD (Fordham)
History

Associate Professor, Department Chair
D.A. Davies, BA, PhD (Washington), Recipient of the Distinguished Teacher Award

Associate Professor, Undergraduate Officer
K.D. Eagles, BA (Cambridge), MA, PhD (Washington)

Professor, Graduate Officer
M.J. Craton, BA (London), MA, PhD (McMaster) FRHistS

Professors
J.R. English, BA (Waterloo), AM, PhD (Harvard), FRSC
P.Y. Forsyth, AB (Mount Holyoke), MA, PhD (Toronto), Recipient of the Distinguished Teacher Award
L.T. Guelka, BSc (Cape Town), MA (York), PhD (Toronto)
P.J. Harrigan, BA (Detroit), AM, PhD (Michigan)
R.C. MacGillivray, BA (Queen’s), AM, PhD (Harvard)
K.M. McLaughlin, BA (Waterloo), MA (Dalhousie), PhD (Toronto), J
W.L. Mitchell, BA, MA, PhD (York)
J.F.H. New, BA, MA (Melbourne), PhD (Toronto), FRHistS
W.O. Packull, BA (Guelph), MA (Waterloo), PhD (Queen’s), G

Associate Professors
N.R. Ball, BA (McMaster), MA, PhD (Toronto)
L.A. Curchin, BA (Western Ontario), MA (Carleton), PhD (McMaster)
R.L. Fowler, BA, MA (Toronto), PhD (Ottawa)
D.J. Horton, BA (Waterloo Lutheran), MA (McMaster), PhD (McGill)
S.K. Johannesen, BA (Evangel College), MA, PhD (Missouri)
H.A. MacDonald, BA, MA, PhD (Toronto)
M.T. Malone, BA (National University of Ireland, Dublin), BEd, MA, PhD (Toronto), J. Recipient of the Distinguished Teacher Award
L.L. Neuhaus, BA (San Francisco), MA (Oregon), PhD (McMaster)
R.J. Sawatsky, BChEd, CMHC, BA (Bethel College), MA (Minnesota), MA (Princeton), G
C.A. Snyder, BA (Waterloo), MA, PhD (McMaster), G
G.J. Stoltz, BA, MA, PhD (Waterloo), PhD (McMaster), J
J.A. Wahl, CR, BA (Western Ontario), MA (St. Louis), J
J.W. Walker, BA (Toronto), MA (Waterloo), PhD (Dalhousie)
D.E. Wright, BA (Cambridge), MA, PhD (McMaster)

Assistant Professors
S.L. Ager, BA (Queen’s), PhD (British Columbia)
L.G. Friesen, BA (Waterloo), MA, PhD (Toronto), G
G.W. Hayes, BA, MA (Wilfrid Laurier), PhD (Western)
K.J. MacHardy, BA, MA (Western Ontario), PhD (Berkeley)
L. Taylor, BA (Western Ontario), MA (London), PhD (Michigan)

Adjunct Faculty
E.P. Patterson, BA (Baylor), MA (Kansas), PhD (Washington), (Retired)
J.O. Stubbs, BA (Toronto), MSc (Econ) (London), DPhil (Oxford)

Faculty Member holding cross appointment to History from:

1 Geography
2 Classical Studies
3 Systems Design Engineering
4 Religious Studies

‘G’ refers to faculty members at Conrad Grebel College
‘J’ refers to faculty members at St. Jerome’s College

Independent Studies

Associate Professor, Director
G.A. Griffin, BA (Colgate), MA, PhD (Wisconsin), Recipient of the Distinguished Teacher Award

Associate Professors
P.D. Beam, BA (Waterloo), MA (McMaster), PhD (Toronto)
M. Ellett, National Diploma in Design (High Wycombe)

Academic Advisor
A.L. Dagg, BA, MA, PhD (Waterloo)

Academic Board Members
Associate Professor, Academic Board Chair
R.H. Holmes, BA, MA (Montana), PhD (Washington)

Professor
J. Gold, BA (Birmingham), PhD (Wisconsin)

Associate Professors
W.R. Hawthorn, BSc, MSc (McMaster), PhD (Western Ontario)
S.C. Lerner, BA (Ohio State), MA (Columbia), Recipient of the Distinguished Teacher Award
C.A. Struthers, BMath, MMath, PhD (Waterloo)

Assistant Professor
J.A. Robinson, BSc (Durham), MSc, PhD (Essex)

Interdisciplinary Social Science

For faculty listing consult Social Development Studies.
University Faculty
International Studies - Latin

International Studies
Associate Professor, Director
A.F. Cooper, BA, MA (Waterloo), DPhil (Oxford)

Advisory Board
Professors
J.R. English, BA (Waterloo), AM, PhD (Harvard)
D.J. Sahas, BA (Athens), STM (Christian Theological Seminary), PhD (Hartford Seminary Foundation)

Associate Professor
J.W. Walker, BA (Toronto), MA (Waterloo), PhD (Dalhousie)

Assistant Professor
R.J.R. Mathies, BA (Waterloo), MA (Guelph), EdD (Toronto)

Italian
Associate Professor, Undergraduate Officer
G.A. Niccoli, BA, MA, PhD (British Columbia), J

Associate Professor
V.P. Goklin, BA (McMaster), MA (Colorado), PhD (California, Berkeley), J

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Japanese
For faculty listing consult East Asian Studies.

Kinesiology
Associate Professor, Department Chair
J.S. Frank, BSc, MSc (Waterloo), PhD (Southern California)

Associate Professor, Associate Chair, Undergraduate Affairs
I.D. Williams, MS, PhD (Illinois)

Associate Professor, Associate Chair, Graduate Affairs
E.E. Pati, BSC (Indian Institute of Technology), MSc Eng (New Brunswick), PhD (Simon Fraser)

Associate Professor, Head of School of Anatomy
D.A. Ranney, BA, MD (Toronto), FRCS (England)

Professors
N.J. Ashton, BSc (McGill), MS (Michigan)
P.J. Bishop, BSc, BPE (Waterloo), MSc (Western Illinois), PhD (Minnesota)
A. Bonan, BA (Western Ontario), MSc, PhD (Illinois)
N. Charness, BA (McGill), MS, PhD (Carnegie-Mellon)
J.E. Curtis, BA (Sir George Williams), MA (Central Michigan), MA (Cornell)
H.J. Green, BA, BPHE (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), Doctor H.C. (Jyvaskyla)
D.A. Winter, BSc, MSc (Queen’s), PhD (Dalhousie), PEng

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-Binghampton), MA, PhD (Michigan)
S.M. McGill, BPE (Toronto), MSc (Ottawa), PhD (Waterloo)
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)
J.A. Thomson, BA, BPE (McMaster), PhD (Waterloo)
R.P. Wells, BSc (Manchester), MEng (McMaster), PhD (Manchester)

Korean
For faculty listing consult East Asian Studies.

Latin
For faculty listing consult Classical Studies.
Latin American Studies

Assistant Professor, Director
M. Gutierrez, BA, MA (McGill), PhD (Laval)

Professor
M.J. Craton, BA (London), MA, PhD (McMaster), FRHistS

Associate Professor
A. Fama, BA (Brock), MA (Western Ontario), PhD (SUNY at Buffalo)

Assistant Professors
T. Korovkin, BA, MA (Moscow), MA, PhD (York)
C.A. Snyder, BA (Waterloo), MA, PhD (McMaster), G

'G' refers to faculty members at Conrad Grebel College

Legal Studies

Committee Members
Associate Professor, Director
C.G. Brunk, BA (Wheaton), MA, PhD (Northwestern), G

Associate Professors
P.J. Carrington, BA (Harvard), MA, PhD (Toronto)
F.G. Reynolds, BSc, MSc (Manitoba), FSA, FCIA, MAAC
J.A. Wahl, CR, BA (Western Ontario), MA, PhD (St. Louis), J
R.P. Wootstencroft, BA, PhD (Alberta)

Assistant Professor
S.P. Gunz, BA, LLB (Sydney), MBA (Manchester)

Adjunct Faculty
S.R. Garrod, BA (McMaster), LLB, MES (York)

'M' refers to faculty members at Conrad Grebel College

Management Sciences

Professor, Department Chair
M.J. Magazine, BS (City College of New York), MS (New York University), MEng, PhD (Florida), PEng

Associate Professor, Associate Chair for Undergraduate Studies
N.M. Fraser, BASc, MASC, PhD (Waterloo), PEng

Professor, Associate Chair for Graduate Studies and Director of Waterloo Management of Integrated Manufacturing Systems Research Group (WATMIMS)
J.H. Bookbinder, MBA (Toronto), MS, PhD (California, San Diego)

Associate Professor, BNR-BC Tel-NESRC/SSHRC Chair in Management of Technological Change
P.D. Guild, BA (Waterloo), MA (Carleton), DPhil (Oxford)

Professors
D.W. Connagh, BA (Stanford), MS (Carnegie Tech), MA, PhD (California, Berkeley), PEng
S.D. Saleh, BA (Cairo), MA, PhD (Case Western Reserve)
G.N. Soulsi,1 BASc (Toronto), MA, PhD (Case Western Reserve)
R.G. Vickson, BSc (British Columbia), PhD (Massachusetts Institute of Technology)

Associate Professors
I. Bernhardt, BA (New York), PhD (California, Berkeley)
D.M. Dils, BS (California Polytechnic), MBA, PhD (Oregon)
J.D. Fuller, BSc (Queen's), MSc, PhD (British Columbia)
Y. Gorochak, BA, MSc (Tel Aviv), PhD (British Columbia)
J.B. Moore, BASc (Toronto), MMath, PhD (Waterloo), PEng
F. Satyayani, BS (Idaho), MSc, PhD (Victoria)

Assistant Professors
A. Grosfeld-Nir, BA (Haifa), PhD (Northwestern)
E.M. Jaworski, BSc (St. Francis Xavier), MBA (Calgary), PhD (Waterloo)
V. Mason, BASc, MASC (Toronto), PhD (Waterloo), PEng, (Retired)*
S.J. Winter, BA (California, Berkeley), MA (Claremont), PhD (Arizona)

Lecturers
C.G. Blake, BASc (Waterloo), MS (Johns Hopkins), PEng

Adjunct Faculty
T. Bryant, BA (Carleton), SM, PhD (Massachusetts Institute of Technology)
J.A. Baucott, BSc, BE (Sydney), MSc, PhD (Birmingham)
D. Gerwin, BS (Carnegie-Mellon), MS (Case Western), PhD (Carnegie-Mellon)
K.N. McKee, BMus, MASC, PhD (Waterloo)
J. Nathwani, BASc, MASC, PhD (Toronto)
H. Noori, BSc (Pahlavi), MBA (Ottawa), PhD (Western)

Faculty Member of Management Sciences holding cross appointment to:
1 Systems Design Engineering

'M' also has Adjunct appointment

Management Studies

Associate Professor, Program Director
T.J. Downey, BA (Waterloo), MA, PhD (Western Ontario)

Mathematics

(See also Applied Mathematics, Combinatorics and Optimization, Computer Science, Pure Mathematics, Statistics and Actuarial Science.)

Associate Professor
P.C. Brifflinger, BA (McMaster), MA (Waterloo)

Assistant Professor
C. Hewitt, BSc (Aberdeen), MSc (Aberdeen), PhD (Waterloo)

Assistant Professor
R. Bradford, BEd (Western), BMath (Waterloo)

Lecturers, Faculty of Mathematics
R. Bradford, BEd (Western), BMath (Waterloo)
L.E. Davidson, BSc (Toronto)
B.A. Ferguson, BMath (Waterloo)
R.G. Scoins, BA (Western Ontario), MMath (Waterloo), (Director of Co-op Teaching)

'G' refers to faculty members at Conrad Grebel College

'J' refers to faculty members at St. Jerome's College
Mechanical Engineering

Professor, Department Chair
H.F. Sullivan, BASc (Waterloo), AM, PhD (Princeton), PEng

Associate Professor, Associate Chair Undergraduate Studies
M. Rankeizbult, BSc (Robert College), MSc (Middle East Technical), PhD (Northwestern), PEng

Professor, Associate Chair Graduate Studies
H.R. Martin, BSc, MSc (Queen's, Belfast), PhD (Nottingham), DSc (Queen's, Belfast), PEng

Professors
K.G. Adams, BSc (Queen's), MASc, PhD (Waterloo), PEng
G.C. Andrews, BASc, MASc (British Columbia), PhD (Waterloo), PEng
G.M. Bragg, BASc (Toronto), Bachelor of Science (Cambridge), PEng
E. Brunodet, BSA (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,* BSc (McGill), DIC, PhD (Imperial College), DSc (University of London)
G. Glinka, MSc, PhD, DSc (Warsaw Technical University)
K.G.T. Hollands, BASc (Toronto), PhD (McGill), PEng, FCSME
J.H.G. Howard, BSc (Queen's), MSc, PhD (Birmingham), PEng
W.H. Hui,* BSc (Peking), PhD, DSc (Southampton)
H.W. Kerr, BASc, MASc, PhD (Toronto), PEng
J.G. Lenard, BASc, MASc, PhD (Toronto), PEng
P. Niessen, BSc (McMaster), MASc, PhD (Toronto), PEng
R.J. Pick, BASc (British Columbia), MSc (Imperial College), PhD (Waterloo), PEng
A. Plumtree, BSc, PhD (Nottingham), PEng, CEng, FIM

G.D. Railby, BSc, MSc (Western Ontario), PhD (Minnesota), PEng, Recipient of the Distinguished Teacher Award
G.E. Schneider, BASc, MASc, PhD (Waterloo)
P.R. Slawson, BASc, MASc, PhD (Waterloo), PEng
A.B. Strong, BASc (Waterloo), MSc (Imperial College), PhD (Waterloo), PEng
R.A. Varin, MSc, PhD (Warsaw Technical)
M.M. Yovanovich,1 BSc (Queen's), MS (Buffalo), ME, ScD (Massachusetts Institute of Technology), FAAA, FAIAA, FASME

Associate Professors
G.A. Davidson, BASc, PhD (Toronto), PEng
F.M. Ismail, BSc, MSc (Alexandria), PhD (McMaster)
J.B. Medley, BASc, MASc (Waterloo), PhD (Leeds), PEng
G.D. Stubley, BASc, (Waterloo), MSc (Stanford), PhD (Waterloo), PEng
D.E. Weckman, BASc, MASc, PhD (Waterloo), PEng

Assistant Professors
S. Bedi, BTech (ITT, Kanpur), MASc (British Columbia), PhD (Victoria)
R.A. Fraser, BSc (Queen's), MA, PhD (Princeton), PEng
M.F. Golnabekhi,2 BSc, MASc (Worcester Polytechnic Institute), PhD (Cornell)
J.P. Hulseston, BA, BAI, PhD (Trinity College, Dublin)
S.B. Lamberto, BASc, MASc, PhD (Queen's), PhD (Waterloo)
E.J. Weckman, BASc, MASc, PhD (Waterloo)

Research Assistant Professor
A.P. Brunger, BASc, ME, PhD (Toronto), PEng
S. Lee, BASc, MASc, PhD (Waterloo)

Adjunct Faculty
R.G.R. Lawrence, QC
J.A. Schey, Dipl Ing, CSc (Budapest), Dr. Ing. h.c. (Budapest), Dr. Ing. h.c. (Miskolc), FASM, FASME, PEng (Retired)

Laboratory Director
M. Kaptelin, 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 Applied Mathematics
4 Physics

University Faculty
Mechanical Engineering
Middle East Studies

Middle East Studies

Director
To be announced.

Professors
A. Banerji, BA (Calcutta), MA (North Dakota State), School of Architecture
A. Diem, BA (Wayne State), MA (Clark), PhD (Michigan), Department of Geography
M.I. Elmasry, BSc (Cairo), MASc, PhD (Ottawa), PEng, Department of Electrical and Computer Engineering
W. Klaassen, BA, BD (Goshen), PhD (Princeton), P. Department of Religious Studies
J.S. North, BA, MA (British Columbia), PhD (Alberta), Department of English
D.J. Sahas, BA (Athens), STM (Indianapolis), PhD (Hartford), Department of Religious Studies

Associate Professors
A.F. Cooper, BA, MA (Waterloo), DPhil (Oxford), Department of Political Science
L.A. Curnill, BA (Western Ontario), MA (Toronto), MA (Carleton), PhD (Ottawa), Department of Classical Studies
F.M. Naqib, BSc (Washington), MSc (Oregon), PhD (Queen's), Department of Economics

Resource Persons
Professors
V.K. Handa, BSc (Calcutta), BSc (Eng) (London), MSc (Queen's), MASc, PhD (Waterloo), PEng, Department of Civil Engineering
W.C. Lennox, BASc, MSc (Waterloo), PhD (Lehigh), PEng
S.D. Saleh, BA (Cairo), MA, PhD (Case Western Reserve), Department of Management Sciences

'G' refers to faculty members at Conrad Grebel College
'P' refers to faculty members at St. Paul's College

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 Applied Mathematics
4 Physics
University Faculty
Music

Associate Professor, Department Chair
W.R. Maust, BS (Eastern Mennonite College), BMus (Peabody Conservatory), MMus, PhD (Indiana)

Associate Professors
L.J. Enns, ARCT (Toronto), BSM (Canadian Mennonite Bible College), BMus (Wilfrid Laurier), MMus, PhD (Northwestern)
D.B. Huron, BSc (Waterloo), MA (York), PhD (Nottingham)
H. Martens, ARCT (Toronto), LRSM, BA (Minnesota), PhD (Columbia)
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
M. Jarrett
T. Kroetsch, BMus (Wilfrid Laurier), ARCT (Toronto), LTCL (London), LRSM (London)
A. Lederman, MMus (York)
A. Martin, ARCT, BMus (Toronto), MMus (Eastman)
S. Martin, BMus (Wilfrid Laurier), MMus (Toronto)
R. Shantz, BMusEd (Goshen), MMusEd (South Methodist)
K. Tomlin, BA (Waterloo), BEd (Western Ontario)
M. Vander Woude, BFA, MFA (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
D. Haas, Kantor (Stuttgart); Harpsichord, Organ
A. Hamilton, DMA (Northwestern); Flute
J. Helmers, BMus (Queen’s), MMus (Indiana); Cello
M. Elligen Hull, BMus (Waterloo); Voice
C. Isaac, BMus (Wilfrid Laurier); Piano
T. Kroetsch, BMus (Wilfrid Laurier), LRSM (Royal Schools of London); Piano
D. Ludolph, BMus (Wilfrid Laurier); Voice

J. Mason, BM (Shenandoah Conservatory), MM (Catholic University, Washington); Cello
J. Noyes, Tuba
T. Prudom, ARCT, BMus (Queen’s), MMus (Western Ontario); Clarinet
D. Pullen, Saxophone
P. Thomson, University of Toronto, Juilliard; Piano
J. Tickner, Trumpet
M. Wood, Percussion

Optometry

Professor, Director, The School of Optometry
A.P. Cullen,^ Dip Opt (City University-London), MSc (Saskatchewan), OD (Pennsylvania College of Optometry), PhD (City University-London), FAAO, FBCO, DCLP

Associate Professor, Associate Director
J.G. Strong, OD, MSc (Waterloo)

Assistant Professor, Undergraduate Officer
J.K. Hovis, OD, MS (Ohio State), PhD (Indiana), FAAO

Professor, Undergraduate Officer
T.D. Williams, OD (College of Optometry of Ontario), MS, PhD (Indiana), FAAO, Recipient of the Distinguished Teacher Award

Associate Professor, Graduate Officer
K.M. Robertson, OD, MSc, PhD (Waterloo), FAAO

Assistant Professor, Associate Graduate Officer
W.R. Babier, BSc (Queen’s), OD, MSc (Waterloo), PhD (Cambridge), FAAO, MBCO

Associate Professors, Admissions Officers
M.G.E. Collender, BSc (Concordia), OD, MSc (Waterloo), MPhil (Aston), FAAO
M.M. Spafford, OD, MSc (Waterloo), Recipient of the Distinguished Teacher Award

Clinical Supervisor, Clinic Director
R. Pace, OD (Waterloo), FAAO

Clinical Supervisor, Assistant Clinic Director
K. Hadley, OD (Waterloo)

Professors Emeriti
E.J. Fisher, BA, MA (Toronto), DSc (Pennsylvania College of Optometry), FAAO, (Retired)
W.M. Lyle, OD (College of Optometry of Ontario), MS, PhD (Indiana), FAAO, (Retired)*

Professors
W.K. Adrian, Dip Opt, Dr-Ing (TH Darmstadt), Dr habil, apl Professor (Karlsruhe)
A. Ramole, BFA (Manitoba), OD (College of Optometry of Ontario), MS, PhD (Indiana), FAAO
J.G. Sivak, LSCO (Montreal), MS (Indiana), PhD (Cornell), OD (Pennsylvania College of Optometry), FAAO
G.C. Woo, OD (College of Optometry of Ontario), MS, PhD (Indiana), LSCO (Melbourne), FVCO, FAAO, DiplLV

Associate Professors
R. D. Beauchamp, BA (McMaster), MA, PhD (Brown)
M.C. Campbell, BSc (Toronto), MSc (Waterloo), PhD (ANU), FAAO, NSERC University Research Fellow
B.R. Chou, BSc (Toronto), OD, MSc (Waterloo), FAAO
M.J. Doughty, BSc (London), MSc, PhD (Warwick), FAAO
J.G. Fianagang, BSc (Optom), PhD (Aston), Adjunct Associate Professor, Dept. of Ophthalm, U. of T., MBCO, FAAO (on leave)
D.A. Ranney, BA, MD (Toronto), FRCS (England)
R.D. Seim, BA (Queen’s), PhD (Waterloo)

Assistant Professor
D. Fonn, Dip Optom (S.A.), M Optom (NSW), FAAO

Assistant Professor (Part-time)
B. Sivak, BPT (McGill), MSc, PhD (Waterloo)

Research Assistant Professor
D.B. Elliott, BSc (Optom), PhD (Bradford), MBCO

Lecturer
B.E. Robinson, OD (Waterloo), MPH (Washington), FAAO

Clinical Faculty
D.B. Buck, OD (College of Optometry of Ontario), FAAO
K. Durnbellow, BSc (Optom), (UWIST, Cardiff), MSc (Waterloo), MBCO  
P.K. Hryndchuk, OD (Waterloo), FAAO  
S.J. Lead, BSc (Optom) (UWIST), PhD (UWIST), FBCO  
A.D. Plotkin, BS (Adelphi), BS, OD (Pennsylvania College of Optometry), MSc (Waterloo)  
C.L. Prokopich, OD, BSc (Waterloo)  
L. Sorbara, OD (Waterloo), FAAO  
R. Wiggins, BS, OD (Indiana)  

Adjunct Faculty  
I. Baker, OD (College of Optometry of Ontario), FAAO  
R.L. Beades, BS (N.C. State University), MS (Pittsburgh)  
R.L. Brilliant, BS (SUNY at New Paltz), BS, OD (Pennsylvania College of Optometry)  
H.A. Green, BS, OD (Pennsylvania College of Optometry)  
B.A. Holden, BAppSc LOSc (Melbourne), PhD (City University, London)  
T. Liu, BSc Med (Hons), MB, BS (Sydney), FRACP, FRCP(C)  
J.V. Lovaasik, BSc (McGill), OD, MSc, PhD (Waterloo), FAAO  
J. Parker, BA (Pennsylvania), MS (Georgetown), PhD (North Carolina)  
D.J. Piggins, Dip Opt (City University, London), MA (Waterloo), FBCO  
B. Schumacher, MD (Toronto)  
P.B. Weind, BSc (Toronto), MD (McMaster), FRCS(C)  
J. Wild, BSc (Optom) (City University, London), MSc, PhD (Aston), FBCO  
P.B. Wilcock, DVM (Guelph), MS, PhD (Purdue)  
M.E. Woodruff, OD (College of Optometry of Ontario), PhD (Indiana), FAAO (Retired)  
S.G. Zontos, BOptom, PhD (NSW), FAAO  
S. Zmigra, BA (Cornell), MS, PhD (Rutgers)  

Faculty Members of Optometry holding cross appointments to:  
1 Systems Design Engineering  
2 Gerontology  
3 Biology  
4 Psychology  
5 Physics  

Faculty Members holding cross appointments to Optometry from:  
6 Kinesiology  
7 Psychology  

* Also has Adjunct appointment  

Clinical Faculty – Part-time  
W.B. Andrews, BA, OD (Waterloo), FAAO  
A. Bernardi, BSc, OD (Waterloo)  
D.R. Bock, OD (Waterloo)  
R.R. Bock, OD (College of Optometry of Ontario)  
K. Burns, BSc (Western), OD (Waterloo)  
R. Chen, OD (College of Optometry of Ontario)  
C. Coles, BSc (Marymount), OD (New England)  
C. Dessuresault, OD (Waterloo)  
P. Devenny, BSc, OD (Waterloo)  
J.L. Dippel, OD (Waterloo)  
G. Gies, OD (Waterloo)  
D.R. Goemans, OD (Waterloo)  
P. Goemans, OD (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)  
L. Lazarus, BSc (Guelph), OD (Waterloo)  
R. Makaran, BSc (Western), OD (Waterloo)  
C. Matyas, OD (Waterloo)  
J. McGugan, OD (Waterloo)  
J. Newman, OD (Waterloo)  
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M. Pollock, OD (Waterloo)  
M. Rosain, BSc (Western), OD (Waterloo)  
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J. Wilkinson, BSc (University of Kent at Canterbury), OD (Waterloo)  
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‘G’ refers to faculty members at Conrad Grebel College.  
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‘R’ refers to faculty members at Renison College.
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J. Wubnig, 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

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‘J’ refers to faculty members at St. Jerome’s College

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D. Hemmings, BSc, PhD (Bristol)

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Planning, Urban and Regional

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Faculty Members holding cross appointments to:
1. Biology
2. Chemistry
3. Applied Mathematics
4. Mechanical Engineering

Faculty Members holding cross appointments to Physics from:
5. Applied Mathematics
6. Chemistry
7. Optometry
8. Mechanical Engineering

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Faculty Members of Planning holding cross and joint appointments to:
1 Geography
2 Environmental Studies
3 Faculty Members holding cross and joint appointments to Planning from:
3 Environmental Studies
4 Geography
5 Faculty Member holding joint appointment with Environmental Studies
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2 Pure Mathematics/Combinatorics and Optimization
3 Pure Mathematics/Computer Science

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G. Wall, BA (Leeds), MA (Toronto), PhD (Hull)
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M.E. Havitz, BSc, MSc (Michigan State), PhD (Texas A&M)
F. Johnson, BA, MA (Windsor), PhD (Minnesota)
S.M. Shaw, BPE, MSc (Dalhousie), PhD (Carleton)

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Religious Studies - Social Development Studies

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A.M. Pedlar, BA (Wilfrid Laurier), MA, PhD (Waterloo)
Adjunct Faculty
D. Ng, BA (Lingnan), MA (Carver), MS, ReD (Indiana)
D. Reid, MA, PhD (Waterloo)

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2 Geography
Faculty Members holding cross appointments to Recreation and Leisure Studies from:
3 Geography
4 Gerontology

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1 Fine Arts
2 English
3 History

'G' refers to faculty members at Conrad Grebel College
'J' refers to faculty members at St. Jerome's College
'P' refers to faculty members at St. Paul's College
'R' refers to faculty members at Renison College

Russian

For faculty listing consult Germanic and Slavic Languages and Literatures.

Sexuality, Marriage and the Family (Studies in)

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J.P. Theis, BA (Western), MA (Notre Dame), PhD (Windsor), J

'J' refers to faculty members at St. Jerome's College

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Lecturer, Co-ordinator of Placements, Diploma Program
D. Clark, BA, BSW (Western Ontario), MSW (Toronto), R

Professor Emeritus
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J.O. Fowler, BA (Toronto), MEd, PhD (Alberta), R

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R. Lahue, BSc (Fordham), PhD (Waterloo), R
M.I. Nagler, BA (British Columbia), MA (Chicago), PhD (Stirling, UK), R
M. Zentner, BA (Temple), MSW (Kansas), R (on leave)

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B. Bell-Rowbotham, BA, MA (Western Ontario), R
L. Fusco, BA (Hofstra), MA (Chicago), R
Society, Technology and Values

Associate Professor, Director
N.R. Ball, BA (McMaster), MA, PhD (Toronto), Systems Design Engineering, Northern Telecom Professor of Engineering Impact on Society

Associate Professor, Option Co-ordinator
S.C. Lerner, BA (Ohio State), MA (Columbia), Recipient of the Distinguished Teacher Award, Environment and Resource Studies

Advisory Board

Professors
M. Chandrashekhar, BTech (Indian Institute of Technology, Kanpur), MSc, PhD (Waterloo), PEng (ex-officio) Systems Design Engineering
M.E. Jernigan, SB, SM, PhD (Massachusetts Institute of Technology), PEng, Recipient of the Distinguished Teacher Award, Systems Design Engineering

Associate Professors
G.F. Atkinson, MA, PhD (Toronto), CChem, FRSC (UK), FCIC, Chemistry
J.W. Hepburn, BSc (Waterloo), PhD (Toronto), Chemistry
R.D. Legge, BA (Transylvania), STB (Harvard), PhD (McMaster), P, Religious Studies
J.A. Thomson, BA, MSc (McMaster), PhD (Waterloo), Kinesiology
B.L. Willis, BASc, MA, PhD (Waterloo), PEng, Systems Design Engineering

Assistant Professors
D.B. Huron, BIS (Waterloo), MA (York), PhD (Nottingham), Music
P.L. Raguse, BMath (Waterloo), PhD (California, Berkeley), Computer Science

Sociology

Professor, Department Chair
R.D. Lambert, BA, MA (McMaster), PhD (Michigan)

Associate Professor, Associate Chair for Undergraduate Studies
F.A. Fasick, BA (Pennsylvania State), MA, PhD (Columbia)

Professor, Associate Chair for Graduate Studies
J. Goyder, BA (Bishop's), MA, PhD (McMaster)

Professor Emeritus
H.J. Falding, BA, BSc, MA (Sydney), PhD (Australian National), FRSC

Professors
J.E. Curtis, BA (Sir George Williams), MA (Central Michigan), MA (Cornell)
W.F. Forbes, BSc, PhD, DSc (London), DIC, ARCS
R.C. Prus, BA (Manitoba), MA, PhD (Iowa)
K. Westhues, BA (Conception), MA, PhD (Vanderbilt), Recipient of the Distinguished Teacher Award
A. Wiper, BA, MA (McGill), PhD (California, Berkeley)
J. Zuzanek, MA (Moscow State University), CSc (Prague Institute of Sociology), PhD (Charles University, Prague)

Associate Professors
P.J. Carrington, BA (Harvard), MA, PhD (Toronto)
F. Desroches, BA (Waterloo), MA (Toronto), PhD (Waterloo), J
A. Muszynski, BA (McGill), MA, PhD (British Columbia)
M.I. Nagler, BA (British Columbia), MA (Chicago), PhD (Stirling, UK), R
N. Thibeau, MA (Boston), PhD (Massachusetts), MSc (Wisconsin), PhD (British Columbia)

Assistant Professors
L. Dawson, BA (Queen's), MA, PhD (McMaster)
R. Helme-Hayee, BA/BPhE, MA (Queen's), PhD (Toronto)
J.P. Hirdes, BSc, MA, PhD (Waterloo)
R.D. Hiscott, BA (Carleton), MA (Queen's), PhD (Toronto)
E. Nelson, BA (Manitoba), PhD (London School of Economics)
Adjunct Faculty
A.J. Fleras, BA (Waterloo), MA (McMaster), PhD (Victoria, New Zealand)
D. Kubat, MA (Kansas), PhD (L. Maximilian, Munich), (Retired)
B.D. McPherson, BA, MA (Western Ontario), PhD (Wisconsin)

Faculty Members of Sociology holding joint appointments to:
1 Kinesiology
2 Gerontology
3 Recreation and Leisure Studies
4 Kinesiology
* Also has Adjunct appointment
'J' refers to faculty members at St. Jerome’s College
'R' refers to faculty members at Renison College

Participating Adjunct Faculty at Wilfrid Laurier University
Professor
A.A. Bomás, BA (Kentucky), MA (Indiana), PhD (Pennsylvania State)

Statistics and Actuarial Science
Professor, Department Chair
K.S. Brown,3 BMath, PhD (Waterloo)

Associate Professor, Associate Chair, Statistics, Undergraduate Affairs
R.W. Oldford, BMath (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)

Professor Emeritus
V.P. Godambe, MSc (Bombay), PhD (London)

Professor, OM/NSERC Industrial Research Chair in Quality and Productivity
C.F.J. Wu, BSc (Taipei, Taiwan), PhD (California)

Professors
B. Abraham, BSc (Kerala), MSc (Guelph), PhD (Wisconsin)
P.P. Boyle,6 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,4 BMath, MMath, PhD (Waterloo), DIC (Imperial College)
W.F. Forbes,7 BSc, PhD, DSc (London), DIC, ARCS
K.W. Hipel,5 BASc, MASC, PhD (Waterloo)
J.D. Kalbfleisch, BSc, MMath, PhD (Waterloo)
J.G. Kalbfleisch, BSc (Toronto), MA, PhD (Waterloo)
J.F. Lawless, BSc, MSc, PhD (Waterloo)
D.L. McLeish, BSc (Queen’s), MSc (Toronto), PhD (McGill)
H.H. Panjer, BA, MA, PhD (Western Ontario), FSA, FCIA

Statistics and Actuarial Science
Professor, Department Chair
K.S. Brown,3 BMath, PhD (Waterloo)

Associate Professor, Associate Chair, Statistics, Undergraduate Affairs
R.W. Oldford, BMath (Waterloo), MSc, PhD (Toronto)

Associate Professor, Associate Chair, Actuarial Science
K.P. Sharp, BA (Cambridge), MA (California, Berkeley), PhD (Waterloo), FCIA, FIA, FSA

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J.G. Kalbfleisch, BSc (Toronto), MA, PhD (Waterloo)
J.F. Lawless, BSc, MSc, PhD (Waterloo)
D.L. McLeish, BSc (Queen’s), MSc (Toronto), PhD (McGill)
H.H. Panjer, BA, MA, PhD (Western Ontario), FSA, FCIA
Systems Design Engineering

Professor, Department Chair
M. Chandrashekar, B Tech (Indian Institute of Technology, Kanpur), MASC, PhD (Waterloo), PEng

Professor, President of the University
D.T. Wright, OC, BASc (Toronto), MS (Illinois), PhD (Cambridge), DEng (Carleton), LL.D (Brock), DSc (Memorial), LLD (Concordia), LHD (Northeastern), DU (Strathclyde), Docteur H.C. (Camplagne, France), Docteur H.C. (Sherbrooke), FCAE, FEIC, FASCE, Life Member IABSE, PEng, APEO Gold Medal, CCEP Gold Medal (term to April, 1993)

Professor, Associate Chair, Graduate Studies
M.E. Jemigan, SB, SM, PhD (Massachusetts Institute of Technology), PEng, Recipient of the Distinguished Teacher Award

Associate Professor, Associate Chair, Graduate Studies
M. Kamei, BSc (Alexandria), MASC (McMaster), PhD (Toronto), PEng

Professor Emeritus
H.K. Kasavan, BSc, BE (Mysore), MS (Illinois), PhD (Michigan State), PEng, (Retired)*

Professors
W.K. Adrian, Dip Ing, Dr-Ing (TH Darmstadt), Dr habil. (Karlsruhe)
M.P. Bryden, SB (Massachusetts Institute of Technology), MSc, PhD (McGill)
A.P. Cullen, Dip Opt (City University-London), MSc (Saskatchewan), OD (Pennsylvania College of Optometry), PhD (City University-London), FAAC, FBCC, DLCP
K.W. Hipel, BSc, MASC, PhD (Waterloo), PEng
K. Huseyn, MSc (Istanbul), PhD (London), DSc (Eng/London), PEng, Recipient of the Distinguished Teacher Award
P.H. ON Roe, BASc (Toronto), MSc, PhD (Waterloo), PEng
G.N. Souls, BSc (Toronto), PEng, (Retired)*
D.A. Winter, BSc, MSc (Queen's), PhD (Dalhousie), PEng
A.K.C. Wong, BSc, MSc (Hong Kong), PhD (Cambridge), PEng

Associate Professors
N.R. Ball, BASc (McMaster), MA, PhD (Toronto), Northern Telecom Professor of Engineering Impact
P.H. Calamai, BASc, MASC, PhD (Waterloo)
K. Hahn, MASC (Waterloo), Recipient of the Distinguished Teacher Award
G.R. Hepler, BASc, MASC, PhD (Waterloo), PEng
G.F. Rabideau, BA, MA (Wisconsin), PhD (Purdue), (Retired)*
G.J. Savage, BASc, MSc, PhD (Waterloo), PEng
H.C. Shen, BM Math (Waterloo), MSc (Toronto), PhD (Waterloo)
B.L. Wills, BASc, MASC, PhD (Waterloo), PEng

Assistant Professors
A.D. Bogobowicz, MSc (Warsaw), PhD (Polish Academy of Sciences, Warsaw)
G.I. Greig, BSc (Queen’s), MASC (Western Ontario), PhD (Toronto)
J.J. Kay, BASc (McGill), MASC, PhD (Waterloo)
J.J. McPhee, CAS (Acadia), BASc (Technical University of Nova Scotia), MASC (Waterloo), PhD (Waterloo)
K. Ponnambalam, BE (Madras), MSc (National University of Ireland), PhD (Toronto)
J.A. Robinson, BSc (Durham), MSc, PhD (Essays)
D.W. Stashuk, BASc (Waterloo), MEng, PhD (McMaster), PEng

Adjunct Faculty
K.C.C. Chan, BM Math, MASC, PhD (Waterloo)
M. De, BSc (Madras), MSc (Indian Institute of Technology, Madras), AICB (York), MASC, PhD (Waterloo)
S. Kalaycioglu, BSc (Middle East Technical University, Turkey), MEng (McGill), PhD (McGill)
D.M. Kilgour, BASc, MSc, PhD (Toronto)

* Also has Adjunct Appointment

University Faculty
Systems Design Engineering - Women’s Studies

Associate Professor, BM Math, MMath, PhD (Waterloo)
A.I. McLeod, BM Math, MMath, PhD (Waterloo)
N. Okada, BASc, MASC, DEng (Kyoto)
K.J. Radford, BA, MA (Canbridge)
E. Siddall, BSc (Eng) (London) PEng
D.A. Stacey, BSc (Guelph), MASC, PhD (Waterloo)
T.N. Tooper, BASc, MASC, PhD (Waterloo)

Faculty Members of Systems Design Engineering holding cross appointments to:
1. Environment and Resource Studies
2. Statistics and Actuarial Science
3. History
4. Earth Sciences

Faculty Members holding cross appointments to Systems Design Engineering from:
6. Actuarial Science
7. Psychology
8. Management Sciences
9. Kinesiology
10. Environment and Resource Studies

Also has Adjunct Appointment

For faculty listing consult Germanic and Slavic Languages and Literatures.

Woman’s Studies

Associate Professor, Director
H.D. Lyons, BA (Columbia), MLLitt, DPhil (Oxford)

Members of the Woman’s Studies Board

University of Waterloo

Assoc Professor, BASc, MSc, MA (Sheffield), PhD (Pittsburgh)

Women’s Studies

Associate Professors
B. Hyma, BS, MS (Madras), MA (Sheffield), PhD (Pittsburgh)

University of Waterloo Professors

D.A. Counts, BS (W.S. Texas State University), MA (Kentucky), PhD (Southern Illinois)
A. Wiper, BA, MA (McGill), PhD (California, Berkeley)

Members of the Women’s Studies Board

A. McLeod, BM Math, MMath, PhD (Waterloo)
N. Okada, BASc, MASC, DEng (Kyoto)
K.J. Radford, BA, MA (Canbridge)
E. Siddall, BSc (Eng) (London) PEng
D.A. Stacey, BSc (Guelph), MASC, PhD (Waterloo)
T.N. Tooper, BASc, MASC, PhD (Waterloo)

Faculty Members of Systems Design Engineering holding cross appointments to:
1. Environment and Resource Studies
2. Statistics and Actuarial Science
3. History
4. Earth Sciences

Faculty Members holding cross appointments to Systems Design Engineering from:
6. Actuarial Science
7. Psychology
8. Management Sciences
9. Kinesiology
10. Environment and Resource Studies

Also has Adjunct Appointment

For faculty listing consult Germanic and Slavic Languages and Literatures.

Women’s Studies

Associate Professor, Director
H.D. Lyons, BA (Columbia), MLLitt, DPhil (Oxford)

Members of the Woman’s Studies Board

University of Waterloo

Professors
D.A. Counts, BS (W.S. Texas State University), MA (Kentucky), PhD (Southern Illinois)
A. Wiper, BA, MA (McGill), PhD (California, Berkeley)

Associate Professors
B. Hyma, BS, MS (Madras), MA (Sheffield), PhD (Pittsburgh)

University of Waterloo Professors

D.A. Counts, BS (W.S. Texas State University), MA (Kentucky), PhD (Southern Illinois)
A. Wiper, BA, MA (McGill), PhD (California, Berkeley)
N. Theberge, BA (Massachusetts), MA (Boston College), PhD (Massachusetts)

Assistant Professor
G.O. Michalenko, BA, PhD (Saskatchewan)

Library
S. Bellingham, BA (Waterloo Lutheran), MLS (Western Ontario)

Lecturer
M.G. Davies, BA (Washington), AM (Harvard), former Acting Director of Women's Studies

Faculty Member holding joint appointment with:

* Anthropology
UW recognizes a distinguished scholar.
The Board of Governors

The Board of Governors acts as the governing body of the University and as such has the power to control UW's property and revenues, and the conduct of its business and affairs. Planning and implementation of the physical and operational development of the University, establishment and enforcement of rules and regulations with respect to University property, and designation of University funds are included under the jurisdiction of the Board of Governors.

The membership of the Board of Governors consists of representatives from the University faculty, staff and student bodies, and the community-at-large, as well as appointees from the Lieutenant-Governor-in-Council, and a number of ex officio members.

Officers
Chairman, M.F. Garvey
Vice-Chairman, P.D. Mitchell
Secretary, L.H.P. Claxton

Ex Officio
Chancellor, S. Ostry
President, D.T. Wright (term to April, 1993)
President, J. Downey (effective April, 1993)
Mayor of the City of Waterloo, W.B. Tumbull
Mayor of the City of Kitchener, D.V.P. Cardillo
Regional Chairman, K. Seiling

From the Community-at-Large
E. Agnew, Toronto
J. Bergsma, Chatham
K. Copeland, Toronto
J.T. Eyton, Toronto
M.F. Garvey, Toronto
P.M. Koch, Ottawa
D.G. McMullen, Toronto
P.D. Mitchell, Waterloo
J.E. Sinclair, Toronto
M.C. Volker, Vancouver

Appointed by the Lieutenant-Governor-in-Council
F.C. Ansley, Toronto
C.S. Boyce, London
R. Jamieson, Oshawa
R.R. Mahabir, Toronto
P.A. McLagan, Toronto
A. Sarlos, Toronto
S. Sharzer, Ottawa

Staff
K. Dietrich (Plant Operations)
P. Mihm (Plant Operations)

Governing Bodies
Board of Governors
Senate

From Senate
Faculty Members
G.C. Andrews
P.Y. Forsyth
K. Hahn
K.W. Hipel
J.G. Kalbfleisch
J.A. Legault
J.E. Thompson

Undergraduate Students
E. Barratt
D. Martin
L. Yeo

Graduate Students
D.A. Clausi
D.B.G. Meister

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, D.T. Wright, OC, BASc, MS, PhD, DEng, LLB, DSc, LHD, DU, Docteur H.C. (Compiègne), Docteur H.C. (Sherbrooke), FCAE, FEIC, FASCE, Life Member IABSE, PEng, APEO Gold Medal, CCPE Gold Medal (term to April, 1993)
Chairman, J. Downey, BA, BEd, MA, PhD, DHL, DLitt, LLB (effective April, 1993)
Vice-Chairman, J.A. George, BSc, MSc, PhD, FRSC, Fellow IEEE (term to June 30, 1993)
Vice-Chairman, To be announced (effective July 1, 1993)
Secretary, L.H.P. Claxton, BA, BLS, MLS

Ex Officio Members
Chancellor, S. Ostry, CC, BA, MA, PhD, LLB, FRSC
Chairman, Board of Governors, M.F. Garvey, BA, CA, FCA
President, D.T. Wright, OC, BASc, MS, PhD, DEng, LLB, DSc, LHD, DU, Docteur H.C. (Compiègne), Docteur H.C. (Sherbrooke), FCAE, FEIC, FASCE, Life Member IABSE, PEng, APEO Gold Medal, CCPE Gold Medal (term to April, 1993)
President, J. Downey, BA, BEd, MA, PhD, DHL, DLitt, LLB (effective April, 1993)
Vice-President, Academic & Provost, J.A. George, BSc, MSc, PhD, FRSC, Fellow IEEE (term to June 30, 1993)
Vice-President, Academic & Provost, To be announced (effective July 1, 1993)
Associate Provost, Academic Affairs, J.G. Kalbfleisch, BSc, MA, PhD
Treasurer, D.J. Battae
Librarian, M.C. Shepherd, BEd, MA (LS)
Registrar, C.T. Boyes, BA
President, Faculty Association, G.C. Andrews, BASc, MASc, PhD
President, Federation of Students, D. Martin
President, Graduate Student Association, D.B.G. Meistsr, BASc, MASc

The Principal or President of each Federated or Affiliated College
G. Cuthbert Brandt, BA, MA, PhD (Principal, Renison)
W. Klassen, BA, BD, PhD (Principal, St. Paul's)
D.R. Letson, BA, MA, PhD (President, St. Jerome's)
R. Sawatsky, BChEd, BA, MA, PhD (President, Conrad Grebel)

The Dean of each Faculty
R.W. Norman, BA, BPE, MSc, PhD, Docteur H.C. (Applied Health Sciences)
B.P. Hendley, BA, MA, PhD (Arts)
D.J. Burns, BSc, PhD, PEng, CEng (Engineering)
J. Kay, BA, MS, PhD (Environmental Studies)
J.D. Kalbfleisch, BSc, MMath, PhD (Mathematics)
J.E. Thompson, BSA, PhD, FRSC (Science)

The Dean of each Faculty
P.M. Rowe, BA, MA, PhD

The Dean of Research
A.J. Carty, BSc, PhD, FRSC, FCIC

Elected Members
Faculty Representatives
To 1993
M.T. Sharratt, BA, MA, PhD (Applied Health Sciences)
D.G. John, BA, MA, PhD (Arts)
T.Z. Fahidy, BSc, MSc, PhD, PEng (Engineering)
E.R. Haldenby, BES, BArch (Environmental Studies)
J. Wainwright, BSc, PhD (Mathematics)
J.G. Strong, OD, MSc (Science)
V.F. Golini, BA, MA, PhD (St. Jerome's)
J. Majoris, BA, MA, MSW, PhD (Renison)
G.F. Atkinson, MA, PhD, CChem, FRSU, FCIC (At large)
H.S. Fournier, BA, MA, PhD (At large)
G.A. Griffin, BA, MA, PhD (At large)
R.H. Holmes, BA, MA, PhD (At large)
H.D. Lyons, BA, MMath, DPhil (At large)
D.A. Winter, BSc, MSc, PhD, PEng (At large)
G.C. Woo, OD, MS, PhD, LOSc, FVCO, FAAO, DipLV (At large)

To 1994
R.C. Mannell, BA, MPE, PhD (Applied Health Sciences)
R.L. Fowler, BA, MA, DPhil (Arts)

R.C.G. Haas, BSc, MSc, PhD, PEng, FCAE (Engineering)
G.B. Priddle, BA, MA, PhD (Environmental Studies)
L.J. Cummings, BSc, MSc, PhD (Mathematics)
J.A. Legault, BSc, MSc, PhD (Science)
K.M. McLaughlin, BA, MA, PhD (St. Jerome's)
J. Gollnick, BA, MA, PhD (St. Paul's)
E.J. Ashworth, BA, MA, PhD (At large)
K.O. Geddes, BSc, MSc, PhD (At large)
K.W. Hipel, BASc, MASc, PhD, PEng (At large)
R.D. Lambert, BA, MA, PhD (At large)
A.L. Magnusson, BA, MA, PhD (At large)
R.G. McLenaghan, BSc, MSc, PhD (At large)
P.J. Schellenberg, BSc, MA, PhD (At large)
J.W. Walker, BA, MA, PhD (At large)

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)
E.B. Dumbroff, BSc, MForestry, PhD (Science)
P.J. Naus, BA, PhD (St. Jerome's)
A.J. Reimer, BChEd, BA, MA, PhD (Conrad Grebel)
P.Y. Forsyth, AB, MA, PhD (At large)
C.K.G. Hahn, MASc (At large)
A. Karr-Lawson, BA, MA, PhD (At large)
I.F. Macdonald, BEng, PhD (At large)
F.R.W. McCourt, BSc, PhD (At large)
W.R. Needham, BComm, MA, PhD (At large)

Student Representatives
To 1993
Undergraduate
K. Barry (Engineering)
L. Yeo (Mathematics)
A. Chopra (At large)
Graduate
D.A. Clausi, BASc (At Large)
N.R. Swart, BASc (At large)

To 1994
Undergraduate
S.L. Roszell (Applied Health Sciences)
R. Farmer (Arts)
D. Montano (Environmental Studies/Independent Studies)
Vacant (Science)
E. Barratt (At large)
Graduate
P.J. Misiaszek, BA (At large)
Vacant (At large)

Alumni Representatives
To 1993
D. Green, BASc, PEng

To 1994
L. Fairburn, BIS
University Offices

To 1995
S. Marshall, BASc
D. Wing, BA

Board of Governors Representatives
To 1993
Vacant

To 1994
Vacant
Vacant

To 1995
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.

Vice-President, Academic & Provost
J.A. George, BSc, MSc, PhD, FRSC, Fellow IEEE (term to June 30, 1993)
To be announced (effective July 1, 1993)
P.A.A. Winspur, BA
Assistant to the Provost

Advisors to the Vice-President, Academic
P.Y. Forsyth, AB, MA, PhD
Advisor on Academic Human Resources
J.A. Legault, BSc, MSc, PhD
Advisor on Interdisciplinary Programs

Operations Analysis
R.D. Truman, BM Math
Director

Vice President, University Relations
R.G.H. Downer, BSc, MSc, PhD, DSc, FRSC

Alumni Affairs
J.S. Roberts, BA, MA
Director

Development
D. Livingston, BBA
Director

Information and Public Affairs
M. Van Nierop, BA
Director

University Secretary
L.H.P. Claxton, BA, BLS, MLS

Secretariat
R.J. Bullen, BMATH
Associate University Secretary
D.P. Scheiffele
Associate University Secretary
T.L. Canning
Assistant University Secretary

Internal Audit
J.E. Buschert, BA, CMA
Director

Security
A.L. MacKenzie, BA
Director

Co-ordinator, Ethical Behaviour and Human Rights
M.M. Erickson, BA

Faculty of Applied Health Sciences
R.W. Norman, BA, BPE, MSc, PhD, Docteur H.C.
Dean of Applied Health Sciences
P.E. Wainwright, BSc, MA, PhD
Associate Dean, Undergraduate Affairs
M.T. Sharratt, BA, MA, PhD
Associate Dean, Graduate Affairs
R. Wells, BSc, MEng, PhD

President Emeritus
B.C. Matthews, BSA, AM, PhD, DU, LL.D, FUG, PAg

President and Vice-Chancellor
D.T. Wright, OC, BASc, MS, PhD, DEng, LL.D, DSc, LHD, DU, Docteur H.C. (Compiègne), Docteur H.C. (Sherbrooke), FCAE, FEIC, FASCE, Life Member IABSE, PEng, APEO Gold Medal, CCPE Gold Medal (term to April, 1993)
J. Downey, BA, BEd, MA, PhD, DHL, DLitt, LL.D (effective April, 1993)

Chancellors Emeriti
J.F. Kates, BA, MA, PhD
J.P.R. Wadsworth, LLD

Chancellor
S. Ostry, CC, BA, MA, PhD, LL.D, FRSC

Chairman, Board of Governors
M.F. Garvey, BA, CA, FCA

President Emeritus
B.C. Matthews, BSA, AM, PhD, DU, LL.D, FUG, PAg

President and Vice-Chancellor
D.T. Wright, OC, BASc, MS, PhD, DEng, LL.D, DSc, LHD, DU, Docteur H.C. (Compiègne), Docteur H.C. (Sherbrooke), FCAE, FEIC, FASCE, Life Member IABSE, PEng, APEO Gold Medal, CCPE Gold Medal (term to April, 1993)
J. Downey, BA, BEd, MA, PhD, DHL, DLitt, LL.D (effective April, 1993)
University Offices

Associate Dean, Computing and Special Projects
J.D. Carter, BA, CGA
   Executive Assistant to the Dean

FACULTY OF ARTS
B.P. Hendley, BA, MA, PhD
   Dean of Arts
H.S. Fournier, BA, MA, PhD
   Associate Dean, Graduate Affairs
H.A. MacDougall, BA, MA, PhD
   Associate Dean, Graduate Studies and Research
D.G. John, BA, MA, PhD
   Associate Dean, Special Programs
L.L. Haworth, BA, MA, PhD
   Associate Dean, Computing
J.F. Willms, 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

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