The Undergraduate Calendar

Except where otherwise indicated, the information in this Calendar applies to the 1988-89 academic year which commences in May, 1988.

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

And booklets on the following:

* Faculty of Arts and the Colleges of Waterloo
* Faculty of Engineering
* Faculty of Environmental Studies
* Faculty of Human Kinetics and Leisure Studies
* Faculty of Mathematics
* Faculty of Science
* Independent Studies Program
Those marked * appear in the WATBOX.

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 reserve the right to invoke changes in this Calendar without prior notice.

The University has developed a number of services to assist students with disabilities. More information is on page 1:14 of this Calendar.

Inquiries

Inquiries and formal applications for admission should be directed to:
The Registrar,
University of Waterloo,
Waterloo, Ontario, Canada N2L 3G1

Telephone (519) 885-1211, ext. 2268
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

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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. Pertinent sectors of the Calendar should be consulted.*
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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. Pertinent sectors of the Calendar should be consulted.*
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, Pass, 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 p. 1:7.

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

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

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

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

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

Minor
A group of approved courses taken by an honours student 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 (Physics Option), or in a career-oriented area, such as Honours Physics (Business Administration Option), or Honours Mathematics (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.

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.
### Academic Calendar – 1988

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<td>March 7</td>
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<td>Preregistration Begins – Undergraduate Programs –</td>
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<td>Preregistration Ends – Undergraduate Programs –</td>
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<td>Meeting – University Senate, 7:30 p.m.</td>
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<td>Meeting – Board of Governors Executive Committee</td>
<td>March 22</td>
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<td>Lectures End – Winter Term</td>
<td>March 30</td>
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<td>Course-Change Deadline – Correspondence – Spring Term</td>
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<td>Good Friday – University Holiday*</td>
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<td>Examinations Begin – Winter Term</td>
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<td>Meeting – Senate Executive Committee</td>
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<td>Meeting – Board of Governors, 3:30 p.m.</td>
<td>April 5</td>
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<td>Meeting – University Senate, 7:30 p.m.</td>
<td>April 18</td>
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<td>Course-Drop or Withdrawal Deadline – Correspondence –</td>
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<td>Final Examination Results Due – Winter Term</td>
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<tr>
<td>Meeting – Senate Executive Committee</td>
<td>May 2</td>
<td>Monday</td>
</tr>
<tr>
<td>Registration – Undergraduate and Graduate Programs –</td>
<td>May 2</td>
<td>Monday</td>
</tr>
<tr>
<td>Spring Term</td>
<td></td>
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<tr>
<td>Lectures Begin – Engineering and Science Courses – Spring Term</td>
<td>May 2</td>
<td>Monday</td>
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<tr>
<td>Lectures Begin – Other Courses – Spring Term</td>
<td>May 3</td>
<td>Tuesday</td>
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<tr>
<td>Start of Late Fees – Spring Term</td>
<td>May 3</td>
<td>Tuesday</td>
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<tr>
<td>Examinations – Correspondence – Winter Term</td>
<td>May 7</td>
<td>Saturday</td>
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<tr>
<td>End of Course-Change Period – Spring Term – See Individual Faculty Chapters</td>
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<tr>
<td>Meeting – University Senate, 7:30 p.m.</td>
<td>May 16</td>
<td>Monday</td>
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<tr>
<td>Victoria Day – University Holiday*</td>
<td>May 23</td>
<td>Monday</td>
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<tr>
<td>Meeting – Board of Governors Executive Committee</td>
<td>May 24</td>
<td>Tuesday</td>
</tr>
<tr>
<td>Spring Convocation (Arts, Human Kinetics and Leisure Studies)</td>
<td>May 26</td>
<td>Thursday</td>
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<tr>
<td>Spring Convocation (Environmental Studies, Independent</td>
<td>May 27</td>
<td>Friday</td>
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<tr>
<td>Studies, Science)</td>
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<td>Spring Convocation (Engineering, Mathematics)</td>
<td>May 28</td>
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<td>Examination Results Due – Correspondence – Winter Term</td>
<td>June 3</td>
<td>Friday</td>
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<tr>
<td>Meeting – Senate Executive Committee</td>
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<td>Tuesday</td>
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<tr>
<td>Preregistration Begins – Co-operative Programs – Winter Term</td>
<td>June 15</td>
<td>Wednesday</td>
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<tr>
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<td>June 17</td>
<td>Friday</td>
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<td>June 20</td>
<td>Monday</td>
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<tr>
<td>Canada Day – University Holiday*</td>
<td>July 1</td>
<td>Friday</td>
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<td>Registration – Summer Session</td>
<td>July 4</td>
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<td>July 4</td>
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<tr>
<td>Start of Late Fees – Summer Session</td>
<td>July 5</td>
<td>Tuesday</td>
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<tr>
<td>Course-Drop or Withdrawal Deadline – Correspondence –</td>
<td>July 26</td>
<td>Tuesday</td>
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<tr>
<td>Spring Term</td>
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<tr>
<td>Lectures End – Spring Term</td>
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<td>Friday</td>
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<tbody>
<tr>
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<td>Monday</td>
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<tr>
<td>Examinations Begin – Fall Term</td>
<td>August 2</td>
<td>Tuesday</td>
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<tr>
<td>Application Deadline – Correspondence – Fall Term</td>
<td>August 5</td>
<td>Friday</td>
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<tr>
<td>Lectures End – Summer Session</td>
<td>August 12</td>
<td>Friday</td>
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<tr>
<td>Examinations – Correspondence – Spring Term</td>
<td>August 13</td>
<td>Saturday</td>
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<tr>
<td>Examinations End – Spring Term</td>
<td>August 13</td>
<td>Saturday</td>
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<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>
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<tr>
<td>Spring Work Term Ends – Co-operative Programs</td>
<td>August 26</td>
<td>Friday</td>
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<tr>
<td>Fall Work Term Begins – Co-operative Programs</td>
<td>August 29</td>
<td>Monday</td>
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<tr>
<td>Examination Results Due – Correspondence – Spring Term</td>
<td>August 31</td>
<td>Wednesday</td>
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<td>Tuesday</td>
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<td>Meeting – Senate Executive Committee</td>
<td>September 6</td>
<td>Tuesday</td>
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<tr>
<td>Registration – Graduate Studies – Fall Term</td>
<td>September 9</td>
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<tr>
<td>Registration Ends – Undergraduate Programs – Fall Term</td>
<td>September 9</td>
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<td>Lectures Begin – Fall Term</td>
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<td>Monday</td>
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<tr>
<td>Start of Late Fees – Fall Term</td>
<td>September 12</td>
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<td>Meeting – University Senate, 7:30 p.m.</td>
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<td>September 20</td>
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<td>End of Course-Change Period – Fall Term – See Individual Faculty Chapters</td>
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<tr>
<td>Meeting – Senate Executive Committee</td>
<td>October 3</td>
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<td>Application Deadline – Correspondence – Winter Term</td>
<td>October 14</td>
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<td>Meeting – University Senate, 7:30 p.m.</td>
<td>October 17</td>
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<td>Fall Convocation</td>
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<td>Friday</td>
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<tr>
<td>Meeting – Senate Executive Committee</td>
<td>November 7</td>
<td>Monday</td>
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<tr>
<td>Preregistration Begins – Co-operative Programs – Spring Term</td>
<td>November 9</td>
<td>Wednesday</td>
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<tr>
<td>Preregistration Ends – Co-operative Programs – Spring Term</td>
<td>November 11</td>
<td>Friday</td>
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<tr>
<td>Meeting – University Senate, 7:30 p.m.</td>
<td>November 21</td>
<td>Monday</td>
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<tr>
<td>Lectures End – Fall Term</td>
<td>December 5</td>
<td>Monday</td>
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<tr>
<td>Meeting – Senate Executive Committee</td>
<td>December 5</td>
<td>Monday</td>
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<tr>
<td>Examinations Begin – Fall Term</td>
<td>December 8</td>
<td>Thursday</td>
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<td>Course-Change Deadline – Correspondence – Winter Term</td>
<td>December 9</td>
<td>Friday</td>
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<td>Meeting – University Senate, 7:30 p.m.</td>
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<td>Monday</td>
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<tr>
<td>Examinations End – Fall Term</td>
<td>December 22</td>
<td>Thursday</td>
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<tr>
<td>Fall Work Term Ends – Co-operative Programs</td>
<td>December 23</td>
<td>Friday</td>
</tr>
<tr>
<td>Christmas Holidays*</td>
<td>December 26-30</td>
<td>Monday-Friday</td>
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<tr>
<td>Winter Work Term Begins – Co-operative Programs</td>
<td>December 27</td>
<td>Tuesday</td>
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</tbody>
</table>

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## Academic Calendar

**1989**

<table>
<thead>
<tr>
<th>Event</th>
<th>Date</th>
<th>Day</th>
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</thead>
<tbody>
<tr>
<td>University Holiday*</td>
<td>January 2</td>
<td>Monday</td>
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<tr>
<td>Final Examination Results Due – Fall Term</td>
<td>January 3</td>
<td>Tuesday</td>
</tr>
<tr>
<td>Registration Begins – Undergraduate and Graduate Programs – Winter Term</td>
<td>January 3</td>
<td>Tuesday</td>
</tr>
<tr>
<td>Meeting – Senate Executive Committee</td>
<td>January 3</td>
<td>Tuesday</td>
</tr>
<tr>
<td>Lectures Begin – Engineering and Science Courses – Winter Term</td>
<td>January 4</td>
<td>Wednesday</td>
</tr>
<tr>
<td>Lectures Begin – Other Courses – Winter Term</td>
<td>January 4</td>
<td>Wednesday</td>
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<tr>
<td>Course-Drop or Withdrawal Deadline – Correspondence – Fall Term</td>
<td>January 5</td>
<td>Thursday</td>
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<tr>
<td>Registration Ends – Undergraduate and Graduate Programs – Winter Term</td>
<td>January 6</td>
<td>Friday</td>
</tr>
<tr>
<td>Meeting – University Senate, 7:30 p.m.</td>
<td>January 6</td>
<td>Monday</td>
</tr>
<tr>
<td>Meeting – Board of Governors Executive Committee</td>
<td>January 16</td>
<td>Monday</td>
</tr>
<tr>
<td>Examinations – Correspondence – Fall Term</td>
<td>January 24</td>
<td>Tuesday</td>
</tr>
<tr>
<td>End of Course-Change Period – Winter Term – See Individual Faculty Chapters</td>
<td>January 28</td>
<td>Saturday</td>
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<table>
<thead>
<tr>
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<tbody>
<tr>
<td>Meeting – Senate Executive Committee</td>
<td>February 6</td>
<td>Monday</td>
</tr>
<tr>
<td>Meeting – Board of Governors, 3:30 p.m.</td>
<td>February 7</td>
<td>Tuesday</td>
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<tr>
<td>Application Deadline – Correspondence – Spring Term</td>
<td>February 10</td>
<td>Friday</td>
</tr>
<tr>
<td>Meeting – University Senate, 7:30 p.m.</td>
<td>February 20</td>
<td>Monday</td>
</tr>
<tr>
<td>Study Week Begins – Arts and Environmental Studies</td>
<td>February 20</td>
<td>Monday</td>
</tr>
<tr>
<td>Study Break – Mathematics</td>
<td>February 20, 21</td>
<td>Monday, Tuesday</td>
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<td>Examinations Results Due – Correspondence – Fall Term</td>
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<tr>
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<tr>
<td>Meeting – Senate Executive Committee</td>
<td>March 6</td>
<td>Monday</td>
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<tr>
<td>Preregistration Begins – Undergraduate Programs – Fall Term</td>
<td>March 6</td>
<td>Monday</td>
</tr>
<tr>
<td>Preregistration Ends – Undergraduate Programs – Fall Term</td>
<td>March 10</td>
<td>Friday</td>
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<td>Meeting – University Senate, 7:30 p.m.</td>
<td>March 20</td>
<td>Monday</td>
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<tr>
<td>Meeting – Board of Governors Executive Committee</td>
<td>March 21</td>
<td>Tuesday</td>
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<tr>
<td>Good Friday – University Holiday*</td>
<td>March 24</td>
<td>Friday</td>
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<tr>
<td>Lectures End – Winter Term</td>
<td>March 31</td>
<td>Friday</td>
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<tr>
<td>Course-Change Deadline – Correspondence – Spring Term</td>
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<tr>
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<td>April 3</td>
<td>Monday</td>
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<tr>
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<td>April 4</td>
<td>Tuesday</td>
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<tr>
<td>Meeting – Board of Governors, 3:30 p.m.</td>
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<tr>
<td>Course – Drop or Withdrawal Deadline – Correspondence – Winter Term</td>
<td>April 19</td>
<td>Wednesday</td>
</tr>
<tr>
<td>Examinations End – Winter Term</td>
<td>April 20</td>
<td>Thursday</td>
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<tr>
<td>Final Examinations Results Due – Winter Term</td>
<td>April 27</td>
<td>Thursday</td>
</tr>
<tr>
<td>Winter Work Term Ends – Co-operative Programs</td>
<td>April 28</td>
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<td>Monday</td>
</tr>
<tr>
<td>Registration – Undergraduate and Graduate Programs – Spring Term</td>
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<td>Lectures Begin – Other Courses – Spring Term</td>
<td>May 2</td>
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<tr>
<td>Start of Late Fees – Spring Term</td>
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<tr>
<td>Examinations – Correspondence – Winter Term</td>
<td>May 6</td>
<td>Saturday</td>
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</table>

*Some University Departments may be open for limited service on these days.*
1989 Contiued

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<tbody>
<tr>
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<td>May 25</td>
<td>Thursday</td>
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<td>Friday</td>
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<tr>
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<tr>
<th>Year</th>
<th>January</th>
<th>February</th>
<th>March</th>
<th>April</th>
<th>May</th>
<th>June</th>
<th>July</th>
<th>August</th>
<th>September</th>
<th>October</th>
<th>November</th>
<th>December</th>
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</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. Enter the Conestoga Pkwy. by following Hwy. 7 East signs. Then follow the Pkwy. and exit at University Ave. West. Drive in a westerly direction on University Ave. to University of Waterloo.

The second route follows the first route to the Conestoga Pkwy. Enter the Pkwy. following Hwy. 7 & 8 West Stratford. Continue on the Pkwy. and exit at Fischer-Hallman Rd. Turn left at the Fischer-Hallman Rd. traffic lights and continue north west until you reach University Ave. Turn right on to University Ave. and drive easterly until you reach the University of Waterloo.
The University of Waterloo
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 Offering 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 four 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 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 1988-1989 academic year, which commences in May, 1989. 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 Arts, Engineering, Environmental Studies, Human Kinetics and Leisure 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 1,000 acre campus in the northwest section of the City of Waterloo. Waterloo, and its twin city Kitchener, are steadily growing industrial centres in mid-western Ontario with a combined population of approximately 200,000.

Since the opening of the first permanent structure on campus in 1956, the University has expanded steadily. More than 40 teaching and service buildings presently on campus include a Computing Centre, a Physical Activities Building, an ice arena, extensive library facilities, two theatres, and a variety of modern residential accommodation in University and Church College residences.

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 1981, and as officially granted in August 1987, by the Lord Lyon King of Arms, are described as follows:

Or, on a chevron Sable 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".

The University Mace

The symbolic theme may be described as follows:

The fundamental concept is unity amid diversity and tension in the creative intellectual process that strives to bring forth a new individual.

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

The four-fold diversity is significant because of the four Faculties existing at the time the Mace was presented to the University and as well, of the four church-related colleges federated and affiliated with the University. These diverse elements together form a crown, and the points of the crown, while tending toward a union do not quite touch but remain as individuals suspended in tension and yet engaged in a deep harmony. This creative process is focused not on the traditional spherical orb of static perfection but rather on an elliptical silver ovum - the egg-shaped symbol of creativity - the marvellous potential of a new individual life.

University 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 addition it should be recognized that all members of the University, as members of society at large, are subject to the general public, civil and criminal jurisdictions whether on or off campus.
Academic Organization

The University is organized under several academic units called Faculties as follows: The Faculty of Arts, The Faculty of Engineering, The Faculty of Environmental Studies, The Faculty of Human Kinetics and Leisure Studies, The Faculty of Mathematics, and The Faculty of Science. Within this framework are various departments and schools. Students who want to follow a more independent and unstructured course of study than the traditional one may wish to seek admission to the Independent Studies Program.

Enrolment for each Faculty including church colleges and off-campus students (anticipated as of November 1, 1987):

<table>
<thead>
<tr>
<th>Faculty of Arts</th>
<th>Full Time</th>
<th>Part Time</th>
</tr>
</thead>
<tbody>
<tr>
<td>Faculty of Engineering</td>
<td>3714</td>
<td>5723</td>
</tr>
<tr>
<td>Faculty of Environmental Studies</td>
<td>2936</td>
<td>298</td>
</tr>
<tr>
<td>Faculty of Human Kinetics and Leisure Studies</td>
<td>1181</td>
<td>354</td>
</tr>
<tr>
<td>Independent Studies Program</td>
<td>1042</td>
<td>317</td>
</tr>
<tr>
<td>Faculty of Mathematics</td>
<td>2979</td>
<td>472</td>
</tr>
<tr>
<td>Faculty of Science</td>
<td>2204</td>
<td>1389</td>
</tr>
<tr>
<td>Total Undergraduate Enrolment</td>
<td>14121</td>
<td>8553</td>
</tr>
<tr>
<td>Graduate Student Enrolment</td>
<td>1380</td>
<td>393</td>
</tr>
</tbody>
</table>

The Church Colleges

There are four church-related colleges associated with the University.

University of St. Jerome’s College

The University of St. Jerome’s College is a liberal arts college affiliated formerly with the University of Ottawa before entering into federation with the University of Waterloo in 1960. Students admitted to UW can register at St. Jerome’s in all Regular programs and several Co-operative programs in the Faculty of Arts, and in all Regular and Co-operative programs in the Faculty of Mathematics.

Academically, the College offers courses in English, French, History, Italian, Mathematics (including Algebra, Calculus, Computer Science, Statistics, and Combinatorics and Optimization), Philosophy, Psychology and Sociology. These courses and programs are fully integrated into the University curriculum and are available to all students of the University.

St. Jerome’s students choose courses offered at the College, other affiliated Colleges, or the six UW Faculties. Graduates of the College receive University of Waterloo degrees. The St. Jerome’s campus includes a teaching and administrative building, a library, an auditorium complex, a men’s residence (131 students) and a women’s residence, Notre Dame College, operated by the School Sisters of Notre Dame (122 students). The University of St. Jerome’s College is conducted by the Congregation of the Resurrection.

Renison College

Renison College was founded by a group of Anglicans committed to the principle of a small residence-teaching community. The College offers the advantages of study in a small college with the resources of a major university.

Academic offerings at Renison serve students registered in
a) Social Development Studies, and
b) General Arts.

Social Development Studies is an interdisciplinary program of courses in Social Work, Psychology, Sociology and Interdisciplinary Social Science leading to a BA of the University of Waterloo with emphasis on both classroom study and community involvement. The College also offers courses in English, Fine Arts, Geography and Religious Studies. Renison College Faculty members and courses are indicated by an R suffix in this Calendar.

The College has two residences accommodating 98 men and 74 women.

Conrad Grebel College

Conrad Grebel College is a Mennonite church sponsored school providing residential, teaching, research and community education programs from a Christian perspective. The residence accommodates 113 students in an intimate atmosphere which emphasizes interpersonal relationships and community responsibility. College-sponsored extra-curricular programs in music, sports and the chapel significantly complement the academic life of the student. The chapel program is central to the religious life of the College. Students from all backgrounds and worldviews are welcome, subject to their willingness to abide by the College’s values. Additionally, an Associate Student program allows University of Waterloo students to enter the life of the college community without living here. Application forms for both the residence and for associate student status are available at the College.

Academically the College offers courses described in the Arts, History, Philosophy, Religious Studies and Sociology sections of this Calendar. Also found in this Calendar are the Peace and Conflict Studies and Music programs offered and administered by this College. These courses and programs are fully integrated into the University curriculum and are available to all students of the University. Students register for CGC courses through the University or through Renison or St. Jerome’s Colleges.
**St. Paul's College**

St. Paul's United College is a teaching and residential community of 150 men and women.

The College offers two Interdisciplinary Options which students may take in conjunction with degree programs at the University of Waterloo. The Canadian Studies Option allows students to gain expertise in the social, cultural, economic, geographic, and political aspects of Canadian life. Studies in Personality and Religion enables students to understand the relationship between religious growth and experience, as they relate to the dynamics of personality development.

Students should consult the appropriate section of the University Calendar for more information about these two Options.

The College 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.

There is an attempt on the part of the College to integrate its academic life with life in the residence. In this regard, one section of the residence is designated "The French Residence" which offers native English-speaking students, who have achieved some competence in French, an opportunity to further develop the French language. This program is offered in co-operation with the French Department.

Resident life in the College provides a valuable contribution to university experience beyond that which comes from courses taken for credit. 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 the College participate in a vital and enriching community.

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**Degrees Offered**

The University of Waterloo offers the following undergraduate degrees:

- Bachelor of Architecture (BArch)
- Bachelor of Arts (BA)
- Bachelor of Applied Science (BASc)
- 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.

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**The University of Waterloo**

**Degrees Offered**

**Systems of Study**

The University of Waterloo offers the following graduate degrees:

- Master of Accounting (MACc)
- Master of Arts (MA)
- Master of Applied Environmental Studies (MAES)
- Master of Applied Science (MASc)
- Master of Mathematics (MMath)
- Master of Philosophy (MPhil)
- Master of Science (MSc)
- 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 (DESS)
- Doctor of Laws (LLD)
- Doctor of Letters (DLit)
- Doctor of Mathematics (DMath)
- Doctor of Science (DSc)

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**Systems of Study**

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

**Regular System**

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

**Co-operative System**

Students studying under the Co-operative System alternate academic terms on campus with work terms off campus in business, industry, or government. Further information about the Co-operative System can be found in Chapter 5.
Part-Time Studies, Correspondence Courses, and Continuing Education

The Teaching Resource and Continuing Education (TRACE) Office, under the direction of Dr. Christopher Knapper, is responsible for major policy development and co-ordination of activities related to correspondence courses, continuing education and to part-time studies in general. The organizational structure of the office is outlined in Chapter 17.

The University of Waterloo, which offers a wide variety of options for learning outside the traditional classroom, encourages students to continue their education through credit or non-credit courses; in a classroom or by distance education; during the day or in the evening.

Credit courses are available to students who are either physically remote from the campus or whose schedules do not permit them to attend class on a regular schedule. Distance education students enrol in UW correspondence courses for a variety of reasons: to study for a university degree, undertake professional upgrading or certification, and to achieve personal learning goals.

For most purposes students will deal with the administrative staff located in a building off-campus at 156 Columbia Street (corner of Columbia and Phillip Streets). General inquiries, admission/registration questions and information on the resources and opportunities available to part-time students can be handled during the usual working hours of 8:30 a.m. - 4:30 p.m. During the first week of classes each term, the office is open until 7:00 p.m.

No academic distinction is made between part-time and full-time students, either in admission standards, grading practices or promotion policies.

The great majority of part-time students are adults, and most are considered for admission under UW's Adult Student Admission Policy. Tuition fees are assessed on a per course basis.

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. The Calendar of Correspondence Courses describes the University's extensive range of distance education courses and also provides other relevant administrative details concerning the program.

Correspondence Courses — Distance Education

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 method of operation, the fee structure, and the application deadlines.

For application deadlines see also p. 2/8 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 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

Part-Time Studies off Campus

Several University of Waterloo credit courses are now offered each year in community centres such as Kitchener and Waterloo, Cambridge, Simcoe, Stratford and Georgetown. 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, if they wish, apply them toward a degree with credits earned on campus or through correspondence courses.

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 directly at the lecture location.

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 who earn most degrees (the engineering degree is one exception) entirely through part-time studies or by a combination of part-time and full-time attendance. For some programs in HKLs, Math, 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.

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

Appointments for individual advice and counselling can be made by phone (ext. 2429) or by visiting the office in the Modern Languages Building, Rooms 224 and 225. Office hours are 8:30 a.m. to 4:30 p.m., Monday through Friday.

B.Sc.N. 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. These courses are available on campus or through correspondence. Further information is available from the Faculty of Nursing, University of Western Ontario, or from Part-Time Studies, University of Waterloo.

Certified Employee Benefit Specialist Program
For individuals in the employee benefits field, the University offers evening courses leading to the designation of Certified Employee Benefit Specialist. Emphasis in these courses is on the fundamental principles underlying the design and operation of employee benefit plans. Additional details are available from Part-Time Studies, 888-4002.

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.

Diploma in Occupational Health for Registered Nurses
The University of Waterloo has assembled 10 half-credit degree courses plus a special 'nursing process' course pertinent to the needs and interests of practitioners in occupational health. These courses are available on campus or through correspondence.

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.

The University of Waterloo
Part-Time Studies, Correspondence Courses, and Continuing Education

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
- Canadian Credit Union Institute
- Canadian Hospital Association Course in Health Services Management
- Canadian Institute of Certified Administration Managers Program (CAM)
- Canadian Institute of Traffic and Transportation
- Certified General Accountants Association of Ontario (CGA)
- Institute for Certified Professional Secretaries
- Institute of Chartered Accountants of Chartered Accountants of Ontario (CA)
- Insurance Institute of Canada Fellowship Program
- Ontario Hospital Association Certified Health Consultant Program
- Ontario Municipal Management Development Program
- Purchasing Management Association of Canada
- Real Estate Institute of Canada (FRI)
- Society of Management Accountants of Ontario (RI/A)

Non-Credit Courses
The University offers some non-credit courses throughout the year. Previous courses have included Understanding Microcomputers, Creating New Products, and Protecting Your Ideas.

Inquiries
Inquiries concerning part-time studies, off-campus courses, diploma programs and continuing education opportunities should be directed to:
Part-Time Studies
University of Waterloo
Waterloo, Ontario N2L 3G1
(519) 888-4002
Cross-registration with Wilfrid Laurier University

Cross-registration procedures have been developed through a joint co-operative advisory council 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, grading systems, etc., 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 host 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. The 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.

<table>
<thead>
<tr>
<th>Assigned Letter</th>
<th>Common Factor</th>
<th>Assigned Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>A+</td>
<td>95</td>
<td>90-100</td>
</tr>
<tr>
<td>A</td>
<td>89</td>
<td>85-89</td>
</tr>
<tr>
<td>A-</td>
<td>83</td>
<td>80-84</td>
</tr>
<tr>
<td>B+</td>
<td>78</td>
<td>77-79</td>
</tr>
<tr>
<td>B</td>
<td>75</td>
<td>73-76</td>
</tr>
<tr>
<td>B-</td>
<td>72</td>
<td>70-72</td>
</tr>
<tr>
<td>C+</td>
<td>68</td>
<td>67-69</td>
</tr>
<tr>
<td>C</td>
<td>65</td>
<td>63-66</td>
</tr>
<tr>
<td>C-</td>
<td>62</td>
<td>60-62</td>
</tr>
<tr>
<td>D+</td>
<td>58</td>
<td>57-59</td>
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<tr>
<td>D</td>
<td>55</td>
<td>53-56</td>
</tr>
<tr>
<td>D-</td>
<td>52</td>
<td>50-52</td>
</tr>
<tr>
<td>F+</td>
<td>46</td>
<td>42-49</td>
</tr>
<tr>
<td>F</td>
<td>38</td>
<td>35-41</td>
</tr>
<tr>
<td>F-</td>
<td>32</td>
<td>0-34</td>
</tr>
</tbody>
</table>

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

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

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 appeals 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 7-10 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 Chairman 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. Excused 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.

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

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

1. Every student may formally appeal a final grade in accordance with established Faculty appeal procedures.
2. Every student, as part of the process of appealing a grade, will be able on request to obtain supervised access to a copy of his or her final examination paper, to read only.
3. The student may provide written comments which will be forwarded, along with the examination paper, to the faculty member for consideration in responding to the appeal.
4. Faculties may broaden the privileges provided above but may not be more restrictive in their implementation of this proposal.

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

Academic Regulations and Student Discipline

As provided in the University of Waterloo Act, 1972, disciplinary jurisdiction with respect to all students of the University is vested in the Board of Governors. The Board of Governors may delegate its authority to the President and the President in turn may delegate authority to the Deans, except that the President may not delegate the power to expel a student from the University.

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 the University Senate on April 20, 1981:

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

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

III. Jurisdiction and Principles.
Problems which cannot be resolved between the professor(s) and the student(s) will be referred to the Faculty Advisory Committee on Academic Discipline.

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

1. Reprimand.
2. Submission of a failing grade in an examination, test, assignment, course, or term.
3. Probation.
4. Suspension.
5. Expulsion.

V. Right of Appeal.
Students shall have the right to appeal a recommendation of the Faculty Advisory Committee on Academic Discipline to the Dean of the Faculty, and to appeal a decision of the Dean to the President of the University.

Copies of the Regulations in full are available on request from the University Secretariat, the Office of the Registrar and the Office of the Dean of each Faculty.
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;
      iv) microfilm the work and submit the microfilm to the National Library of Canada;
      v) publish the abstract of any work which is a student thesis.

2. Computer programs written or partially written by a student in support of a project, thesis, or other original work, may have potential value as a marketable intellectual property. The University acknowledges the student’s ownership rights in the same manner as for other copyright material, with the following exceptions:
   a) Students may be participating in software development as part of a process of research and development within a research group or department. In such circumstances, students may be asked to sign a waiver or assignment of software rights to the University, or to the supervising faculty member or research group.
   b) The University assumes a non-exclusive, paid-up, royalty-free license to use, for the University’s administration, education and research activities, all software written using University facilities or written in support of academic work at the University. This license does not include the right to sublicense the software to third parties for commercial purposes, but may be extended in this sense by means of a written agreement between the student and the University.
   c) Students acquire no rights to software written under supervision in the course of employment by the University, for example as a research assistant or during a co-op work term. In cases where students are employed by faculty, or by recognized research groups, they should inquire into the software policy of that particular professor or group involved before undertaking extensive software development.

The University of Waterloo
Ownership of Student’s Work
Student Academic Records
Student and Administrative Services

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Student Academic Records

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

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

The Students’ Council is the governing body of the Federation and includes 32 elected students from all Faculties, St. Jerome’s and Renison Colleges plus all Executive members. The functions of Council include upholding the above objectives, administration and control of finances and control of all 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, all Board Chairpersons, and all Commission Commissioners. The Board controls day-to-day administration, finance, 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 the Federation Budget, the Federation’s Ancillary Services and other services such as Fed Flicks, the Toronto Bus Service, SCOOPS, the Legal Resource Office, Women’s Centre and Birth Control Centre. This Vice-President also oversees the Boards of Entertainment, Communication and Creative Arts.

The Vice-President University Affairs is directly responsible to Council, to make sure they are informed of all matters pertinent to Federation policy. This position also is responsible for the supervision of the Speaker and Secretary of Council as well as the Boards of Academic Affairs, External Liaison, Education, Internal Liaison and Women’s Commission.

The Athletic Commission provides a means for the expression of athletic concerns that relate to the student on all levels; from the promotion of, to the participation in, sport.

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 annual student handbook, as well as calendars, flyers, and information published less frequently.

The Board of Entertainment co-ordinates and supervises all campus-wide programs such as Orientation, Homecoming, Winter Carnival, 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 Education Commission works to provide an out-of-the classroom education, sponsors programs and speakers on campus to broaden the student-learning experience.

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

The International Student Board acts as the student body responsible for promoting international student activities and issuing and maintaining relations between the international students and the Canadian students at the University of Waterloo.

The Women's Commission 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 Ombudsman 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 Ombudsman deals with situations both academic and non-academic in nature. The Ombudsman’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 WORDS – a Word Processing Service, the Record Store, Campus Shop, Post Office, Used Books Store, the Bombshelter Pub and Patio, Federation Hall, Chinese Library, and access to a non-pay phone (For local calls only).

Persons wishing more information on any aspect of Federation activities are advised to write to the Federation of Students. Campus Centre, Room 235, or to telephone 888-4042.

Campus Centre
The Campus Centre, with the assistance of a Student Board, offers a place for the University community to meet, relax or take advantage of the many facilities in the building. Open around the clock every day of the year, the CCB offers nonstop music, free movies, craft fairs, occasional exhibits, live entertainment, 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 the news 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 perpetually to typeset copy, design pages, research and write stories, take photos, review everything from books to concerts, organize departments, and keep accounts. 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. 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. The University holds membership in the Ontario Universities Athletic Association with 15 other Ontario universities, and competes in over 40 sports in this inter-university league. Campus Recreation provides an intramural program at a competitive, recreational, and instructional level, including such sports as slow-pitch, fitness, scuba, ballroom dancing and many others. The Physical Activities Building, a golf course, numerous outdoor fields, Seagram Stadium, Columbia Icefield arena and other facilities, provide excellent accommodation for these well-rounded programs.

More information on aspects of the University of Waterloo athletic program may be obtained by contacting the Athletic Department, Red North entrance of the Physical Activities Complex.

Book Store

South Campus Hall

Text books, general interest books and supplies are available at the University Book Store. Crested items are available at the Open Door Gift Shop, across from the Book Store. Normal hours are 9:00 a.m. to 5:00 p.m. Monday through Friday. Extended hours will be posted.

Centre for the Arts

Room 161, Hagey Hall of the Humanities

Entertainment is available on campus throughout the fall and winter terms in UW's two attractive theatres, with special discounts for students. The UW Arts Centre offers a series of shows in comedy, stage, popular and Classical Music and children's entertainment.

The Humanities Theatre, located in Hagey Hall is a 721 seat Theatre with one balcony and a proscenium stage. Most of the shows take place here. The Theatre of the Arts, located in the Modern Languages building, is modelled after the Stratford Festival Theatre. It is the smaller of the two theatres, seating just over 500 people and is the scene of the Chamber Music Series, Drama presentations and various other campus events.

In addition, the Centre cooperates with the Federation of Students and other campus organizations in many other university-based theatrical events. The two theatres are also rented from time to time to community organizations such as local dance schools, the Kiwanis Club, Gilbert and Sullivan Society and more. The UW Arts Centre general offices and box office are located in Room 161, Hagey Hall of the Humanities, at ext. 2126 or 2127. Free brochures and tickets are available on campus, or call 888-4280 for immediate mail service. The UW Arts Centre Box Office is a BASS ticket outlet, supplying tickets to the Humanities Theatre, the Theatre of the Arts and any event on the BASS ticket system. Visa and Mastercard are accepted for phone orders.

Counselling Services

Room 2080, Needles Hall

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

Career Resource Centre

Room 1115, Needles Hall

The Centre provides information which can help students in choosing a career, as well as with all aspects of the job search: résumé and letter writing, employer information and creative job search strategies. Summer and part-time jobs are also handled by the Centre. For more information see page 5.9.

Health and Safety Department

Health and Safety Department Building

The Health and Safety Department is the Medical clinic centrally located on campus. It provides comprehensive care to all students and emergency care to anyone 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 for by the Ontario Health Insurance Plan. More details are given in The Ontario Health Insurance Plan General Guide available without cost at the Health and Safety Department.
All full-time students are also covered by a Student Supplementary Health Insurance Plan which provides partial payment for prescriptions and other services.

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

Appointments for individual advice and counselling can be made by phone (ext. 2429) or by visiting the office in the Modern Languages Building, Rooms 224 and 225. Office hours are 8:30 a.m. to 4:30 p.m., Monday through Friday.

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 development of research policy; liaison with outside organizations; distribution of grant information and regulations; processing of faculty grant applications; development and administration of contracts; liaison, development and administration of international projects; development of the University Research/Technology Park; and financial administration for all research activities.

Among the functions of the Office of Research are the following: to ensure that University policies and agency/sponsor requirements are met, to act as a centre of communications between granting agencies and faculty, to assist faculty in obtaining grants and contracts for undertaking research, and to provide administrative and financial monitoring and reporting to researchers and external sponsors.

1. Research Grants: Assistance is made available on preparation and forwarding of grant applications, including liaison with faculty representatives and individual consultations. A resource centre containing information on available grants, application forms and procedures is maintained in Room 3014, Needles Hall.

2. Contract Research: With its responsibility for contract research the Office of Research has absorbed the Waterloo Research Institute, formerly the Industrial Research Institute established in 1967. In this regard the Office of Research is the organization through which research and development assistance on a contract basis can be made available to industry, governments and other sectors of society. The Office of Research provides a working liaison between the University and all organizations in which contracted research offers potential assistance and draws upon the resources of all Faculties of the University in providing research services on a contractual basis.

3. Research Involving Human Subjects: The Coordinator (Human Research), in consultation with members of the Committee on Research Involving Human Subjects, reviews University research proposals involving human subjects as to ethical acceptability, legal liability and medical advisability. As the official liaison officer between the University and local public and separate school boards, the Coordinator is also responsible for obtaining school age children as subjects for suitable University research projects.

4. Research Involving Animals: The Committee on Animal Care reviews University research proposals involving animals according to the requirements of The Animals for Research Act and the Canadian Council on Animal Care Guide. The Coordinator of Animal Care monitors the facilities on-campus and reports to the Dean and to the Committee on activities and procedures relating to the care of research animals.

5. International Programs: Assistance is available on preparation and submission of international projects. Liaison is maintained with government and other international funding agencies. Financial administration and logistical assistance is provided in the Office of Research.

6. Research/Technology Park: The University is promoting the development of an industrial Research/Technology Park on the North Campus. This initiative will further enhance industry and university co-operation at all levels.

7. Commercial Development Office (CDO): Operating out of the Office of Research, and initially funded by IDEA Corporation, an Ontario Crown Corporation, the office has been established to facilitate the identification of commercially significant research-based technologies. The CDO also assists the University research community in technology-transfer and commercialization of research spin-off technologies, including assistance in patenting, licencing, and the sale and protection of technologies on behalf of the researcher and the University.
8) National Research Council (NRC): To assist small and medium companies, NRC has made arrangements with the university to accommodate and support a Field Advisory Service representative on the campus as an adjunct to the Office of Research.

Residences
Accommodation is available at the University for approximately 4,700 students. There are two large undergraduate residences, Village I and Village II; a townhouse complex; five smaller Federated & 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) 884-4408

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

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

The University of Waterloo
Student and Administrative Services

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.,
280 Phillip St.,
Waterloo, Ontario N2L 3X1
or phone (519) 884-3670

Facilities for Disabled Students
The University has developed a number of services to assist 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.

Both 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 including a Kurzweil reading machine, has been established in the Optometry Department to aid visually disabled students. For information call ext. 3581.

The Library has a listening room equipped with four-track tape recorders and a Braille. The Library staff will also provide assistance for disabled students.

The Co-ordinator of Services for Disabled Persons will assist disabled students to access campus services and facilities. For information or assistance, call ext. 2993. Off-campus TTY/TDD users may call 888-4044. On-campus TTY/TDD users call ext. 4044.

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

All students from outside Canada are invited to visit the International Student Office, Needles Hall, Room 2080, ext. 2814. Office hours are 8:30 a.m. to 4:30 p.m., Monday to Friday.
Teaching 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 about developments and innovations relevant to teaching and learning in higher education. In 1985 the TRO became part of the new 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 presently located in Needles Hall, Room 3005 (ext. 2579), and will move, in the summer of 1988, to the fourth floor of the Mathematics and Computer Building. A library of computer-catalogued resource materials on teaching is held in the TRACE office.

Visitors Reception Centre
The Secondary School Liaison Office invites students to visit the Centre which is located in the Optometry building, room 306. 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. Many Faculties have set aside all or several Wednesdays to provide students with the greatest exposure to lectures, other students, and faculty. Visitors to the campus are invited to phone to make arrangements. The number to call is (519) 885-1211, ext. 3614.

Although 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.
Admissions
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, 1988.

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 Early Admission made to an Ontario secondary school student if the applicant fails to complete diploma requirements with a minimum final overall average of 60% in six Grade 13 or Ontario Academic Course credits or with any other specific final average or 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 Faculty of Mathematics and the Regular system of study in the Faculty of Arts. It is also possible for students to register at St. Jerome’s in the Co-op Honours English program or Co-op Applied Studies program in the Faculty of Arts.

Admissions

General Information
General Admission Requirements

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 2:5-2:7) as well as meeting average requirements.

Normally Ontario Secondary School applicants who are refused admission to a particular program will automatically be considered for admission to other programs for which they satisfy the specific subject and marks requirements. Applicants who are not currently in an 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 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

Because of the nature of the Co-operative programs at the University, in which a student alternates four months of study on campus with four months of practical work experience in business, industry, or government, applicants from other countries must obtain Permanent Resident Status in Canada before applying for admission to a Co-operative program.
Until such proof of Permanent Resident Status is received, applicants will be considered for a comparable program, if available, offered under the Regular system of study. If applying to Co-operative Engineering programs, Permanent Residents must have completed at least one year of formal academic study or have one year's work experience in Canada before applying for admission.

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 1

A) Applicants From Ontario Secondary Schools
See the 1988-89 Admission Requirements for Year One Programs on pages 2:5-2:7 for general admission requirements and specific program requirements.

B) Equivalent Certificates
All applicants are required to hold the specific subject requirements indicated on pages 2:5-2:7 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 incicate subjects studied, the grades received and an interpretation of the grading system used.

Applicants from Other Canadian Provinces

<table>
<thead>
<tr>
<th>Province</th>
<th>Grade</th>
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<tbody>
<tr>
<td>Alberta</td>
<td>Grade 12</td>
</tr>
<tr>
<td>British Columbia</td>
<td>Grade 12</td>
</tr>
<tr>
<td>Manitoba</td>
<td>Grade 12</td>
</tr>
<tr>
<td>New Brunswick</td>
<td>Grade 12</td>
</tr>
<tr>
<td>Newfoundland</td>
<td>Year 1 Memorial University</td>
</tr>
<tr>
<td>Nova Scotia</td>
<td>Grade 12</td>
</tr>
<tr>
<td>Prince Edward Island</td>
<td>Grade 12</td>
</tr>
<tr>
<td>Quebec</td>
<td>First Year CEGEP program or equivalent</td>
</tr>
<tr>
<td>Saskatchewan</td>
<td>Grade 12</td>
</tr>
</tbody>
</table>

Applicants from Other Countries

Countries following a "British" System of Education

General Certificate of Education or equivalent with Passes in at least five subjects, two of which must be at the Advanced Level. Credits on the "School Certificate" or Subsidiary Passes on the "Higher School Certificate" of recognized examining bodies will be accepted as equivalent to Ordinary Level Passes on the G.C.E. and Principal or Main Passes on the 'Higher School Certificate' as equivalent to Advanced Level Passes.

International Baccalaureate

Passes in at least six subjects, three Higher Level and three Subsidiary Level with a grade total not less than 26.

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 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.

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 or Grade 13 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.

Admissions
Other Applicants

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. Usually no further documents are required.
### Specific Faculty Program Recommendations and Requirements for Year One Programs

<table>
<thead>
<tr>
<th>Faculty/Program</th>
<th>Required University-Entrance Subjects and Minimum Averages</th>
<th>Recommendations</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>The Ontario Universities' Application Centre (OUAC) codes for the various programs are given below to assist applicants in completing their applications.</strong></td>
<td><em>See Note below.</em></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 admission decision, students who are interested in particular programs are encouraged to apply regardless of their expected average. Students are encouraged to achieve as much breadth of preparation as possible in the course of their secondary school studies.</td>
</tr>
<tr>
<td><strong>Arts Regular</strong></td>
<td>Six Grade 13 or Ontario Academic Course credits including English.</td>
<td>Along with the credit in English, preferably a course that stresses writing skills, applicants should take university-entrance level courses such as History and languages other than English. A Mathematics course is recommended for applicants who are considering social science programs.</td>
<td>In recent years, most students admitted have had averages of 70% or better. A number of students with lower averages, however, are admitted on the basis of other indicators, including information provided on the Arts Admissions Information Form. Preference is given to applicants who have at least two Arts-related Grade 13 or OAC courses. These include English, History, Languages, Geography, Dramatic Arts, Family Studies, Music and Visual Arts. Admission to departmental programs, including Co-op, occurs following Year One. An exception is Social Development Studies which generally admits students at the beginning of the first year.</td>
</tr>
<tr>
<td><strong>Co-op (Accreditation Studies)</strong></td>
<td>Six Grade 13 or Ontario Academic Course credits including English.</td>
<td>Along with the credit in English, preferably a course that stresses writing skills, applicants should take university-entrance level courses in Algebra and Calculus. Students lacking Algebra and/or Calculus must rectify this deficiency in Year One.</td>
<td>Applicants with averages over 85% will be given first consideration. Students will register in either Co-op Chartered Accountancy or Co-op Management Accounting. Applicants to Arts Accountancy Studies Co-op will be considered for admission to Arts Regular (WAA) or Arts Co-op Applied Studies (WQ) where interest in these alternatives is well-supported on the Arts Admissions Information Form.</td>
</tr>
<tr>
<td><strong>Co-op (Applied Studies)</strong></td>
<td>Six Grade 13 or Ontario Academic Course credits including English.</td>
<td>Along with the credit in English, preferably a course that stresses writing skills, applicants should take a broad range of courses such as History, Mathematics, a second language, and Science.</td>
<td>In recent years, most students admitted have had averages of 80% or better. A number of students with lower averages, however, are admitted on the basis of other indicators, including information provided on the Arts Admissions Information Form. Preference will be given to applicants who have at least two Arts-related Grade 13 or OAC courses. These include English, History, Languages, Geography, Dramatic Arts, Family Studies, Music and Visual Arts. Applicants not admitted to Arts Co-op (Applied Studies) will be considered for the Arts Regular program. Students enrolled in Regular or Co-op (Applied Studies) may apply to departmental Co-op programs, except Accounting, following Year One.</td>
</tr>
</tbody>
</table>

*NOTE: Ontario secondary school students seeking admission, must present the Secondary School Honour Graduation Diploma (SSHD) or Ontario Secondary School Diploma (OSSD) including a minimum of six Grade 12 or Ontario Academic Course credits. An overall average of 60% on six Grade 13 or Ontario Academic Courses is the minimum required for consideration, but higher averages may be required for admission to individual programs in which the demand for places by qualified applicants exceeds the supply of places available in those programs. The actual averages required for admission to particular programs are determined each year on the basis of the number of applicants and the marks of those applicants. The Secondary School Honour Graduation Diploma and the Ontario Secondary School Diploma will normally be given equal credit for admission purposes. 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 course or courses.

As the Ontario Academic Course curriculum guidelines are implemented, it is expected that some specific subject requirements for admission will change. The changes which have been determined to date, are related to the introduction of the Ontario Academic Courses in Mathematics. These changes are summarized in the Supplementary Chart on page 2/8.

The University reserves the right to withdraw the Offer of Early Admission made to an Ontario secondary school student if the applicant fails to satisfy the diploma requirements with a minimum final overall average of 60% in six Grade 13 or Ontario Academic Course credits. Any specific final average or condition stated on the Offer of Admission.
## Admissions
Specific Faculty Program Recommendations and Requirements

### Required University-Entrance Subjects and Minimum Averages

<table>
<thead>
<tr>
<th>Faculty/Program</th>
<th>Recommendations</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Engineering</strong></td>
<td>Refer to the Supplementary Chart on page 2:8.</td>
<td>Since Engineering requires considerable writing of reports and reviews, as well as the reading of books, articles and journals, the sixth credit for admission should be a subject requiring literary skills such as English, History, or Geography. It is also recommended that applicants include a Computer Science course in their high school background. Year One enrolment is limited to approximately 650 students. Approximately 80% of these places are filled by Ontario Secondary School students. In recent years, most students admitted have had averages of 75% or better. If applicants have an average lower than 75%, they may be admitted if other evidence indicates they have had extensive involvement in extracurricular activities and that they have an aptitude and interest in Engineering. Applicants with high numeric overall standing who are missing one or two of the five specific requirements must contact the Admissions Officer no later than December for September admission. Applicants will be evaluated and advised on the courses of action required to meet the specific requirements.</td>
</tr>
<tr>
<td>OUAC codes for Engineering (Group)</td>
<td></td>
<td><strong>Environmental Studies</strong></td>
</tr>
<tr>
<td>Chemical – WC</td>
<td></td>
<td></td>
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<tr>
<td>Civil – WE</td>
<td></td>
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<tr>
<td>Computer – WWJ</td>
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<tr>
<td>Electrical – WWF</td>
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<tr>
<td>Geological – WWG</td>
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<tr>
<td>Mechanical – WWH</td>
<td></td>
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<tr>
<td>Systems Design – WD</td>
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<tr>
<td>Architecture</td>
<td>Six Grade 13 or Ontario Academic Course credits including Calculus, Physics, English (Français), and one of Algebra, Finite Mathematics, or Relations &amp; Functions. 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 Grade 12 and university-entrance level academic records. Admission is based on the results of the interview (including a required portfolio), an English prose-writing exercise designed to test skills of analysis and expression, and on secondary school achievement. In recent years, most students admitted have had averages of 75% or better.</td>
<td></td>
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<tr>
<td>(pre-professional program)</td>
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<tr>
<td>OUAC code: WR</td>
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<tr>
<td>Environment and Resource Studies</td>
<td>Six Grade 13 or Ontario Academic Course credits including English. Applicants are encouraged to take at least one Grade 12 or university-entrance level Science. A course in Relations &amp; Functions or Finite Mathematics is recommended. Applicants with an average of 70% or better are given first consideration.</td>
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<tr>
<td>OUAC code: WER</td>
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<tr>
<td>Geography</td>
<td>Six Grade 13 or Ontario Academic Course credits including English. Applicants are encouraged to take university-entrance level Geography, and one of Algebra, Calculus, Relations &amp; Functions or Finite Mathematics. Applicants with an average of 70% or better are given first consideration.</td>
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</tr>
<tr>
<td>OUAC code: WG</td>
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<tr>
<td>Urban and Regional Planning</td>
<td>Six Grade 13 or Ontario Academic Course credits. Applicants are encouraged to take one of university-entrance level Algebra, Calculus, Relations &amp; Functions or Finite Mathematics. Of the recommended Mathematics courses, Calculus has top priority. Good English writing skills are required. Applicants with an average of 70% or better are given first consideration. Letters of reference and a Personal Information form are required. When necessary, selective interviewing may be part of the admission process.</td>
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<tr>
<td>OUAC code: WP</td>
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<tr>
<td>Human Kinetics &amp; Leisure Studies Dance</td>
<td>Six Grade 13 or Ontario Academic Course credits. Applicants to the General or Honours BA degree program should include English and History in their university-entrance level program. Applicants living within a reasonable commuting distance of Waterloo should arrange an interview with the Undergraduate Officer regarding admission to the program. Applicants unable to travel to Waterloo should contact the Undergraduate Officer to make other arrangements. Auditions for advanced placement in studio courses are held during registration week in early September.</td>
<td></td>
</tr>
</tbody>
</table>
### Admissions

Specific Faculty Program Recommendations and Requirements

<table>
<thead>
<tr>
<th>Faculty/Program</th>
<th>Required University-Entrance Subjects and Minimum Averages</th>
<th>Recommendations</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Health Studies</strong></td>
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<tr>
<td>OUAC codes:</td>
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<tr>
<td>Regular – WF</td>
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<tr>
<td>Co-op – WJ</td>
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<tr>
<td>DUAC codes:</td>
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<tr>
<td>Co-op – WJ</td>
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<tr>
<td><strong>Kinesiology</strong></td>
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<tr>
<td>OUAC codes:</td>
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<tr>
<td>Regular – WK</td>
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<tr>
<td>Co-op – WJ</td>
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<tr>
<td><strong>Recreation and Leisure Studies</strong></td>
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<tr>
<td>OUAC codes:</td>
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<tr>
<td>Regular – WJ</td>
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<td></td>
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<tr>
<td>Co-op – WJ</td>
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<tr>
<td><strong>Mathematics</strong></td>
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<tr>
<td>OUAC codes:</td>
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<tr>
<td>Co-op (C.A. Option) – WN</td>
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<tr>
<td>Co-op (Including Computer Science) – WJ</td>
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<tr>
<td>Regular (Including Computer Science) – WM</td>
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<tr>
<td><strong>Science</strong></td>
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</tr>
<tr>
<td><strong>All Programs</strong></td>
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<tr>
<td>OUAC codes:</td>
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<td></td>
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<tr>
<td>Biology (Co-op) – WU</td>
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<tr>
<td>Applied Chemistry (Co-op) – WH</td>
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<tr>
<td>Applied Earth Sciences (Co-op) – WJ</td>
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<tr>
<td>Regular – WJ</td>
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<tr>
<td>Co-op (Years 1-4) – WB</td>
<td></td>
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</tr>
<tr>
<td><strong>Questions and Answers</strong></td>
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</tbody>
</table>

Each applicant to Independent Studies is considered on the basis of a personal interview with a committee composed of students and staff. Those who show an aptitude for self-direction and independent study, and the ability to flourish in an unstructured academic setting will be given preference.

The Faculty of Mathematics makes every effort to ensure that those students who are best prepared are admitted. It is recognized that school grades are the primary indicator of preparedness, and the majority of admitted students have averages of 75% or higher. The Admissions Committee also gives close attention to evidence indicating an exceptional aptitude and interest in mathematics, teachers’ recommendations, performance in the Desjardins Mathematics Contest, and involvement in extracurricular activities. Any combination of these may considerably enhance an applicant’s possibility of admission. Students not offered admission to the program of their choice are considered for all other Mathematics Programs.

Students wishing to pursue the Joint Honours Co-op Computer Science/Chaired Accountancy program should apply to the Co-op (C.A. Option) – WH category.

The most recent minimum average of successful applicants to Regular Science has been in the mid to high 60’s; Biochemistry, low 80’s; and other Cooperative programs low to mid 70’s. Minimum special averages required for the following Co-operative programs are: Biochemistry and Applied Chemistry; 70% in Chemistry and 70% in Mathematics; Applied Physics: 75% overall required in Physics & Mathematics, with at least 70% in Physics and 70% in Calculus. Students not admitted to the program of their choice are automatically considered for other programs in Science for which they qualify. Total expected enrolment in Year One: 600 students.
### Supplementary Chart

<table>
<thead>
<tr>
<th>Faculty/Program</th>
<th>Admission Requirements for those Studying Mathematics from the Grade 13 Curriculum Guidelines</th>
<th>Admission Requirements for those Studying Mathematics from the Ontario Academic Course (O.A.C.) Curriculum Guidelines</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Engineering</strong></td>
<td>Six Grade 13 or Ontario Academic Course Credits including: Algebra (Gr. 13), Calculus (Gr. 13), Relations &amp; Functions (Gr. 13), Physics</td>
<td>Six Grade 13 or Ontario Academic Course Credits including: Algebra and Geometry (O.A.C.), Calculus (O.A.C.), Chemistry, Physics, English</td>
</tr>
<tr>
<td>OUAC Codes for Engineering (Co-op): Chemical — WC, Civil — WE, Computer — WWJ, Electrical — WFW, Geological — WWG, Mechanical — WWH, Systems Design — WD</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Human Kinetics &amp; Leisure Studies</strong></td>
<td>Six Grade 13 or Ontario Academic Course Credits including: One Mathematics course from Algebra, Calculus, Relations &amp; Functions (Gr. 13), Chemistry, One Science from Biology or Physics</td>
<td>Six Grade 13 or Ontario Academic Course Credits including: Calculus (O.A.C.), Chemistry, One Science from Biology or Physics</td>
</tr>
<tr>
<td>Kinesiology</td>
<td></td>
<td></td>
</tr>
<tr>
<td>OUAC codes: Regular — WK, Co-op — WL</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Mathematics</strong></td>
<td>Six Grade 13 or Ontario Academic Course Credits including: Algebra (Gr. 13), Calculus (Gr. 13), Relations &amp; Functions (Gr. 13), with a minimum grade of 60% in each of the required Mathematics courses</td>
<td>Six Grade 13 or Ontario Academic Course Credits including: Algebra and Geometry (O.A.C.), Calculus (O.A.C.), English, with a minimum grade of 60% in each of the required Mathematics courses</td>
</tr>
<tr>
<td>OUAC Codes: Co-op (C.A. Option) — WN, Co-op (including Computer Science) — WT, Regular (including Computer Science) — WM</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Application Procedures

1. Applicants who wish to pursue degree studies on a full-time basis must submit their applications through the Ontario Universities’ Application Centre (OUAC):
   a) Applicants 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.

2. a) Applicants who wish to pursue degree studies on a part-time basis or non-degree or post-degree studies should contact the Registrar’s Office for the appropriate application forms.
   b) Applicants who wish to take courses by correspondence should write to the Correspondence Program, University of Waterloo, Waterloo, Ontario N2L 3G1 or call (519) 888-4050.

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

Further instructions on application procedures and documents required will be sent out 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 1988</td>
<td>March 1, 1988</td>
</tr>
<tr>
<td>July 1988</td>
<td>June 1, 1988</td>
</tr>
<tr>
<td>September 1988</td>
<td>July 1, 1988</td>
</tr>
<tr>
<td>January 1989</td>
<td>November 1, 1988</td>
</tr>
</tbody>
</table>

**Correspondence Program**

- Fall Term 1988 : August 5, 1988
- Winter Term 1989 : October 14, 1988

*Applications and all supporting documentation must be received no later than May 1, 1988 for all Year One limited-enrolment programs, with the following exceptions:

1. **Architecture** requires that applications must be dated as received at the OUAC no later than March 15 and that supporting documents be received at the University no later than April 15.
2. **Optometry** requires that applications must be received at the University no later than February 28.

Normally no application will be accepted after the first day of lectures in any specific session/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 10, 1988 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 admitted 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 early offer of admission on June 10, 1988 are encouraged to confirm as soon as possible, but are not required to respond before June 24, 1988.

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 accomplished 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:

A) NEWLY ADMITTED STUDENTS:
As soon as possible after academic admission. Information regarding preregistration is forwarded when the student is admitted.

B) RETURNING STUDENTS:
1. Co-operative Programs –
   During the preceding on-campus term.
2. Regular Programs –
   During March of the preceding academic year.

The above action will produce the "Student Schedule and Fee Statement."

Students are encouraged, where possible, to preregister and pay their fees by mail by sending a cheque or money order payable to the institution of their intended registration (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
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 4 on page 3:7).

Fees and Registration
Preregistration, Registration, Fees

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

B) REGULAR PROGRAMS:
1. All Terms
   a) Architecture Year 1, 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.
   b) 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.

2. Summer Session (July-August)
   Students are assessed by course at the Unit Course Fee shown.

Payment
A) TIMING AND AMOUNTS DUE
All fees are due and payable by the end of the registration period. See pages 7-10 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.

B) METHODS
1. By Mail
   The University encourages students to register by mail. Detailed instructions outlining the payment procedure will be included with the Fee Statement.

2. In Person
   For students who cannot register by mail, a registration period is held on campus at the beginning of each term. See pages 7-10 for dates.
C) GENERAL INFORMATION

1. Fees should be paid with cash, money order or cheque payable to “University of Waterloo.”
2. 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.
3. Students who have received a “Notice of Assessment” under the Ontario Student Assistance Program may arrange payment of fees using this source of funds.
   Apply for OSAP early (Allow 60 days processing time). OSAP funds not received by start of term cannot be used as a means to register.
4. The University will accept post-dated cheques as an arrangement for the payment of fees. Post-dated cheques can be dated up to, but not beyond, the date of the first day of registration for the terms as shown below:

<table>
<thead>
<tr>
<th>Term</th>
<th>First Day of Registration</th>
</tr>
</thead>
<tbody>
<tr>
<td>May 1988</td>
<td>2 May 1988</td>
</tr>
<tr>
<td>September 1988</td>
<td>6 September 1988</td>
</tr>
<tr>
<td>January 1989</td>
<td>3 January 1989</td>
</tr>
<tr>
<td>May 1989</td>
<td>1 May 1989</td>
</tr>
</tbody>
</table>

5. Students who are not able to pay or arrange fees as shown above must visit the “Fees Arranged” section of Financial Services during the on-campus registration period to discuss fee arrangements.
6. Students whose cheques are returned by the bank for any reason will be assessed a handling charge of $15.00 plus late registration penalty as applicable.
7. Students who fail to fulfill fee payment arrangements will be assessed a 5% surcharge on the total fees outstanding plus 1 1/2% per month service charge applied to the balance outstanding and calculated from the due date.
8. Failure to pay all outstanding fees, accounts or other assessments such as library fines before conclusion of lectures may bar a student from writing examinations and will result in withholding of credit and transcripts for previous work.

Banking Information
Most major banks are near campus but it is suggested that students bring a certified cheque, draft or money order as their initial deposit. Fund transfers can take up to two weeks to complete, during which time the student does not have access to the funds.
   It is the student’s responsibility to ensure that funds are available at registration; late fees will not be waived for students who have failed to make timely transfer arrangements.

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

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

See pages 7-10 for dates when late fees start.
Students will not be allowed to register after the dates shown below.

<table>
<thead>
<tr>
<th>Term Starting</th>
<th>Last Date to Register</th>
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<tbody>
<tr>
<td>May 1988</td>
<td>30 June 1988</td>
</tr>
<tr>
<td>July 1988</td>
<td>29 July 1988</td>
</tr>
<tr>
<td>September 1988</td>
<td>31 October 1988</td>
</tr>
<tr>
<td>January 1989</td>
<td>31 January 1989</td>
</tr>
<tr>
<td>May 1989</td>
<td>30 June 1989</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:

a) Students withdrawing before the start of classes will receive a full refund.

b) 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.

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

d) Refunds are not provided to students after week 7 of a term (week two of Summer Session).
   The specific withdrawal dates are included in the registration information package sent to students each term.
e) 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.

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

g) 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.

h) The Recreational Facility Fee and Federation Hall Fee are not refundable.

i) 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.

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).

Fees and Registration
Preregistration, Registration, Fees

SCHEDULE OF FEES
The Board of Governors reserves the right to make changes in the published schedule of fees without notice. The University does not undertake or accept responsibility to notify all recipients of this Calendar of fee changes made subsequent to printing deadlines.
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 estimated based on information available in late January 1988. A schedule of fees approved by the Board of Governors will be included with the 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 Fee Term (Note 1)</th>
<th>Co-op Fee (Note 2)</th>
<th>Total Tuition Fees</th>
<th>Total Tuition Fees</th>
<th>Total Unit Incidental Fees</th>
<th>Total Unit Fees</th>
<th>Unit Course Fee (Note 3)</th>
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<td>– Year 1</td>
<td>765.50</td>
<td>250.00</td>
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<td>– Upper Year, Co-op</td>
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<td>158.00</td>
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<td>– Accountancy Studies Co-op</td>
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<td>– Co-op</td>
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<tr>
<td>– Regular</td>
<td>705.50</td>
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<td>705.50</td>
<td>794.18</td>
<td>158.00</td>
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<tr>
<td>– Co-op</td>
<td>705.50</td>
<td>250.00</td>
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<td>705.50</td>
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<tr>
<td>– Co-op</td>
<td>705.50</td>
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<td>955.50</td>
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<td>158.00</td>
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<td>– Co-op</td>
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<td>Full Course (1.0 credits)</td>
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</tbody>
</table>

*The total fee for the Professionally Accredited Stream (PAS) of this program includes the required Internship Fee of $150.00 per term.

Schedule of fees effective May 1, 1988.
Fees for Foreign Students with Student Authorization (see also Note 4)
These fees have not been approved by the Board of Governors. They are estimated based on information available in late January 1988. A schedule of fees approved by the Board of Governors will be included with student registration information.

For an undergraduate student on Student Authorization:
   a) Registration in an undergraduate program* in Architecture, Engineering, or Optometry:
      Regular program fees are $4337.50 per term plus incidental fees as shown below. The Unit Course Fee is $867.50 per Term Course.
   b) Registration in any other undergraduate program:
      Regular program fees are $2661.00 per term plus incidental fees as shown below. The Unit Course Fee is $532.20 per Term Course.

*Registration in Co-operative programs is available only to students who are Canadian Citizens or Permanent Residents.

Incidental Fees
The following incidental fees are compulsory:

<table>
<thead>
<tr>
<th>Service</th>
<th>Term</th>
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</thead>
<tbody>
<tr>
<td>Interuniversity Athletics</td>
<td>$25.25</td>
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<tr>
<td>Health Insurance</td>
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<tr>
<td>(See Note 5)</td>
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</tr>
<tr>
<td>- Regular</td>
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<tr>
<td>- Co-op</td>
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<td>Recreational Facilities</td>
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<td>(See Note 6)</td>
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</tr>
<tr>
<td>Federation Hall</td>
<td>$ 7.50</td>
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<tr>
<td>(See Note 7)</td>
<td></td>
</tr>
</tbody>
</table>

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.

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 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 fee is set at a level which distributes the cost recovery over all terms of the Co-operative programs in which students pay fees.

In 1987 the Minister of Colleges and Universities requested a province-wide review of the costs of providing Co-operative education. Pending the results of this study, universities were asked not to increase Co-op fees beyond the 1987-88 levels. Data submitted for use in the study, adjusted for an estimated inflation rate of 4.5%, suggest that Co-op fees could increase, if permitted, to about $320.00 per term in 1988-89. Barring major changes, subsequent rate increases are expected to be responses to inflationary pressures.

Note 3 – Unit Course Fee (1988-89)
The fee assessed at $158.00 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 4 – 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 1 January 1977. The higher fees apply to all students beginning a program on or after 1 January 1977, except for those who qualify for exemption under one of the following categories.

1. A citizen of Canada within the meaning of the Canadian Citizenship Act or a person registered as an Indian within the meaning of the Indian Act;
2. A Permanent Resident within the meaning of the Immigration Act, 1976;
3. A visitor admitted to and remaining in Canada under clause 10(c) of the Immigration Act, 1976 who has entered Canada or is in Canada to carry out his 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 member of the staff of any such diplomat, consular officer, representative or official;
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 the Canadian International Development Agency (including the Commonwealth Scholarships and Fellowships), or by 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 provided he or she is studying in Canada under a cultural exchange agreement between the Government of Canada and the government of another country or a formal agreement between a provincially-assisted institution in Ontario and a post-secondary institution in another country, provided that under such an agreement, the number of places made available in Ontario universities, Ryerson or the Ontario College of Art normally equals the number of places made available to Ontario residents in the other country or institution as the case may be.
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.

Note 5 – Health Insurance
Effective 1 September 1978, a revised supplementary Student Health Insurance Plan was put into effect at the request of the student body. Student premiums are as shown in the Schedule of Fees. The premium and coverage may be waived if proof of equivalent or better insurance coverage is provided. Dependent (family) coverage may be obtained on request and by payment of a further $17.91 for a Regular student per term and $33.58 for a Co-operative student at each registration.
This plan does not include the premium or benefits of the Ontario Health Insurance Plan. It is the student’s own responsibility to ensure that such personal coverage is obtained.

Further details are available from Health Services.

Note 6 – Recreational Facility
A non-refundable fee approved by student referendum for construction of the Columbia Ice Field (Ice Arena North Campus).

Note 7 – Federation Hall
This non-refundable fee being assessed starting Fall term 1984 was approved by student referendum in 1983.

Note 8 – Federation of Students
Payment of the Federation of Students fee is required at registration, but a student who does not wish to participate may obtain a refund by applying to the Federation of Students within three (3) weeks after the start of lectures as indicated on pages 7 to 10 of this Calendar.

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 7 to 10 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 7 to 10 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 7 to 10 of this Calendar.

Fees and Registration
Schedule of Fees

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

This fee is voluntary, refundable, and not a requirement for registration. Requests for refund 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 7 to 10 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 7 to 10 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 7 to 10 of this Calendar.

Note 15 – Other Costs
The fees shown do not include the costs of textbooks, 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
Re-examination fee (Engineering only) $25.00
Returned Cheques – Handling charge (plus late registration penalty as applicable) $15.00
Duplicate Tax Receipt $ 5.00
Duplicate of Fee Statement Receipt $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 – $3.00 for first copy – $1.50 for each additional copy ordered at the same time as the first copy.
Letter of Permission $20.00
To Whom It May Concern Letters
– $3.00 for first copy
– $ .50 for each additional copy ordered at the same time as the first copy.
Residence
Residence fees are payable by term and are due in full on or before the day of residence registration. Students who have received a Notice of Assistance under any awards program may apply to residence fees only those funds which are received during the term in question.

Income Tax Receipts
Receipts for income tax purposes for fees paid covering the academic period 1 May 1988 to 30 April 1989 will be available after 1 March 1989.
- receipts to part-time students and Co-operative program students on work term will be mailed to the home address on record.
- receipts to on-campus students will be available for pick-up at specified location(s) on campus.
(Notice of pick-up location(s) will be published in the University of Waterloo Gazette, prior to 1 March 1989.)
Scholarships and Prizes, Bursaries and Financial Aid
Scholarships and Prizes, Bursaries 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.

Regulations Governing University of Waterloo Undergraduate Scholarships

1. The first charge against any scholarship payment will be for tuition and fees.
2. If no qualified applicant is found for a particular award in any year, the University reserves the right to withhold the award.
3. Awards based on donations from outside sources cannot be guaranteed by the University and can be forwarded only after the funds have been received from the donor.
4. If a student withdraws or otherwise fails to complete the term(s) covered by a scholarship, the scholarship may be pro-rated.
5. Entrance scholarships normally require that students register for a full course load.

University of Waterloo Entrance Scholarships

The University awards a substantial number of entrance scholarships to entering students. With the exception of special awards for students from Waterloo County secondary schools, these scholarships are awarded on the basis of 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 awarding entrance scholarships in Chemistry, Engineering, Mathematics, and Physics as follows:

Scholarships and Prizes, Bursaries and Financial Aid
University of Waterloo Entrance Scholarships

Chemistry Scholarships
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.

An application for admission to the University will suffice as an application for any entrance scholarship for which the student is eligible.

ARTS FACULTY SCHOLARSHIPS

The Faculty of Arts is offering several entrance scholarships in recognition of academic excellence. Entrance scholarships, awarded on the basis of secondary school performance, have values of $2100 of which $1200 is allocated for first year and an additional $900 for second year, if the student maintains an A average. The Faculty also offers numerous Arts Scholar Awards valued at $100.

Arts Alumni Entrance Scholarships
A number of one year scholarships with a value of $1,100 are offered annually to students entering Arts Regular or Applied Studies in recognition of academic excellence in secondary school studies.

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 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 $1000 is named in recognition of Mrs. Hanna's support of and interest in accounting education. The award is to be made annually to a student entering an Accounting Program within the Faculty of Arts at the first year level, whose prior academic record displays potential for academic in an Accounting Program within the Faculty of Arts. In addition to overall
academic excellence this student will have attained high levels of success in humanities subjects at the high school level.

**J. Sayer Minas Entrance Scholarship**
The award, valued at $1500 in the first year and renewable at $1200 for three years, if the student maintains an A average, to a possible total value of $5100, is given to the most outstanding student entering first year in the Faculty of Arts.

**Mary Rosenthal Entrance Scholarship**
One scholarship, valued at $300 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 Accountancy Studies Admission Information Form.

**Waterloo Accounting Alumni Association Entrance Scholarships**
Two scholarships of $500 each are available annually to outstanding high school students entering an undergraduate accounting program in the Faculties of Arts or Mathematics.

**ENGINEERING FACULTY ENTRANCE 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 or two year awards each with a total value of $1100 to $3900 (3) one or two awards valued at $2000 for Year One and renewable for Years Two, Three and Four each having a total value of $4200. 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.

**Scholarships and Prizes, Bursaries and Financial Aid**
University of Waterloo Entrance Scholarships

**Alfred Armbrust Memorial Scholarship**
This scholarship is awarded annually to an outstanding student entering the Faculty of Engineering.

**Association of Professional Engineers Entrance Award**
The Association of Professional Engineers of the Province of Ontario provides a $750 entrance Award to an outstanding student who is entering an accredited Engineering program at the University of Waterloo.

**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 Alumni Association is offering an entrance scholarship of $1200 renewable for three years to a total value of $4800 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.

**Hilliker Engineering Entrance Award**
One award of $500 is given to an outstanding student entering the Faculty of Engineering from Annandale High School or Glendale High School, Tillsonburg, Ontario. Preference will be given to students entering Systems Design.

**Sullivan Engineering Entrance Award**
One award of $500 is given to an outstanding student entering the Faculty of Engineering from Pauline Johnson Collegiate and Vocational School, Brantford, Ontario. Preference will be given to students entering Chemical Engineering.

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

**Geography**
Awards are offered on the basis of academic standing only.
Environment and Resource Studies
Awards are offered on the basis of comments on the supplementary information form and academic standing.

Planning
Awards are offered on the basis of comments made on the personal information form and academic standing.

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

MATHEMATICS FACULTY SCHOLARSHIPS
René Descartes Scholarships, Fellowships and Bursaries
The René Descartes Foundation offers 200 annual awards ranging in value from $300 in Year One to $10000 distributed over four years. One hundred of these have values of $1000 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. First preference is given to those who have made the Faculty of Mathematics their first choice of program.

K.D. Fryer Entrance Scholarship
This award is given in recognition of an incoming freshman 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, such as student government or sports, or a devotion to the development of additional talents in music or the arts. The student will receive a $12000 scholarship in support of an entire undergraduate Math program at Waterloo.

Waterloo Accounting Alumni Association Entrance Scholarships
Two scholarships of $600 each are available annually to outstanding high school students entering an undergraduate accounting program in the Faculties of Arts or Mathematics.

SCIENCE FACULTY SCHOLARSHIPS
Biology
Biology offers several awards valued at $1350 for Year One and renewable for Year Two for a total value of $2000. Students must maintain an 83% average at the end of Year One for renewal.

Scholarships and Prizes, Bursaries and Financial Aid
University of Waterloo Entrance Scholarships

Biochemistry
as above, provided by the Departments of Biology and Chemistry.

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 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 $4000 may be offered for Year One and renewable for Year Two, Three and Four for a possible total of $10000. Several scholarships valued at $2000 for Year One and renewable for Year Two, Three and Four for a possible total of $5000 will also be offered. A year average of 83% is required for renewal of entrance scholarships.

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 $1200 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 $7000. (These scholarships may be limited by other major concurrent awards held by the recipient.)

UNIVERSITY - WIDE SCHOLARSHIPS

University of Waterloo – Waterloo County Entrance Scholarships
One Entrance Scholarship per school is awarded to an outstanding student entering the University from a Waterloo County Secondary School. 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%.
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 Regional Municipality 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 Waterloo County secondary schools. 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 Waterloo County secondary schools. They are awarded in conjunction with Waterloo County Entrance Scholarships.

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 Association Scholarships
Entrance scholarships with a maximum value of $4600 of which $1200 is allocated in the first year and $1200 may be allocated in each of three additional years, will be awarded from an endowment fund established by the Alumni Association to outstanding students entering each Faculty. The criteria for awarding and renewing these scholarships will be determined by the awarding Faculty.

Scholarships and Prizes, Bursaries and Financial Aid
University of Waterloo Entrance Scholarships
University of Waterloo Upper Year Scholarships

University of Waterloo Upper Year Scholarships

ARTS FACULTY SCHOLARSHIPS
Upper year scholarships valued at $900 are awarded on the basis of the previous year's standing. Part-time students may be eligible for awards of $100 after completing at least 10 half credits at UW.

ENGINEERING FACULTY SCHOLARSHIPS

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.

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.

ENVIRONMENTAL STUDIES FACULTY AND STAFF 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.

Architecture Fourth Year Entry Prize
This $500 award is given to the student returning to fourth year Architecture with the best overall performance in design upon completion of the Bachelor of Environmental Studies degree.

HUMAN KINETICS AND LEISURE STUDIES FACULTY AND STAFF 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.

Lois Matthews Scholarship Program for Human Kinetics and Leisure Studies
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.
INDEPENDENT STUDIES SCHOLARSHIPS
A limited number of upper year scholarships in varying amounts are made available each year.

MATHEMATICS FACULTY SCHOLARSHIPS
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.

K.D. Fryer Gold Medal
The Faculty of Mathematics awards at each Fall Convocation a gold medal to an outstanding member of the graduating class in Mathematics. The recipient will exemplify high academic standing, demonstrate qualities of good student citizenship and be involved in extracurricular activities. 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 humoured dedication until his death in 1984.

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.

SCIENCE FACULTY AND STAFF SCHOLARSHIPS
A limited number of scholarships may be awarded to students in General Science.

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 his research group within the Department. Awards to students entering upper years are based on the previous year’s academic performance.

Scholarships and Prizes, Bursaries and Financial Aid
University of Waterloo Upper Year Scholarships
Undergraduate Scholarships

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.

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.

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).

Undergraduate Scholarships
Where required, applications are available in the Student Awards Office.

Aetna Canada Award
Two scholarships of $500 each are awarded to the outstanding students in the second year of the Actuarial Science program. Applications should be submitted during the 1B term.

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.

Allergan Prize - For Excellence in Anatomy of the Eye and Visual System
A cash award of $500 plus a plaque is awarded 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.

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.

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

Association of Professional Engineers Undergraduate Scholarship
The Association of Professional Engineers of the Province of Ontario offers three annual scholarships of $375, one to the student in each of the first, second and third years in an accredited Engineering program who has the highest average in the examinations for that year.

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.

Scholarships and Prizes, Bursaries and Financial Aid
Undergraduate Scholarships

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 who are spending their summer in research support in Physiological Optics.

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.

The 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.

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 $1000. 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.
Bell Canada Engineering and Computer Science Awards
The value of these awards is tuition for the final undergraduate year plus an offer of work-term employment with Bell Canada, although acceptance of employment is not a condition of the award. The awards are available to third-year Engineering or Computer Science students who rank in the top half of their class, have an interest in telecommunications or related fields and have been involved in on-campus or community activities. Applications should be submitted during the third year Spring or Fall terms.

J.P. Bickell Foundation 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.

British Columbia Optometric Association Scholarship
The British Columbia Optometric Association presents a scholarship in the amount of $500 to a resident of British Columbia who is admitted to the first professional year of the School of Optometry. This is awarded on the basis of academic achievement.

Canada Packers Inc. Post Secondary Awards
A Canada Packers Inc. - Research and Development Division Award of $800 is available to an undergraduate student in Chemical Engineering who has a high academic standing during the first and second year and is continuing in that program. Positive evidence of leadership and contribution to university and/or community life is also given strong consideration. Applications should be submitted during the 2B term.

A Canada Packers Inc. - Edible Oils and Dairy Division Award of $750 is available to an undergraduate student in Chemistry Co-op Option who has high academic standing during the first and second year and is continuing in the program. Positive evidence of leadership and contribution to university and/or community life is also given strong consideration. Applications should be submitted during the 2B term.

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

Scholarships and Prizes, Bursaries and Financial Aid
Undergraduate Scholarships

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 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 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.

All of the above prizes are made available through contributions of the following Canadian Suppliers and Laboratories:

Alden Optical Laboratories, Fort Erie, ON
Canadian Optical Supply Co., Montreal, PQ
Hydron Canada Ltd., Etobicoke, ON
KDS Optical Company Limited, Toronto, ON
N & N Optical Ltd., Mississauga, ON
Plastic Contact Lens Co. Ltd., Toronto, ON
Professional Optical Co., Ltd., Willowdale, ON
Rodentstock Canada Inc., Toronto, ON
Union Optics Corp. of Canada, Scarborough, ON
Canadian Society for Chemical Engineering Prize
One award, to a Chemistry student, is made annually by the institute. The awards, 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 his/her course.

Carousel Dance Centre Entrance Award
The Carousel Dance Centre has an award fund of $1000 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.

Keith Carr Memorial Award
An annual award 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 the outside community.

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
An award of $1500 is given to two or three final-year Optometry students who have achieved excellence in their special studies.

Certified General Accountants Association of Ontario Award for Excellence
An annual award of $1000 composed of a cash award of $150 plus a credit of $850 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.

Morgan Champness Memorial Award
Two awards of $75 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.

Scholarships and Prizes, Bursaries and Financial Aid
Undergraduate Scholarships

Dr. John H. Chapman Memorial Prize in Communications Engineering
A prize of $1500 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
Two awards of $1000 are awarded to outstanding undergraduate students entering the final year in Engineering. One award of $1000 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 3rd 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.

Classical Studies Correspondence Prize
A prize of $75 is awarded annually to an outstanding Correspondence student who is majoring in Classical Studies.

Classical Studies Essay Prize
The Classical Studies Essay Prize of $75 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 academic year.

Classical Studies 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.
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.

Crowntek Computer Science Scholarship
The scholarship, valued at $350, is awarded to the outstanding student entering fourth-year Computer Science (Co-op) who has demonstrated both academic excellence and outstanding leadership. Applications should be submitted during the 3B term.

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

Data General (Canada) Inc. Award
An Annual award of $1000 is awarded to a Computer Science student entering third year who has demonstrated academic excellence and an interest in computers as related to business. Applications should be submitted during the 2B term or the second half of Year 2 Regular.

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.

John Deere Limited Scholarship
An award valued at $1000 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.

Charles E. DeLeuw Transportation Scholarship
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.

Scholarships and Prizes, Bursaries and Financial Aid
Undergraduate Scholarships

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.

Dow Chemical of Canada Scholarship in Chemical Engineering
$900 is awarded to the student and a grant-in-aid of $350 to the Department. The scholarship is awarded annually to a student, not otherwise holding a scholarship, entering final year of an undergraduate program in Chemical Engineering who has a sincere interest in the chemical industry and who has demonstrated leadership in extra-curricular activities. Applications should be submitted during the 3B term.

George Dufault Medal for Excellence in Communication
The George Dufault Medal is awarded annually to the graduating student in the 4B term in Engineering who has demonstrated excellence in communication ability through the submission of outstanding work-term reports and the oral presentation of one of these reports in a competition held during the last (4B) term of the academic program. The award was established by the family of the late George Dufault in recognition of his contribution to the University as its first 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 allocated to a student in third-year Chemical Engineering who has a good academic record, has demonstrated a strong interest in extracurricular activities and athletics and has evidence of leadership qualities. Applications should be submitted during the 3B term.

J.W. Dyck Honours Scholarship
An annual award of approximately $1000 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.
Samuel Eckler Medal in Actuarial Science
This prize was established to recognize the contribution of Samuel Eckler to the actuarial profession and is provided by Eckler Partners. The medal, which is cast in gold, is awarded each year to the outstanding graduating student of the Honours Actuarial Science Program.

Electrohome 75th Anniversary Scholarship
Established by the Victor Company of Japan Ltd. and Kanematsu-Gosho Ltd. in recognition of the 75th Anniversary of Electrohome Ltd., one scholarship of $1500 is awarded 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.

Elgin County Scholarship
Elgin County offers two scholarships of $200 each to the two students from Elgin County attaining the highest academic standing.

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 will be presented to an Architecture student who submits the best energy related design. Students should submit their designs to the Chairman of the Awards Committee.

English Language Proficiency Prize
Several prizes of $100 each are awarded to students from all Faculties who achieve the highest scores on the English Language Proficiency test.

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.

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

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.

L. Fejer Award in Mathematics
The scholarship will not exceed $3200 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 Faveau Memorial Award
A $500 award has been established in memory of Scott Kelsey Faveau, 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.

Fine Arts Art History Scholarship
One award presented annually to a deserving Fine Arts major who has completed with distinction 3 years of Art History studies and elects to continue in the fourth year of the Honours Arts History Program.

First Year Engineering Prizes
Prizes of approximately $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 chairman, Dr. John Fisher. The award, consisting of a citation and a honorarium of $1000, is made from time to time to a graduating Engineering student who has made significant contributions to Co-operative Engineering Education. Nominations, which can originate from student groups or faculty members, should be directed to the Waterloo Chapter Awards Committee Chairman of the Sandford Fleming Foundation.

Sandford Fleming Debate Awards
The Sandford Fleming Foundation has established the Sandford Fleming Debates 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.
Scholarships and Prizes, Bursaries and Financial Aid
Undergraduate Scholarships

Sandford Fleming Medal for Academic Excellence
The Sandford Fleming Foundation has established six medals for graduating students, one in each of the Engineering programs: Chemical, Civil, Electrical, Mechanical, Systems Design Engineering 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 Engineering programs: Chemical, Civil, Electrical, Mechanical and Systems Design Engineering. 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.

Andrea Fraser Memorial Scholarship
This scholarship was established by classmates, relatives and friends in memory of Andrea Louise Fraser, B.Sc. The award is presented to a 3rd or 4th 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 awards office by January 30.

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.

Gandalf Data Limited Award
An annual award of $1000 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.

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. Applications should be submitted in 3B or the 2nd term of third year Regular.

General Motors of Canada Limited Co-operative Student Awards
Up to five new awards per term are offered to cover tuition and an allowance for books and materials. All Co-op students who have successfully completed at least three school terms and two work terms with GM are eligible to apply. Selection of recipients will be based on work-term performance evaluations, university marks, work-report evaluations, interest in continuing Co-op employment with GM and in becoming a permanent GM employee, extra-curricular activities, and an interview. Interested Co-op students should apply to the Co-operative Education Co-ordinator at any GM plant location during their second work term at GM.

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.

Robert E. Gobeil Auditing Scholarship
The Robert E. Gobeil Auditing Scholarship valued at $500 has been established by Alcan and many friends of Mr. Gobeil 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 Professionally Accredited Studies in Accounting 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.

Graham Goddard Anthropology Medal
A silver medal is awarded annually to a third or fourth-year Anthropology Major or Honours student with an interest in the Native Peoples of North America (including any aspect of their society and culture - prehistoric, historic, or contemporary) demonstrated either through course selection or essay writing. No application necessary.

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

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 training function in the University or the community. Letters of recommendation and the application should be forwarded to the Student Awards Office by October 15.

Percy Hermant Centennial Bursary Scholarships
These awards 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 $2000, 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 15 of each year.

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
Two awards of calculators will be made annually. The calculators are awarded to the top student in the final year of the Computer Engineering and Computer Science programs.

Lynn Holmes Memorial Award
An award of $450 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.

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 he or she is registered.

Institution of Production Engineers Canadian Council Award
This prize consists of a book and a one-year membership in the Institution. It is awarded annually to the best all-round fourth-year student in the production and manufacturing option of Mechanical Engineering, based on academic standing and involvement in student affairs. The award was established in memory of Stan Thurgar and all the members of the institution who have conscientiously worked for the good of Canadian industry.

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 Limited 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 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 Biology and Chemistry and one prize to a student in Co-op Honours Biology.

Jeanne La France Scholarship
The Jeanne La France Scholarship 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.

Leopold LaCourciere Award for General Proficiency
District #3 of the Ontario Association of Optometrists present 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.

James D. Leslie Prize
This $100 prize was established to recognize the contribution of Prof. 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.

**Lieutenant Governor's Medal for Architecture**
The medal is awarded to the fifth year's top academic and design student in Architecture.

**RJR-Macdonald Accounting Excellence Scholarship**
This scholarship, valued at $4000, is awarded annually to the student pursuing the Masters of Accounting program who is judged to be the outstanding member of the graduating class in Honours Accountancy Studies, based on excellence in academic performance and demonstrated leadership. The scholarship is paid to the student in two equal instalments during the first two terms of the Master of Accounting program.

**Donald C. MacKenzie Prize in Classical Languages**
The Classical Studies Prize of $75 is awarded annually to the student who attains the highest mark in either Latin 203/204 or Greek 100. To qualify for the prize the student must enrol in a further Latin or Greek course at the 200 level.

**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 $1000 award is made on the basis of academic achievement.

**Manitoba Optometric Society Scholarship**
The Manitoba Optometric Society presents a scholarship in the amount of $300 to a resident of Manitoba who is entering the first professional year of Optometry.

**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 Bio/Chemistry) program with the highest overall average in third and fourth year courses.

**Scholarships and Prizes, Bursaries and Financial Aid**
**Undergraduate Scholarships**

- **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 3rd or 4th year Honours Co-op Recreation student who has maintained a minimum B average and who is involved in or has contributed to intramural athletics and has demonstrated interest and involvement in Community Recreation and sport activities. Letters of recommendation and the application should be forwarded to the Student Awards Office by October 15th.

- **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.

- **Burton McKay Memorial Scholarship**
The British Columbia Optometric Association presents a scholarship in the amount of $500 to a resident of British Columbia who is admitted to the first professional year of the School of Optometry. This is awarded on the basis of academic achievement.

- **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.

- **J.C. McKeegney Memorial Fund**
Two awards are given to the third or fourth-year students in the Faculty of Arts who have shown outstanding academic performance and/or extracurricular interests in the Hispanic Area; one in Peninsular Spanish Studies and one in Spanish American Studies. Applications should be submitted no later than February.

- **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.
Mediacom Inc. Scholarship
An annual scholarship of $350 is awarded to a third or fourth-year student in Urban and Regional Planning based on high academic standing and an interest in planning.

Jerome T. Miller Memorial Prize
A $50 prize was established in 1968 by relatives and friends in memory of the late Jerome Thomas Miller, B.Sc., M.Sc. (1966) - 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.

W.I. Miller Scholarship
The W.I. Miller scholarship, worth $1500, 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.

Murata Erie North America, Inc. Award
Two awards of $500 each are given to students entering fourth-year Electrical Engineering based on outstanding performance in courses related to analog circuit design and measurement. Applications should be submitted during the 3B term.

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.

OIRCA Award
A sum of $500 is provided by the Ontario Industrial Roofing Contractors Association annually. This is awarded to the winner of an architectural competition open to all students in the School of Architecture. Selection of the winner is made by four judges, two of which are invited external experts.

Ontario Association of Architects Medal
A medal of gold, silver or bronze is awarded to a graduating student (BArch) for excellence in architectural design.

Ontario Association of Architects Second Year Award
The award of $1000 is based on studio performance in second year and overall performance up to the second year.

Ontario Association of Architects Third Year Award
An award of $1000 is based on studio performance in third year and overall performance up to third year.

Ontario Hydro Electrical Engineering Award
An annual award of $1000 is made to a student entering fourth-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 3B term.

Ontario Rubber Group/Rubber Chemistry Division, CIC Award
The Ontario Rubber Group and the Rubber Chemistry Division of the Chemical Institute of Canada have made available two $300 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 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.

Pennsylvania German Folklore Society Prize
An annual prize of $150 is awarded for the best essay submitted on any topic related to the history, culture or language of the Pennsylvania German people of Ontario. Submissions should be made by March 15, directly to the Department of Germanic and Slavic Languages and Literatures.

Marcel Pequegnat Scholarship
A $1200 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.
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 Optometry 347 and demonstrates clinical proficiency.

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.

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.

Ready Mixed Concrete Association of Ontario Scholarship
Two scholarships of $250 each are awarded to students in 3B Civil Engineering who are residents of Ontario, who have demonstrated particular interest in the use of concrete and reinforced concrete, and who have obtained a high average in related courses. Consideration will be given for experience gained in work terms which involved working with concrete. Applications should be submitted during the 3B term.

Recreationists’ Association of West Central Ontario
One award valued at $100 is presented to a third-year Recreation 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 should be submitted during the 2B term.

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.

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, B.E.S. ’71 (Geography). The book is awarded each year, on the basis of marks, to a Geography student completing the third year of study.

Scholarships and Prizes, Bursaries and Financial Aid
Undergraduate Scholarships

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

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.

Mrj Schaefer Prize in Architecture
An annual $200 award is presented to an Architectural student who has been elected to serve on one of the School committees and who combines academic proficiency with a contribution to student affairs and student life in the School of Architecture.

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
Nicola Duthie
Anne Fiedtkou
Roman Guzowski
David Lamb
Wade Mesher
Mary R. Mitchell
E.J. (Ted) Mulrooney
Robert G. Sommerville
Michael Souliere

Smale Fellowship
The award of $600 is based on work in the fourth year (BArch) program, leadership ability and academic and design excellence.

Society of Chemical Industry Award
An engraved plaque is awarded by the Society to the student with the highest standing in the final year of Chemistry.

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.

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.
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.

Superlite Research Scholarship
The Superlite 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.

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 Optometry (Optometry 242, 252, etc.).

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 Association Gold Medals
The University of Waterloo Alumni Association is providing 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.

R.H. Walters Award
One or more awards, based on academic excellence, are made each year to outstanding students in the Honours Psychology program.

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.

Michael Wright Memorial Scholarship
$300 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.

Scholarships and Prizes, Bursaries and Financial Aid
Undergraduate Scholarships
Work-Term Report Awards

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.

Work-Term Report Awards
All of the following are awards for work-term reports judged best for clarity, grammar and other communication skills. The technical content of the report is important but not a qualifying requirement. 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.

Allen-Bradley Canada Limited Awards
Three awards of $100 each to second, third or fourth year Electrical or Computer Engineering students.

Babcock & Wilcox Canada Limited Awards
Three awards of $100 each to second, third or fourth year Mechanical Engineering students.

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

Canadian Information Processing Society Awards - Grand Valley Section
Three awards of $100 each to second, third or fourth year Computer Science students.

Control Data Canada, Ltd. Work-Term Report Award
Three awards of $100 each to second, third or fourth year Computer Science students.

Institute for Polymer Research Award
Three awards of $100 each to second, third or fourth year Chemical Engineering or Applied Chemistry students.
**Dofasco Awards**
Three awards of $100 each to Civil, Electrical, Geologically and Mechanical Engineering students following their first work term.

**George J. Dufault Awards**
The George Dufault Awards arise from a fund established by the Sanford 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 $100 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.

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

**Sandford Fleming Foundation Awards**
Awards of $100 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.

**General Foods Limited Work-Term Report Award**
Three awards of $100 each to second, third or fourth year Biochemistry students.

**The Sir Casimir Stanislaus Gzowski Award for Work-Report Proficiency**
This award, in the amount of $100 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 $100 to second, third or fourth year Systems Design students.

**Institute for Improvement in Quality and Productivity Award**
Six awards of $100 each to second, third or fourth year Engineering, Mathematics or Arts Accounting students.

**S.C. Johnson & Son Limited Awards**
Three awards of $100 to second, third or fourth year Chemical Engineering students.

**Scholarships and Prizes, Bursaries and Financial Aid**
**Work-Term Report Awards**

**Kerr Addison Mines Limited 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 to second, third or fourth year Biology students.

**MacLaren Engineers Inc. Awards**
Three awards of $100 to second, third or fourth year Civil Engineering students.

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

**Morrison Beatty Limited Award**
Awards of $100 to second, third or fourth year Geography 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**
Nine awards of $100 to second, third or fourth year Electrical or Computer Engineering, Systems Design Engineering and Computer Science/Information Systems Option students.

**Polysar Awards**
Two awards of $100 to Chemical Engineering students following their first work term.

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

**Walter Runge Award**
One award of $100 to a first year Computer Engineering student.

**Society of Management Accountants of Ontario Awards**
Three awards of $100 each to second, third or fourth year Mathematics/Management Accounting students.

**Thorne Ernst & Whinney 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 Mathematics/Chartered Accountancy Option and/or Arts Accountancy Studies students.

Xerox Research Centre of Canada Limited Awards
Three awards of $100 to second, third or fourth year Applied Physics students.

Bursaries
Bursaries are awarded to full-time undergraduates experiencing financial difficulties and normally maintaining a B average. Students with Student Authorizations who have not been in Canada for more than one year will not normally be considered. Students in a Regular program should apply by January 30th. Co-op students may apply only in their B term. All bursaries are applied for on a common University of Waterloo application form, available from the Student Awards Office, unless otherwise stipulated.

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 now experiencing financial hardship re-entering the academic world. Mature students experiencing financial difficulties should write to the Student Awards Office 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 bonafide residents of the Province of Ontario.

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.

Barkley’s of Avonmore Bursary
One bursary is awarded annually to a student from a Third World Country. Foreign students must complete the bursary application and arrange an appointment with the Student Financial Aid Officer.

Scholarships and Prizes, Bursaries and Financial Aid

Bechtel Canada Engineering Bursary
Bechtel Canada Engineers Limited has made available six bursaries, each in the amount of $500 to be awarded to six students entering second-year Engineering at the University of Waterloo. Each award will be disbursed in a manner that shall not serve to reduce the amount of any federal or provincial loan and/or grant to which any recipient may otherwise be eligible. Financial need and scholastic standing shall be criteria employed in determining award winners.

J.P. Bickell Foundation 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 Student Bursary
This $200 bursary donated by the Biology Undergraduate Society, is available to any undergraduate student registered in the Biology Department.

Birks Family Foundation Bursary
Bursaries are made available by the Foundation to deserving undergraduates.

Campus Centre Board Bursary
Students encountering financial difficulties should arrange to speak with the Student Awards Officer regarding assistance from this source.

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 percent 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 women 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 women students studying on a part-time basis. Candi-
dates must be pre-registered or registered in a degree program, have completed at least two half credits and are working toward an undergraduate degree through part-time studies. An application form as well as an explanation regarding financial need must be submitted to the Student Awards Office prior to the month in which the study period begins.

**Credit Valley Conservation Authority Foundation Bursary**
One bursary of $200 is awarded annually to a Geography or Urban and Regional Planning student whose permanent address is within a member municipality of the Credit Valley Conservation Authority.

**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 required.

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

**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.

**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 honour of J.G. Hagey, President Emeritus of the University, and in recognition of his significant contributions to post-secondary education, the Alumni Association 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.

**Scholarships and Prizes, Bursaries and Financial Aid**

**Bursaries**

**William H. Gale Bursary**
One bursary of $250 is awarded annually to a second, third or fourth year student in Co-op Applied Economics.

**Huron County Bursaries**
Huron County Council has established a bursary fund at the University of Waterloo for students who attended high school in Huron County and whose home is in the County. The bursaries, offered annually, will be for an amount of $200 and are awarded to full-time undergraduate students in any Faculty of the University who have good academic records and who are in need of financial assistance to enable them to continue their studies.

**I.O.D.E. – Tommy Atkins Chapter Bursary**
A bursary valued at $150 is awarded annually to a needy full-time undergraduate whose permanent residence is in Kitchener or Waterloo.

**Interprovincial Pipe Line Company Bursary**
The Company provides $2000 for bursaries for students beyond the first year who are in need of financial assistance. At least 50% of the funds granted must go to students in Engineering. Preference will also be given to students whose normal residence is Canada or the USA.

**K-W Professional Engineers Wives' Association Bursary**
Two awards of $100 each are given to a male and female student in Engineering who are experiencing financial difficulties.

**Kitchener-Waterloo Community Foundation Bursary**
A bursary of $500 may be awarded annually to a full-time student from the Kitchener and Waterloo area registered in an Arts or Music program.

**Litton Systems Bursary**
Two bursaries, valued at $250 each, are offered annually by Litton Systems (Canada) Limited to students in the Faculty of Engineering, with preference being given to those in the electronic or electromechanical fields.

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

Bursaries

A.F. (Tony) Pickard Memorial Award
An award has been established in memory of A.F. (Tony) Pickard, former research co-ordinator, Applied Analysis and Computer Science, at the University of Waterloo. The amount of the award will vary from year to year depending upon the capital investment income. Undergraduates enrolled in the Faculty of Mathematics who have an active interest in Computer Science and show academic promise combined with financial need may apply for this award.

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

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.

Rockwell International of Canada Limited, Collins Canada Division Bursary
Bursaries totalling $500 is awarded to deserving undergraduates in Electrical Engineering. Applications should be made to the Awards Officer by the end of the first month of the term. Preference will be given to students in third or fourth year.

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.

Alan W. Shattuck Memorial Bursaries
Normally two bursaries of $400 to $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.

University of Waterloo Bursaries
The University has established a bursary fund to assist students who have a proven financial need. Bursaries normally valued at $200 each are awarded to full-time undergraduates in any Faculty 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 standing and must demonstrate adequate repayment terms. 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.

Alumni Association 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.

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.

Scholarships and Prizes, Bursaries and Financial Aid
University Loan Funds

David Cook Memorial Fund
The University of Waterloo Mathematics Society has made an amount available to be used as an addition to the University’s Emergency Loan Program. The Society’s contribution is intended for Mathematics students who have been faced with unexpected expenses during their academic year.

Co-operative Lecture Emergency Loan Fund
This fund was established by Canadian politician T. Douglas in 1970.

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

Engineering Memorial Loan Fund
The Federation of Students has established an interest-free, short-term loan fund in honour of deceased students of the Faculty of Engineering. Loans are normally to a maximum of $300 for 90 days and are available to first-year Engineering students. To date, contributions have been received in memory of: Marc Cayouette.

Engineering Society “A” Loan Fund
This fund was established by the Engineering Society “A” to assist Engineering students in need of short-term loans.

Engineering Student Loan Fund
This fund was established by the Faculty of Engineering. Loans up to $300 for a period of up to 90 days are intended for Engineering students who have been faced with unexpected expenses during their academic term.

Environmental Studies 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 H.K.L.S. 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 H.K.L.S. 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.

**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 their third year, registered or not, who are experiencing severe financial hardship. Appointment with the Student Financial Aid Officer is necessary.

**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 Financial Aid Officer regarding assistance from this source.

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**Scholarships and Prizes, Bursaries and Financial Aid**

**University Loan Funds**

**Government Assistance Programs**

**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.

**Bruce Walker Memorial Loan Fund**
This loan fund has been established by classmates of the late Bruce Walker, who lost his life in an accident in 1973. The fund represents contributions received from classmates. Loans are made available to Kinesiology students. Maximum loans are $100 with repayment within 90 days.

**Women's Auxiliary to the Optometrical Association of Ontario Loan Fund**
This fund has been established by the Auxiliary to provide interest-free short-term loans to all eligible full-time Optometry students at the University who are experiencing temporary financial difficulty.

---

**Government Assistance Programs**

**The Ontario Student Assistance Program (OSAP)**
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.

**CSAP consists of the following five plans:**

1. Under the Ontario Study Grant Plan, Ontario students may apply for non-repayable grant assistance without having to borrow money first.
2. The Canada Student Loans Plan provides assistance in the form of interest-free loans to students who wish to pursue post-secondary studies who are not eligible for any, or sufficient, grant assistance.
3. The Ontario Student Loans Plan makes interest-free loan assistance available to students whose needs are not fully met by the Ontario Study Grant Plan and the Canada Student Loans Plan.
4. 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. A personal interview is normally required.
5. The Ontario Work-Study Plan establishes a means whereby students can actively finance the cost of their education through part-time employment in
and around the campus thus lessening their dependence on loan funding. Positions are posted outside the Student Awards Office.

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.

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**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.

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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.

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**Tuition Assistance for Senior Citizens**

The University will consider applications for financial assistance from Canadian citizens or permanent residents age 60 years or over who find payment of the required tuition fees a hardship. In such cases applicants should write a letter, indicating the reasons for their inability to meet the cost of tuition, to: The Student Financial Aid Officer, Office of the Registrar.
The Department of Co-operative Education and Career Services
Department of Co-operative Education and Career Services

Director
J.C. Wilson, BScCE (New Brunswick), PEng

Program Administrators
T. H. Fitzgerald, BA (St. Lawrence)
W.B. Fuller, BA (Western Ontario)
J. W. Hoag, BArch (Toronto), FRAIC
K.B. Kenning, BA (Wilfrid Laurier)
R. A. Klawitter, BA (Western Ontario), CIM
M. A. McMartin, BA (Western Ontario)
R. A. Pullin, BSA (Toronto)
J. F. Westlake, BSc, MSc, PhD (Waterloo), PEng

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

Co-ordinators, Co-operative Education
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G. P. Berthin, BSc (Manitoba), PEng
L. R. Bricker, BSc, MEng (Waterloo)
P.H. Critchley, BArch (Waterloo), MRAIC
W. G. Dailey, BArch (Liverpool)
G. P. Dobbin, BASc (Toronto), PEng
G. G. Ellsworth, AB Geol (Princeton)
S.A. Feraday, BSc (Waterloo)
M.E. Flett, BE (TUNS)
B.L. Fretz, BA (Goshen)
R. A. Grant, BSc (Queen's), PEng
D. S. Harris, BEng (McGill), PEng
J.C. Henshaw, BSc (Toronto), PEng
J.W. Holland, BASc (Toronto), MBA (Western Ontario), PEng
H. T. Lemon, FCIP
R. Louw, BSc (Toronto)
A. F. MacKinnon, BComm (Acadia)
J. Martin, BA (Windsor)
R. Mateyk, BASc (Toronto), PEng
P. J. Mazzei, BSc, MSc (Queen's), PEng
W.B. Moore, BA (McGill)
G. C. Murphy, PEng
R. Parker, BSc (Montreal), MBA (Toronto)
L. I. Pinaud, BSc, MSc (Queen's)
A. M. Prins, BA (McMaster)
R. H. Roach, BSc (Waterloo)
H. S Straßen, BA (Queen's)
P. V. Solomonian, BMath (Waterloo), MBA (Wilfrid Laurier)
V. E. Sparrow, BA (Waterloo)
G. Subasic, BASc (Washington), PEng
C. J. Webster, BSc (Guelph)

Special Projects Co-ordinator
I.A. Lebold

Liaison Co-ordinator
O. F. Naase, BA (Waterloo)

Co-operative Education and Career Services

Placement Advisors
R. Hawes
J. L. Metz
J. Peg
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 is in no sense a substitute for, but is rather a complement to, the 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 5:3 and 5:4. 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

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

### Program (By Faculty)

#### Arts


<table>
<thead>
<tr>
<th>Stream</th>
<th>1A</th>
<th>1B</th>
<th>2A</th>
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#### Accounting Studies

Chartered Accountancy Studies: Stream 4

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#### Management Accountancy Studies:

Stream 4

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#### With admission to Honours BA Accountancy/MAcc program from Co-op

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<td>3B</td>
<td>4A</td>
<td>4B</td>
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</table>

#### Economics (Applied)

Regular off term 2A + 2B + 3A + 3B + 4A + 4B

#### English

Regular off term 2A + 2B + 3A + 3B + 4A + 4B

#### Anthropology, Political Science, Psychology, Sociology

Regular off term 2A + 2B + 3A + 3B + 4A + 4B

#### Engineering

Chemical, Civil, Computer**, Electrical, Mechanical

Stream 8

<table>
<thead>
<tr>
<th>Stream</th>
<th>1A</th>
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#### Geology

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#### Systems Design

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#### Environmental Studies

Architecture

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#### Environment and Resource Studies

<table>
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#### Geography

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#### Urban and Regional Planning

<table>
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<td>3B</td>
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#### Human Kinetics and Leisure Studies

Health Studies, Kinesiology, Recreation and Leisure Studies

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

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* This four-month term is spent at the University of Western Ontario, Faculty of Education, London.

S Students seeking admission must normally have satisfactorily completed two work terms in another Co-op Math program.

T Teaching work term.

V Admission occurs by January for the 2B term.

A Application for Professionally Accredited Stream should be made in 2A for all streams. Students not entering PAS will take their 2B term as indicated above.

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.

Z Admission occurs at the time of selection of second-year courses. Students cannot be admitted to Co-op in first year.

† Following the 4A academic term, students may take the 4B academic term or the subsequent work term in either Jan/Apr or May/Aug periods.

* * Stream 8 only

†† Stream 4 only

††† Pre-Professionally Accredited Stream phase of the Honours BA Accountancy/MAcc program.

(+) Optional Work Term.

∞ Internship in Honours BA Accountancy/MAcc program.
## Work/Study Sequence

**Program (By Faculty)**

<table>
<thead>
<tr>
<th>Mathematics</th>
<th><strong>Math/Chartered Accountancy</strong></th>
<th><strong>Math/Management Accounting</strong></th>
<th><strong>Math Teaching Option</strong></th>
<th><strong>Science</strong></th>
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</thead>
<tbody>
<tr>
<td>Stream 8</td>
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<td>Stream 8</td>
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<tr>
<td>1A</td>
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</tr>
<tr>
<td>Stream 4</td>
<td>1A</td>
<td>1B</td>
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<td>2B</td>
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<tr>
<td>Applied Math, Applied Math with Computer Science, Applied Math with electives in Engineering, Pure Math, Pure Math with Computer Science</td>
<td></td>
<td></td>
<td></td>
<td>Stream 4</td>
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<tr>
<td>or Statistics</td>
<td></td>
<td></td>
<td></td>
<td>Applied Earth Sciences</td>
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<tr>
<td>1A</td>
<td>1B</td>
<td>2A</td>
<td>2B</td>
<td>3A</td>
</tr>
<tr>
<td>Math/Chartered Accountancy</td>
<td>Computer Science/Chartered Accountancy</td>
<td>Computer Science/Management Accounting</td>
<td>Math Teaching Option</td>
<td>Psychology</td>
</tr>
<tr>
<td>1A</td>
<td>1B</td>
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<td>off term Reg 2B</td>
</tr>
</tbody>
</table>

* This four-month term is spent at the University of Western Ontario, Faculty of Education, London.
* Students seeking admission must normally have satisfactorily completed two work terms in another Co-op Math program.
* Teaching work term.
* Admission occurs by January for the 2B term.
* Application for Professionally Accredited Stream should be made in 2A for all streams. Students not entering PAS will take their 2B term as indicated above.

**Note:**

- Although the Co-op program begins in 2A, admission is made to the program at the time of the initial application to the University.
- Admission occurs at the time of selection of second-year courses. Students cannot be admitted to Co-op in first year.
- Following the 4A academic term, students may take the 4B academic term or the subsequent work term in either Jan/Apr or May/Aug periods.
- Stream 6 only
- Stream 4 only
- Pre-Professionally Accredited Stream phase of the Honours BA Accountancy/MAcc program.
- Optional Work Term
- Internship in Honours BA Accountancy/MAcc program.
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 upon the student’s proof of identification. No information may be removed from the file. Copies of Employers 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 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 if placed there on the placement program. Refusal to accept the job will normally be recorded on the Co-operative Student Record as: "Failed work term – refusal to honour previous agreement".

Deleting 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 the 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 two 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 appropriate for 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
Co-operative Education and Career Services
Work Terms

Second consecutive work term will normally be recorded on the Co-operative Student Record as “Failed work term – refused to honour previous agreement”.

Unsatisfactory Performance
Unsatisfactory performance by a student on a work term is investigated by the student’s Co-ordinator. If benefits from further professional training are questionable, the student may be required to withdraw from the program.

On Own
This condition, as recorded on the Co-operative Student Record, does not count towards the minimum requirements for graduation. This terminology is used to denote the following conditions:

- **On Own – Self Imposed:** The student has been granted a term off by the Department of Co-operative Education and Career Services for personal reasons. This condition may be changed on the student record should the student find suitable employment through his or her 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 deleting 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 lack of choice of core or elective subjects during particular terms.

terms normally equals the number of work terms available and remaining to the student in the program from his/her 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 Examination Report 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. Provision is, however, allowed for such situations as part-time jobs and economic uncertainty. In all cases, failure to obtain approval from the appropriate Co-ordinator to not return for a
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 his/her student file is current and correct.

Standings and Appeals
Applicable to information on pages 5:5 and 5:6. The Department of Co-ordination and Placement 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 or 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
Normally 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, as well, may 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 p. 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 less than four work terms available to the student, and 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 these 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 1956 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.

F. G. Brown (President)
IBM Canada
J. D. MacDonald (Past President)
Northern Telecom Canada
P. A. McLagan (Vice-President)
DMR Group Ltd.
R. T. Mahler (Secretary)
Amdahl Limited
S. H. Cornforth (Public Relations Chairman)
Price Waterhouse
P. B. Patterson (Membership Chairman)
Mercantile and General Reinsurance Company
N. Best
Best Associates
C. S. Boyce
3M Canada Limited
D. W. Brown
Air Canada
D. J. Cash
Niagara Region Development Corporation
D. M. Caughhey
CADENCE Computer Corporation
R. D. Colling
CNCP

Co-operative Education and Career Services
Co-operative Degree Designation
Waterloo Advisory Council
Student Advisory Council

G. E. Cooper
Noranda Exploration Company Limited (Retired)
P. Davies
Consumers Gas Company Limited
S. Gendron
Inco Limited
V. Gibbons
Consumer & Commercial Relations
J. K. Hogan
Shell Canada Ltd.
R. D. Hossack
Coopers and Lybrand
J. E. Hunt
Concord Scientific Corporation
C. Irwin
Bank of Montreal
W. L. Krestinski
CP Rail
D. S. Layne
Toronto General Hospital
P. B. Lesaux
Public Service Commission
A. M. Levine
Allan Levine, Architect
J. D. Miller
Dow Chemical Canada Inc.
K. D. Mills
Westinghouse Canada Inc.
J. D. Reynolds
The Mutual Life Assurance Company of Canada
G. G. Stewart
Labatt Brewing Company
R. G. Taylor
Telepanel Inc.
P. Werner
Skills Development
W. G. Whiteside
Block Drug Co. (Canada) Ltd.
J. Yates
Computerland

Student Advisory Council
The Student Advisory Council to the Department of Co-operative Education and Career Services is the formal liaison between students and the Department. The Council consists of Co-op students appointed by the various student societies. 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)

Co-ordinator, Career Services
F. M. Ruszer, BA, MSc (Guelph)

Career Advisors
M. Bryan, BA (Waterloo)
L. Kling, BA (Waterloo), BEd (Western)

Alumni Placement Advisor
D. Hudspeth

Students at all academic levels, Regular or Co-op, in all Faculties, are assisted in determining career paths and in obtaining employment upon graduation. Employment possibilities and organizations compatible with the individual student’s needs and abilities are discussed during personal interviews with career advisors.

Group workshops for students are held on job search, interview techniques, as well as resumé and letter writing. Career talks that cover many areas of interest to students are held throughout the year. These talks are designed to provide students with current information on career opportunities and employment trends.

Each year, several hundred employers are invited to conduct on-campus interviews for all graduating students. Employers interested in hiring graduates interview students during a four-week period in January/February. Summer and part-time employment opportunities are also available for non Co-op students.

The Alumni Referral Service is offered year-round to alumni seeking short-term or permanent employment. Resumes are forwarded on behalf of alumni to employers who are seeking candidates for open positions in their organizations.

The Career Services offices are located on the first floor of Ira G. Needles Hall.

Student Vocational Advisor Program (SVA)
Student Vocational Advisors are students trained in career planning and job search who are available in the Fall and Winter terms to act as peer resource persons. SVAs have regular office hours three hours a week and conduct workshops of special interest to students in the various faculties. Watch posters for office locations and times or check for information in the Career Services office, Needles Hall, room 1001, ext. 2494.
Organizations Employing Co-operative Students

The following is a list of employers who participated in Waterloo's Co-operative programs in 1987. The list does not acknowledge the many individual departments within some of the organizations who participated.

Aart's Hair & Fitness Studio
Abell Waco Ltd.
Abitibi Price Inc.
Absopulse Electronics Ltd.
Accugraph Corporation
Acto Compounds Inc.
Access International Limited
Actel Resources Inc.
Actrex Partners Limited
Adam Scott College & Vocational Institute
Adamson Associates
Adcom Electronics
Addiction Research Foundation
Adult Occupational Centre
Adventure Guide Inc.
AER Computers Inc.
A.E.G. Bayly Inc.
Aerostar Limited
Aetna Canada
AGF Management Limited
Agri Services Laboratory Inc.
Ainsley & Associates Limited
Air Canada
Akitt & Swanson
Akler Melotex Cunningham & Frimet
Ala-Kantti Woodman
Leo Alarie Sons Ltd.
Alberta Research Council
Albian Computer Systems Ltd.
Alcan Ltee. Socite
Alcan Foil Products
Alcan Smelters & Chemicals Ltd.
Alchem Inc.
The Algoma Steel Corp. Ltd.
Algoods Div. of Alcan Canada Products Ltd.
Allelix Inc.
Allen-Bradley Canada Ltd.
Lotus A. Allen & Co.
Allen Miles Fox & Johnston
Allinson-Ross Corp.
Alpha Basics Corporation
Amberson
Ambico Limited
Amdahl Communications Inc.
American Cinemex
American Express Canada Inc.
AMS Canada Inc.
Arthur Andersen & Company
H.H. Angus & Associates Ltd.
Annand Burton-Brown Architects
Antel Optronics Inc.
Apple Canada
Applewood Heights Secondary School
Aratek International Inc.
Daniel Arbour et Associes
Arcop Associates
Arcop Architects Inc.
Arjay Engineering
Armstrong Szweczyk Klayman Chartered Accountants
Armtec
Arrell Observation & Detention Home for Children
Arrixa Corporation
Arvak Management Inc.
Ashland Chemicals
Assayeurs Ontario Ltd.
Associated Engineering
Associated Spring Division Wallace
Barnes Comp. Ltd.
Assumption Mutual Life Insurance Company
Astra Pyrotechnics Canada Limited
ASW Computer Systems Ltd.
A S Y T Technologies Inc.
Atkinson Tremblay & Assoc. Inc.
Atlantic Packaging Products Ltd.
Atlantic Flight Research Inc.
Atlas Supply Company of Canada Ltd.
Atomic Energy of Canada Ltd.
AT & T Canada Inc.
Ault Dairies Ltd.
The Austin Company Limited
Australian Mutual Provident Society
P.C. Automation Inc.
Automation Tooling Systems Inc.
Avery Label Systems
Avico
Babcock & Wilcox Canada
Bache Securities inc.
B. & A. Consulting Group Ltd.
Bailey Controls
Bailey Hoogovens Canada Inc.
Bakelite Thermostats Limited
Balderson Mieleco & Co.
Baldwin & Franklin
Kenneth W. Ball & Company
Bank of Nova Scotia
Bank of Canada
Bank of Montreal
Bapco
Barbecon Inc.
Barber Water Power Products
Barclays Bank of Canada
Barnes Investor Relations
Barr Associates
Barton Tubes Limited
Basf Canada Inc.
Bata Limited
Bateman & Battaglia
Bathurst Pain & Sports Medicine Clinic
Batten Graphics
Batronics Inc.
Baxter Travenol Canada Inc.
Baycrest Hospital
Bay Mills Midland Ltd.
Bayview Wildwood Resorts
Beaton Wills & Jefferson
Beaver Lumber Company Limited
Bechtel Canada Ltd.
Becker Milk Company Limited
N.K. Becker & Associates Ltd.
Beckers Lay-Tech Inc.
Beclawat Canada Inc.
Bell Canada
Bell Cellular Inc.
Belleville PUC
Herman J. Bell
Bell-Northen Research
Bell Tootal
Bell-Tronics
Dr. J.W. Bender Reg. Naturopathic Practitioner
Bendix Electronics Ltd.
Bernard Reach Architect
Berner & Company Inc.
Best Energy Systems
Bethesda Home
BFR Industries Ltd.
Bick's Multifoods Limited
Biokinetics and Associates Limited
Biotechnology Research Institute National Research Council
Birch Glen Resort
Bird Archer Inc.
Bird Construction Company Limited
Bimbaum Prenick Stekel & Co.
Bishop Strachan School
Bit Slice Software
Black & McDonald Ltd.
Blouse Metal Products
Bluewater Splashdown Park
John Blums Architect
Boehring Ingleheim
Boeing of Canada Limited Amprior Division
Joseph Bogdan
Boise Cascade Canada Ltd.
Borden Chemical Co. (Canada) Ltd.
Borg-Warnor (Canada) Ltd.
Borough of East York
Bours Wilson Scott & Proctor
Bowes Co. Ltd.
Boyle-Midway (Canada) Limited
Boyne River Natural Science School
The Braeside Group
Bramalea Limited
Bramalea Software Systems
Brampton Centennial Secondary School
 Brampton Echo Electric Commission
Branchton Camp
Brant County Board of Education
D.H. Braun Consulting Engineers Ltd.
Bregman & Hamann
Breitnauer Centre
Brexik Scorgie Wasiyko Architects Inc.
Breslube Ltd.
Brief Rottar Wynberg Cappe Chartered Accountants
Briestensky Architect Ltd.
Brison Brook Beynon Architects
Bristol-Myers Manufacturing
British Columbia System Corp.
Brookline Psychiatric Hospital
Brookside Youth Centre
Brouwer Turf Equipment Limited
Merrill D. Brown OIs
Brunton Browning Day & Partners
Budd Canada Inc.
Building Design Partnership
Bundy of Canada Limited
Burns Fry Ltd.
R.J. Burnside & Associates Ltd.
Burrowes Manufacturing Limited
Burtch Correctional Centre
The Cabinet Office
Edmund Cachia & Co.
Cactus Machinery Inc.
Cadillac Fairview Corp. Ltd.
CAE Electronics Ltd.
CAE Webster Ltd.
Caledon Laboratories
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<th>Company Name</th>
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Datapoint Canada Inc.  
DataSpace Corporation  
N.J. Davenport & Assoc.  
Davis Engineering  
Davis Martinfield  
DCP Canada Inc.  
Decalog Systems Limited  
Deltacan - De Leuw Cather Canada Ltd.  
Deloitte Haskins & Sells Chartered Accountants  
Deloro Stellite  
Delphax Systems  
Develicon Electronics Ltd.  
Dial-A-Dex Communications  
Dialectic Computer Services  
A.J. Diamond Associates  
Diamond Shamrock Canada Ltd.  
Dickenson Mines Ltd.  
Die Cor Products Inc.  
Digital Equipment of Canada Ltd.  
Digital Video Systems Ltd.  
M.M. Dillon Limited  
District Municipality of Muskoka  
Diversey Wyandotte Inc.  
Diversified Products of Canada  
Diversified Research Laboratories  
Dixon Gordon & Company  
DMR & Associates  
Doane Raymond  
Dofasco  
Dominion Bridge Sulzer Inc.  
Dominion Soil Investigations Inc.  
Dominant Canada Ltd.  
Donn Canada Ltd/Lite.  
Dorcan Ltd.  
Dorland & Dorland  
Dorval Computer Centre  
Dow Chemical Canada Inc.  
Dow Corning Canada Inc.  
Downs/Archambault  
Dowty Equipment of Canada Limited  
Dresser Pump Division Dresser Canada Inc.  
DSMA International  
Gene Dub Architecture  
Dufferin Aggregates  
Dufferin Construction Co.  
The Dufferin-Peel Roman Catholic Separate School Board  
Dun & Bradstreet Canada  
Dunlop Farrow Atken Cansfield  
Dunwoodo & Company  
Dupont Canada Inc.  
Durham Board of Education  
Durham College of Applied Arts & Technology  
Durward Jones Barkwell & Co.  
Dyeco Ltd.  
Dylex Limited  
Dynatech Communications Ltd.  
DY-3 Systems Inc.  
Eagle Precision Technologists  
East York Board of Education  
EasyNet Systems Inc.  
Eaton's  
E.C.E Group  
Eckler Partners Ltd.  
Economical Mutual Insurance Company  
Economic Council of Canada  
E.B. Eddy Forest Products Ltd.  
E.D.S. of Canada Ltd.  
EHM Inc.  
Econ Technology Corporation  
W.M. Eisenberg & Company  
Electrohome Limited  
Eli Lilly Canada Inc.  
Ellie-Dor Limited  
Elmwood School  
Emco Ltd.  
Emery Chemicals Limited  
Encor Insurance Managers Inc.  
Enermodal Engineering Ltd.  
Engineered Electric Controls Limited  
Engineering Interface Limited  
England Naylor Engineering Ltd.  
Environmental Management Corporation  
Epton Industries Inc.  
Equitable Life Insurance Co. of Canada  
Erco  
Arthur Erickson  
Ernst Leitz (Canada) Ltd.  
Esco Limited  
Steve Eskind Architect  
Esselte Pendaflex Canada Inc.  
Esso Chemical Canada  
Esso Minerals Canada  
Esso Petroleum Canada  
Esso Plaza Physical Fitness & Lifestyle Program  
Esso Resources Canada Ltd.  
Etatex Industries Inc.  
Etobicoke Board of Education  
Etobicoke Hydro  
Evans Martin & Co.  
Exide Canada Corp.  
Export Development Corporation  
Fabricated Steel Products Ltd.  
Falconbridge Limited  
Family Service Association  
Famme & Co. Chartered Accountants  
Farrington Lockwood Company Limited  
Fathom Oceanology Limited  
Federal Bolt & Nut  
Feet First  
Ferguson & Ferguson  
Ferranti-Packard Limited  
Ferro Industrial Products Ltd.  
Fiberglass Canada Inc.  
Financial Life Assurance Company of Canada  
Financial Models Co.  
M.B. Finney Ltd. Consulting Engineer & Architect  
First Brands Industries Corp.  
Fisher Controls Co. of Canada Ltd.  
Flanagan Beresford & Patterson  
Flemingdon Medical Laboratories  
Fliss Gates McGowan Easton  
Ford Electronics Manufacturing Corporation  
Ford Glass Ltd.  
Ford Motor Company of Canada Ltd.  
Forest City Kiwanis Community Centre  
Forest Engineering Research Institute of Canada  
Forest Valley Day Camp  
Fox Glickman & Company  
Frankel Steel Ltd.  
Fraser Inc. Thorold Division  
Fraser Lake Camp  
Frere Homes  
Fryett Shifflett Associates  
Fullerton Sherwood Engineering Ltd.  
Galtaco Inc.  
Gamsby & Manworner Limited  
Gandall Data Limited  
Garrett Manufacturing Limited  
Gastops Limited  
Gateman Milloy  
Gavilier & Company  
G.B.B. Associates Limited  
Geac Canada Limited  
GEC Canada Ltd.  
Gellman Hayward & Partners Ltd.  
General Electric Canada Inc.  
General Foods Limited  
General Mills Limited  
General Motors of Canada Limited  
Geneva Park YMCA Conference Centre  
Geocanex  
Geological Survey of Canada Atlantic  
Geoscience Centre  
George Weston Limited  
Georgian College of Applied Arts & Technology  
Gevision Corporation  
Giant Yellowknife Mines Ltd.  
Gibbons Foods Div. of Eden Manufacturing Co. Ltd.  
Gibson & Associates  
Gilmore Walsh & Co. CA's  
Ginsberg Gluzman Pege & Levitz  
Girl Guides of Canada  
Glaxo Canada Ltd.  
Glegg Water Conditioning Inc.  
Glengarry Secondary School  
Glengarry Industries  
GO Computer Center Inc.  
Goebel Macadam Alexander  
The Gold Disc Inc.  
Golder Associates  
Golds Gym  
Goodfellows Consultants Inc.  
Steven A. Goodrich Chartered Accountant  
B.F. Goodrich Canada Inc.  
Gordon Graydon Memorial Secondary School  
Gore & Storrie Limited  
GO Transit  
Government of Canada  
Agriculture Canada  
Atmospheric Environment Service  
Canada Centre for Inland Waters  
Canadian Coast Guard  
Canadian Forestry Service  
Canadian Transport Commission  
Dept. of the Auditor General  
Dept. of Communications  
Dept. of Consumer & Corporate Affairs  
Dept. of Customs & Excise  
Dept. of Energy, Mines & Resources  
Dept. of Fisheries & Oceans  
Dept. of Indian and Northern Affairs  
Dept. of National Defence  
Dept. of National Health and Welfare  
Dept. of Public Works  
Dept. of Supply & Services  
Dept. of Treasury Board  
Employment & Immigration Canada  
Environment Canada  
International Joint Commission  
Parks Canada  
Revenue Canada  
Rideau Veterans' Home  
Statistics Canada  
Transport Canada  
Government of Northwest Territories  
Graham McCourt Architects  
Greater Canada Colour Printing  
Greater Niagara General Hospital  
Great Lakes Forest Products Ltd.  
Green Dingfield & Nakamura
Co-operative Education and Career Services
Organizations Employing Co-operative Students

Greenwood Cook & Company
Greer Fleming Rolland & Co.
Griff Harendorf Lebene
Hoffmann & Merrick
Grouptheory Systems Incorporated
G.S.W. Building Products Company
GTE Sylvania Canada Ltd.
Guelph Hydro
Guelph Tool & Die Ltd.
Gulf Canada Corporation
Erland Gustavs Architect Planner
Zenon Gutkowski Chartered Accountant
The Halifax Insurance Company
J.C. Hallman Manufacturing Co. Ltd.
Halton Hills Hydro Electric Commission
Halton Regional Museum
Halton Regional Police Force
Hamilton Board of Education
The Hamilton Harbour Commissioners
Hamilton Psychiatric Hospital
Hammond Manufacturing Co. Ltd.
Hands-on Packaging Ltd.
Harbourfront
Douglas Hardie Architect
Hardy Holzman Pfeiffer Associates
Harlequin Books
Harris Media Systems Limited
Harris Title & Partners
Hart Chemical Ltd.
Hatch Associates Ltd.
Hever College
Hayes-Dana Inc.
HCR Corporation
H.J. Heinz Co. of Canada Ltd.
Hematite Mfg. Div. of Pwaco Plastic
Henderson Partners
John T. Hepburn Ltd.
Hewitt Therapy Services
Hewlett-Packard (Canada) Ltd.
James F. Hickling
Spencer R. Higgins Architect
High Park Physiotherapy & Sports Medicine Clinic
C.M. Hincks Treatment Centre
Hoechst Canada Inc.
Holiday Inn
Home Hardware Stores Ltd.
Honda Canada
Honeymoon Bull Ltd.
Hoover Universal Canada
Takvor Hopyan Architect
W.E. Horne & Co.
Horseshoe Valley Resort
Horton Bail Walter Fedy McCargar
Hachborn
Hospital for Sick Children Research Development Corporation
Houghton Mifflin Canada Limited
Howdon Applied Research Limited
A.C.A. Howe International Limited
Hudson’s Bay Company
Ivor M. Hughes Barrister & Solicitor
The Hugh MacMillan Medical Centre
Hugin Sweda Inc.
Humantech Inc.
Humber College of Applied Arts & Technology
Humberview School
Humpage Taylor McDonald & Company
Huron County Health Unit
Huronia Regional Centre
Husky Injection Holding Systems Limited
Hyda Industries
Hyde-Houghton & Company
Hydro Chem. Ltd.
Hydro Electric Commission Cambridge & North Dumfries
Hydro Mississauga
IBI Group
IBM Canada Limited
I.E.C. Beak Consultants Ltd.
I.I. Nash Associates Ltd.
Imperial Life Assurance Co. of Canada
Imperial Oil Limited
Imperial Tobacco
Indal Limited
Indal Technologies Inc.
The Individual Education Centre
Induco Consultants of Canada
Industrial Accident Prevention Association
Industrial Automation Systems
Indias Integrated Systems
Infortam
Info 2000 and Associates
Insight
Insurance Services
Intera Technology Limited
International Artcrafts Co. Ltd.
International Development Research Centre
International Verifact Inc.
Iogen Corporation
Istec Limited
Jackson Ryder
James River-Marathon Ltd.
J.A. Turner Secondary School
JDS Information Systems
Barry Johns Architect Ltd.
Johnson Controls Ltd.
Johnson & Higgins Willis Faber Ltd.
Johnson & Johnson
S.C. Johnson & Sons Limited
Jornar Computer Systems Ltd.
Judd Jones
Jones & Kirkland Architects
J.H. Jorden
JPS Microsystems Inc.
Kaptest Engineering Limited
Karmax Heavy Stamping
Kathyn Systems Inc.
T.T. Katz
Kaufman Footwear Inc.
Keanan Bell
Kellogg Salada Canada Inc.
Kemp Elliott & Blair
Kenneth Caplan & Associates
Kent County Children’s Treatment Centre
Kentner Kelly & Wilson
Kentridge Levitt Architects Ltd.
Kerr Addison Mines Limited
Keynote Design Inc.
Kidd Creek Mines Ltd.
Kids Records
Kilborn Engineering Limited
Kilpatrick Stephens Architects
Kimberly-Clark of Canada Limited
Kime Ditchfield Mills & Dunlop
Kimtron Corp.
Kinark Child & Family Services
King Pesticides Ltd.
Kingston Psychiatric Hospital
Kirainblatt Korman Associates
Architects & Planners
Kitchener Transit
Kitchener-Waterloo Hospital
Kitchener-Waterloo Symphony Orchestra
K-Konsult Canada Inc.
K Mart Canada Inc.
Knoll Office Inc.
Dr. D.W. Knox
Kodak Canada Ltd.
Koehring Canada
L. Koffman
Kofman Engineering Services Ltd.
Koster, Spinks & Koster Chartered Accountants
Krispak
KTS Business Systems Inc.
Kuwabara Payne McKenna Blumberg
Labatt Breweries of Canada
Lakehead University
Lake Ontario Steel Company
Lakeside Lodge
Lake Simcoe Enterprises Ltd.
Lamb & Jorden Architects Planner
Lambdrey Greer Galloway
Lander Control Systems Inc.
Lanzarotta Wholesale Grocers Limited
Laprairie Limited
Laura Secord Inc.
Lavalin Inc.
Laventhal & Horwath
Leaf Confections Ltd.
Lean Flow Metal Products Inc.
Leco Industries Ltd.
Ledge Engineering
Leeds-Grenville County Board of Education
Lee Merrick & Associates Limited
Legalware Inc.
Robert Lehman Planning Consultants Ltd.
Leigh Engineering & Aerospace
Leitch Video Ltd.
Lenis Trotter Architect
Lever Brothers Ltd.
The L.G.L. Group & Associates Ltd.
LGS Data Processing Consultants Inc.
LI Architects Inc.
Linamar Machine Ltd.
Linear Technology Inc.
The Linton Technology Group Ltd.
Thomas J. Lipton Limited
Lipton Wiseman Albaun & Partners
Robert Little Promotions
Lilton Systems Canada Ltd.
Livingston International
L & L Computer Systems Inc.
Lloyds Bank of Canada
Loblaws Limited Central
Loeb Inc.
Loewen Muncaster Inc.
London Life Insurance Company
London Rehabilitation Service
Long Lac Mineral Exploration Ltd.
Long Manufacturing Ltd.
Lotelk Engineering Inc.
Lower Thames Valley Conservation Authority
Ludwig Engel Canada Ltd.
Lumronics Inc.
Macdonald and Zuberec
Macdonald Dettwiler & Associates
MacGillivray & Co.
Mac Industries Inc.
Mack Canada Ltd.
A.F. MacLaren & Company
MacLaren Engineers Planners & Scientists Inc.
MacLaren Plansearch Inc.
Maclean Hunter Limited
MacMillan Bloedel Ltd.
Madgehaar & Partners
Madison Chemical Industries Inc.
Magna International
La Maison de L’Ordinaire
Co-operative Education and Career Services
Organizations Employing Co-operative Students

Malone Given and Parsons
Managements Limited
Management Board of Cabinet
M.A.N. Ashton
Mandelbaum Rosenberg Sone & Glickman
Mann Equitest Inc.
Mann Testing Laboratories Ltd.
Manufacturers Life Insurance Company
Manvile Canada Inc. Holosphere Division
Marinyl Yves Associates
Maritime Life Assurance Co.
Marketech
Marketing Communication
Markham Racquet Club
Markham Village Women's Club
Mark Musselman McIntyre Combe
Mar-Land Engineering Limited
Marlin Controls
Marshall Macklin Moroghlan Ltd.
Marsh Engineering Ltd.
Meno S. Martin Contractor Ltd.
Massey Ferguson Industries Limited
Mastercraft Development Corp.
Mathers & Haldenby
Matsui Baer Vanstone
Maxima Computer Management Consultants Ltd.
May & Baker Canada Inc.
Mayfield Secondary School
MBB Helicopter Canada
McAsphalt Industries Limited
McCallum Brodeur Chartered Accountants
McCullough Turner & Co.
McConnell Maughan Limited
M.P. McCleary & Associates
Neil J. McDonald Architect
McDonald's Restaurant of Canada Ltd.
McDonnell Douglas Canada Limited
McGrath & Associates
McLean Capin & Jamieson Chartered Accountants
McLeod Young Weir & Co. Ltd.
McMaster University Medical Centre
McMichael Collection
McRobert Springs
MCW Computers
Meadowvale Secondary School
Mechanical Cables Ltd.
Mekind Snyder Weis Architects
Mental Health Centre
Mercantile & General Reinsurance Group
William M. Mercer Limited
Merck Frost Laboratories
Meridian Technologies
Merrell Dow Pharmaceuticals (Canada) Inc.
Merrill Lynch Canada Inc.
Meta Systems (Canada)
The Metropolitan Fitness & Leisure Club
Metropolitan Life Insurance Co.
Metropolitan Toronto Assn. for the Mentally Retarded
Metropolitan Toronto Police
Metropolitan Toronto District Health Council
Metro Toronto News Company
Michael Squire Architect
Microsoft Corporation
Microsystems Inc.
Microlab Pacific Research Ltd.
Midwestern Regional Centre
Miles Laboratories Limited
Millard Rouse & Roushough
D. Miller & Company Limited Inc.
Mill & Ross
Milrod Metal Products Division of ITT
Industries
Milton Hydro
Milus Braitenberg Topps Watchorn
Landscape Architects
Mintz & Partners
Mitchell Partnership
Mitel Corporation
Mitelman Engineering
Mitsubishi Electronics Industries
Canada Inc.
MIU Automation Inc.
Mobil Oil Canada Limited
Modern Track Machinery Ltd.
Moffat Kinoshita
Walter Moffat Architect
Mohawk College of Applied Arts & Technology
Mohawk Data Sciences Canada Limited
Molnar Systems Group
The Molson Companies Limited
Money Concepts
Monsanto Canada Inc.
Monteith Correctional Centre
Monteith Ingram Graham Ltd.
Monteith Monteith & Company
Montreal Trust Company
Moore Corporation Ltd.
Moore Instruments Ltd.
Moorelands Camp
Thomas K. Moore Architect
Moorehead Fleming Corban & McCarty
Morgan Stanley Canada
Morrison & Beatty Limited
Mossad Inc.
Motion Picture Video Corporation
Motorola Canada Limited
Motorola Dاسcan Ltd.
MPH Consulting Ltd.
M & T Chemicals Ltd.
MTD Products Limited
Multiple Sclerosis Society of Canada
Mulvey and Banani
Murata Erie North American Inc.
A. Robert Murphy Architect
Murray Keep & Company
Murray & Murray Associates
Muskoka Board of Education
Musikana Centre
The Mutual Life Assurance Company of Canada
 Nabisco Brands Ltd.
Nacan Products Ltd.
Nasello & Francella Chartered Accountants
Natalie Scott & Browne Architects
National Arts Centre
National Capital Commission
The National Museums of Canada
National Research Council
National-Standard
National Trust
NCI Canada Limited
Neil Squaire Foundation
Nelson's Dairy Ltd.
Nestle Owen Rowland & Roy
Nels Inc.
Neo Visuals Inc.
Nesbitt Handy
Nestle Enterprises Ltd.
Netron Inc.
Newbridge Communication Networks Corporation
New Brunswick Telephone Co.
New Dundee Creamery
New Liskeard College of Agricultural Technology
New York Life Insurance Company
Niagara Regional Development Corporation
Nicol & Johnston
A.C. Nielsen Company of Canada Ltd.
Noma Industries Limited
Noranda Inc.
Noranda Mines Limited Geco Division
Noranda Research Centre
Norcal Energy Resources Limited
Norfolk Board of Education
Norgrow Plastics
Nor Architects & Engineering
Notak Software Ltd.
North American Life Assurance Company
Northern Digital Inc.
Northern Dynamics Ltd.
Northern Ontario Appraisals Limited
Northern Pigment Co. Ltd.
Northern Telecom
Paul H. Northgrave Architect
North Halton Youth Employment Service
Northland Engineering Limited
North Peel Secondary School
Northbridge Financial Group
North Sails Flog
North Waterloo Academic Press
North York Board of Education
North York Hydro
Norwest Research Ltd.
Norwich Union Life Insurance
Norwood District High School
Notre Dame of St. Agatha
Nottawasaga Inn
Novacor/AGEC
Novatel Communications Ltd.
Novenco Canada Inc.
Novocel Chemical Mfg. Co. of Canada Ltd.
Numex Engineering
Oaklands Regional Centre
O.B.K. Engineering
OD Transpo
Office of the Legislative Assembly
Office of the Provincial Auditor
Officesmiths Inc.
Office Specialties Ltd.
Oleary Construction Corp.
Oliver Mandge McColl & Associates Ltd.
Omark Canada Limited
Onex Packaging Inc.
Ongoing Results Ltd.
Ontario Cancer Institute
Ontario Cancer Treatment & Research Foundation
Ontario College of Art
Ontario Correctional Institute
Ontario Geological Survey
Ontario Hydro
Ontario Lottery Corporation
Ontario Ministry of Times
Ontario Mining Association
Ontario Paper Co.
Ontario Police College
Ontario Police Commission
Ontario Research Foundation
Ontario Science Centre
Ontario Waste Management Corporation
Ont. Min. of Agriculture & Food
Ont. Min. of the Attorney General
Ont. Min. of Citizenship & Culture
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<th>Co-operative Education and Career Services</th>
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<td>Organizations Employing Co-operative Students</td>
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<table>
<thead>
<tr>
<th>Organization/Industry/Technology</th>
<th>Location/City</th>
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<tbody>
<tr>
<td>Playtex Limited</td>
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<td>Pleasure Valley</td>
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<td>Polaris</td>
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<td>Polyresins Inc.</td>
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<td>Polysar Limited</td>
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<td>Port Credit Secondary School</td>
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<tr>
<td>R.J. Posluff Architect</td>
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<td>Powell Jones &amp; Company</td>
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<td>Powerplex Technologies Inc.</td>
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<td>PPG Canada Inc.</td>
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<td>PRA International</td>
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<td>Pratt &amp; Whitney Aircraft of Canada Ltd.</td>
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<td>Preston Sand &amp; Gravel Co. Ltd.</td>
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<td>Prevett &amp; Rowden Chartered Accountants</td>
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<td>Price Waterhouse</td>
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<td>Prince Edward Heights Centre</td>
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<td>Prior Data Sciences Ltd.</td>
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<td>Prochem Limited</td>
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<td>Procor Limited</td>
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<td>Profit Centre International</td>
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<td>Project CANOE</td>
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<td>Protek</td>
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<td>Province of Ontario</td>
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<td>Prudential Assurance Co. Ltd.</td>
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<td>Prud'homme's Landing</td>
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<td>Public General Hospital</td>
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<td>Public Service Commission Canada</td>
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<td>Pulp &amp; Paper Research Institute of Canada</td>
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<td>Pure Data</td>
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<td>Quaker Oats Company of Canada Ltd.</td>
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<td>Quality Meat Packers Ltd.</td>
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<td>Quantex Chemical Inc.</td>
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<td>Queen Street Mental Health Centre</td>
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<td>Allan Rae Architect</td>
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<td>Rafael &amp; Burka</td>
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<td>Redpath Sugars Limited</td>
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<td>Reed Inc.</td>
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<td>Region of Muskoka Board of Education</td>
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<td>The Rehabilitation Centre</td>
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<td>Reichhold Ltd.</td>
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<td>Reich &amp; Petch Architects Inc.</td>
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<td>Rice Brydone Ltd.</td>
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<td>Richter Usher &amp; Vineberg</td>
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<td>Ridgeway College of Agricultural Technology</td>
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<td>Rio Algom Limited</td>
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<td>Riverview Hospital</td>
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<td>RJM Computer Consultants</td>
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<td>Robbie Architects Inc.</td>
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<td>Robert Land Academy</td>
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<td>W.M. Roberts Electrical &amp; Mechanical Limited</td>
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<td>Robin Hood Multifoods Limited</td>
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<td>Robinson Lott &amp; Brohman</td>
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<td>Rockway Mennonite Collegiate</td>
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<td>Rockwell International of Canada Ltd.</td>
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<td>Rogers Cablesystems Inc.</td>
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<td>Romegroup Designers &amp; Planners</td>
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<td>S.M. Roscoe Architect</td>
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<td>Rosenberg Fine Goodfield Sacks &amp; Smith</td>
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<td>Rosen Erzin Ogus &amp; Co.</td>
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<td>Peter Rose Architect</td>
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<td>Rose Technology Group Ltd.</td>
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<td>Ross Pope &amp; Company</td>
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<td>Ross Video Limited</td>
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<td>Rotenberg &amp; Hochman Chartered Accountants</td>
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<td>Roth &amp; Co.</td>
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<td>Rothay Rendering Plant of Maple Leaf Mills</td>
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<td>Rowan Williams Davies &amp; Irwin Inc.</td>
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<td>Rowe Varinckle &amp; Co.</td>
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<td>Roxul Company</td>
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<td>Royal Bank of Canada</td>
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<td>Royal Canadian Mounted Police</td>
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<td>Royal LePage</td>
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<td>Royal Military College of Canada</td>
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<td>Royal Ottawa Hospital</td>
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<td>Royal Trust</td>
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<td>Royal Winnipeg Ballet</td>
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<td>RPA Consultants Ltd.</td>
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<td>Rubinovich Newton Back &amp; Strom Chartered Accountants</td>
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<td>Gus Ryder Health Club</td>
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<td>Rygie Home</td>
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<td>Sacks Pollack Houp &amp; Company</td>
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<td>Saint John Shipbuilding Ltd.</td>
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<td>Salomon Broders Inc.</td>
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<td>Salvation Army Eventide Home</td>
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<td>Sampson Controls</td>
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<td>Sanders Canada Inc.</td>
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<td>Sandox Anca Laboratories</td>
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<td>Sangamo Canada (Div. of Schlumberger Canada Ltd.)</td>
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<td>Sarafchin Associates Ltd.</td>
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<td>Sarco Canada Limited</td>
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<td>Sault College of Applied Arts &amp; Technology</td>
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<td>Scarborough Board of Education</td>
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<td>Scarborough General Hospital</td>
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<td>S &amp; C Electric Canada Limited</td>
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<td>Fred Schaffer &amp; Assoc. Ltd.</td>
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<td>Schlegel Canada Inc.</td>
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<td>Schlumberger of Canada</td>
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<td>Schmidt &amp; Company Chartered Accountants</td>
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<td>Schmidt Feldberg Croll Henderson Architects/Engineers</td>
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<td>Schoeler &amp; Heaton</td>
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</table>
Co-operative Education and Career Services
Organizations Employing Co-operative Students

Schulz Data Systems
Schwartz Levitsky Feldman Chartered Accountants
Schwarzkopf Ltd.
Science North
Sciex Incorporated
Scorer & Guich
Scott Batenich & Company Chartered Accountants
Sears Canada Inc.
Sears & Russell
SEL Canada Div. of ITT Industries Canada Ltd.
Selkirk Communications Ltd.
Semi-Tech Microelectronics
Seneca College
Sensy Systems Inc.
Sensor/B.M. Hi-Tech Inc.
Senstar Corp.
Sentrol Systems Limited
G.M. Sernas & Associates Ltd.
S.F. Excavating Ltd.
Sharp Electronics of Canada Ltd.
I.P. Sharp Associates Ltd.
Shaw Industries Ltd.
Shawware Incorporated
Shelton Centre for Outdoor Education
Shell Canada Limited
The Sheppard Club
Sheridan Geophysics Ltd.
Sherwood Basses Limited
Shimmerman Penn Beckner Chartered Accountants
SHL Systemhouse Inc.
Shoppers Drug Mart
Shopsy's Foods Ltd.
R.G. Shugg Engineering Ltd.
Signalcom Canada Corp.
Shi Pumps Ltd.
Silicofab Limited
Silverwood Dairies Ltd.
Simcoe County
Simon Davis Architect
Simware Inc.
Sintex Inc.
Sir Sam's Inn
S.L. Ross Environmental Research Limited
George H. Smith Chartered Accountant
Snap on Tools of Canada Ltd.
Snyder Reichard & March
Snow Valley Resort
Sobeco Group Inc.
Soberman Ishenbaum & Colomby
Software AG of Canada Inc.
Software Concepts
Software Kinetics Ltd.
Soil-Eng Limited
Solaray
Solarchem Research
Solomon & Simon
Somapor Ltd.
Joe Somfay Architect
Sorbara Group
Southam Murray Printing
Southstar Development Inc.
Southwestern Regional Centre
Sovereign Life Insurance Company
Spar Aerospace Limited
Sparrow Lake Camp
Spicer Computer Developments
Spicer MacGillivray
Sports World
Springer & Lucas
Spring Lake RV Park Ltd.
Sprucedale Youth Centre
Spruce Falls Power & Paper Company Limited
Spruce Leigh Farms Div. of Canada Packers Ltd.
Spruce Lodge
Spyder
Square D Canada
Stake Technology Ltd.
G.M. Stamn Economic Research Associates
Stan-Canada Inc.
Stanadyne Inc.
Standard Life Assurance Company
Standard Tube Canada Inc.
St. Andrews College
Stanley Hardware
Starnich & Associates
Stark Hick's Spragge
Starkman Kraft Rothman Berger & Grill Chartered Accountants
Starplex Ltd.
Starret & Starret
St. Clair College of Applied Arts & Technology
St. Clements School
Steeple Rock Calcite
Stegor Consultants Limited
Stelco Inc.
Stern Cohen Weinstein Baines
Sterrson Ltd.
Stevens & Burgess Assoc. Architects
W.C. Steyn
Stille Sutton Fenton Chartered Accountants
St. Jerome's College
St. Joe Canada Inc.
St. Joseph's Health Centre
St. Joseph's Health Centre of London
St. Joseph's Home
St. Lawrence College
St. Lawrence Seaway
St. Lucie Exploration Co. Ltd.
St. Michael's Hospital
Stone Conway Snowbell Kirschner & Swanson Chartered Accountants
Storwell International Inc.
Stouffer
Stow Brown & Foeller
Streetsville Secondary School
St. Thomas Psychiatric Hospital
Sunar Hauserman Ltd.
Suncor Inc.
Sun Life Assurance Co. of Canada
Sunnybrook Medical Centre
Sunnyhill Orthopaedics
Sunrise Automation Systems Sanyo Machine Works Ltd.
Surgikos Ltd.
Sutherland-Schultz Limited
Svedas Koyanagi
William R. Swain
Syncrude Canada Limited
Synerlogic Inc.
Syntex Limited
Tamco Limited
Tamwood Lodge
Tandem Computers Canada Limited
Target Electronics Systems Inc.
Tax Time Services
Taylor Instruments
Taylor Leibow
Taylor Machine
Taylor Slatten Camps
Taylor Steel Inc.
Techform Products Limited
Technical Service Laboratories
Techninorm Consultants
Techno Scientific Inc.
Teklogix Ltd.
Tele-Direct
Telusat Canada
Temagami Wilderness Centre Limited
Temprite Industries Limited
Tenneco Automotive Retail
Administrative Offices
T E S Limited Engineering Research
Teutech Industries Inc.
Texaco Canada Inc.
Thames Valley Childrens Centre
Thom Partnership
Thomas A. Stewart Secondary School
J.P. Thomson Associates
Thorne Ernst & Whitney
Tillman & Ruth
TIL Systems Limited
Timberjack Inc.
Timminco Ltd.
C.J. Tinkham & Associates
TKM & Associates
T.L. Kennedy Secondary School
T.N.T. Canada Inc.
Tochinsky & Goodz
Toronto Board of Education
Toronto Dominion Bank
Toronto Fire Safety Ltd.
Toronto General Hospital
Toronto Hydro Electric System
Toronto Public Library
Toronto Stock Exchange
Toronto Transit Commission
Torrington - Fafrir
Totten Sims Hubicki Associates Limited
Touche Ross & Company
Towers Perrin Forster & Crosby
Townend Stellura Baileshta & Nicholls Architects
Town of Ampring
Town of Bracebridge
Town of Halton Hills
Town of Kincardine
Town of Lincoln
Town of Markham
Town of Oakville
Town of Paris
Town of Pickering
Town of Richmond Hill
Town of Valley East
Township of Arthur
Township of Georgian Bay
Township of North Dorchester
Township of Cumberland
Township of Georgina
Township of Mono
Township of Oro
Township of Sarnia
The Township of Woolwich
Toyoda Canada
Tracor Engineering Inc.
Trafalgar Castle School
Trane Canada Inc.
Transcanada Pipelines
Translectric Technology Inc.
Travelers Canada
Travelbird Canada Inc. of Canada
Tremco (Canada) Limited
T.R. Enterprises Incorporated
Tristat Coatings Company Div. of Trebor Industries Ltd.
Trow Ltd.
Co-operative Education and Career Services
Organizations Employing Co-operative Students
The University Library
The University Library

University Librarian
M. C. Shepherd, BEd (Saskatchewan), MA (L5) (Denver)

Associate Librarian, Planning & Systems
C. Presser, AB (Hunter), MLS (Pratt)

Co-ordinator, Library Administrative Services
L. Beattie, BA (Loyola of Montreal), MA, PhD (Waterloo)

Special Collections Librarian
S. Bellingham, BA (Waterloo Lutheran), MLS (Western Ontario)

Librarian
J. Eadie, BA (Queen's), MLS (Western Ontario)

Business Administrator
J. Jorgensen, BA (Toronto)

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

Collections Division

Associate Librarian, Collections
C. D. Emery, BA (Durham), ALA

Head, Cataloguing Department
W. Oldfield, BA (Waterloo Lutheran), MLS (Western Ontario)

Cataloguers (Catalogue Department)
H. Calogeridis, BA, MLS (McGill)
Y. Gordon, BA (Manitoba), BLS (Toronto)
L. Heltand, BSc (York), MLS (Western Ontario)
R. Lamb, BA (Guelph), MLS (Western Ontario)
L. Teather, BA, MLS (British Columbia)
M. Wen, 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)

Collections Development Librarian
J. Begio, BA (Waterloo Lutheran), BA (Waterloo), MA, MLS (Toronto)

The University Library

Public Services Division

Associate Librarian, Public Services
B. MacNeil, BSc (Laurentian), MLS (McGill)

Co-ordinator, User Education
L. Leger, BSc (Toronto), MLS (Western Ontario)

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

University Map Librarian
R. Pinnell, BSc (Toronto), MSc, MLS (Western Ontario)

Cataloguer (University Map and Design Library)
A. Chan, BA (Hong Kong), MLS (Western Ontario)

Co-ordinator, Information Services
L. Claxton, BA (Waterloo), BLS, MLS (Toronto)

Head, Arts Reference & Collections Development Department
G. Draper, BA, MA, PhD, MLS (Western Ontario)

Reference & Collections Development Librarians
M. Aquan-Yuen, BA, MLS (Toronto), MA (Waterloo)
D. Binkley, BA (Toronto), MLS (Western Ontario)
M. Blok, BA (Waterloo), MLS (Western Ontario)
R. Crusz, BA (Ceylon), BLS (Toronto), MA (Waterloo)
D. Fitzpatrick, BA, MA (Windsor), MLS (Toronto)
A. Lakos, BA (Jerusalem), MLS (British Columbia)
S. Moskal, BSc, (Wisconsin-Madison), MLS (Western Ontario)
S. Rahman, BA, MA (Punjab), MA (Waterloo), MLS (Indiana)

Head, EMS Reference & Collections Development Department
Joan Macdonald, BSc, BEd (Dalhousie), MLS (Western Ontario)

Reference & Collections Development Librarians
J. Cummings, AB, MLS (California, Berkeley)
D. Harding, BSc (Guelph), MLS (Western Ontario)
A. Hansen, BEng (McGill), MLS (Dalhousie)
W. Macpherson, BSc, MLS (Dalhousie)
M. Mortimore, BA (Acadia), BSc, MLS (Alberta)
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 Reading Room.

The Dana Porter Library, ten stories high and situated in the centre of the campus, is the focal point of the University. 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 160 readers, the Doris Lewis Rare Book Room, the microform collection, and eight typing cubicles. The second or main floor contains the public catalogue, the circulation counter and the Information Desk. Also on the main floor is the Interlibrary Loan Office and the Reference Collection. The periodical and newspaper collections are located on the third floor. Government publications are located on the fifth 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 1,950,000 items including books, pamphlets, theses, microforms, documents, reports, sound recordings and other material. The Library subscribes to over 6,000 periodicals 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 collection numbers over 400,000 items including books, microforms, government publications, technical reports and maps. The Library subscribes to over 4,000 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 120,000 items including maps, air photographs, books, theses, and periodicals. The resources of this library, like those of the Dana Porter and Davis Centre Libraries, are available to all members of the University.

The Optometry Reading Room 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.

The Community Access Module (CAM), an extension of the circulation system, provides library users at remote locations with access to the Library's author, title and call number files. A computer terminal and a valid library borrower's card are needed to use CAM.

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

Special services including a brailer and a four-track cassette recorder and playback unit are available for the visually handicapped. A room on the seventh floor of the Dana Porter Library is 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. All libraries are accessible by wheelchair.

The Federated and Affiliated colleges (St. Jerome's, Conrad Grebel, St. Paul's and Renison) have their own libraries which are accessible to University of Waterloo students, staff, and faculty. Conrad Grebel College Library has approximately 13,000 items which include a special collection on Peace Studies. It is also the home of a Mennonite Archive which consists of church records and documents of the Mennonites of Ontario. St. Jerome's College Library has a collection of about 32,000 volumes. St. Paul's College Library has about 3,000 books specializing in the areas of Religious Studies and Canadian Studies. The 5,000 volumes in the Renison Library serve the College's Social Development Studies Program and its courses in Third World Studies and General Arts. A small section deals with Anglican theology.

The University of Waterloo, Wilfrid Laurier University, York University, the University of Western Ontario, Brock University and the University of Guelph Libraries have reciprocal borrowing agreements which allow students, faculty and staff of one institution to borrow monographs from the other Libraries. Wilfrid Laurier University's collection is particularly strong in the fields of Christian Religion, Business, Social Work, and Music. The University of Guelph has large holdings in Agricultural Science, Family and Consumer Studies, and Veterinary Medicine. Collection strengths at York include Social Sciences (especially Canadian History, Psychology and Sociology); Literature; Fine Arts (principally twentieth century, but some strength in the nineteenth century); Physical Education and Law. The University of Western Ontario has strong holdings in Law, Medicine, Education and Canadiana.
The staff of the University Library is engaged in obtaining material, processing it for the collections, and in 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 system.

The Library Handbook is available in all the libraries. It explains the use of the libraries, the classification system, the card catalogues, the serials list and general rules and procedures. Also available are other publications, such as bibliographies and guides to using the reference materials.

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
Computing Services on Campus

DEPARTMENT OF COMPUTING SERVICES

Director
P. H. Dirksen, BSc, MA (Waterloo)

Associate Directors
J. W. Dodd, BASc (Toronto), MSc (Waterloo)
- Operations
J. P. Sprung, BASc (Toronto), MA (Waterloo)
- Information Systems & Planning
R. W. Watt, BSc, MMath (Waterloo)
- Systems

Manager - User Services
B. E. Uttley, BMath (Waterloo)

The Department of Computing Services provides computing facilities and services for faculty, staff, graduate and undergraduate students. The facilities include terminals, program preparation areas, high speed printers, a wide variety of microcomputers, an incremental plotting facility, and other computing hardware and software chosen to handle the wide range of computing applications in a university community. Faculty, academic staff, graduate and undergraduate students, use the computing facilities to aid them in their research. In addition, many academic courses require the use of computers in course assignments. Administrative staff use computers in applications such as student records, course timetables, examination results and financial accounting.

Almost all computer services offered by the Department are interactive. Undergraduate students have access to microcomputers, which are connected in groups to shared disk storage systems and to key driven CRT terminals which connect them to controlled environments on large time-sharing computers. More advanced users have access to all the facilities of the VM/370 CMS operating system which provides both a time-sharing environment and a general BATCH environment. Text-editing software, including special software to handle mathematical symbols, automatic typesetting, other applications’ packages and specialized environments such as APL are all available.

The Department provides terminals which are accessible to anyone who has been authorized to use the computer services. Printed and hard-copy graphic output can be retrieved from local printers or from a large I/O (Input/Output) operations room located in the Math and Computer Building. Many users have the use of remotely located terminals which gain access to VM/370 CMS over sophisticated communications systems, including the SYTEK local area network.

Off-campus access to the system is possible over the ordinary telephone system, or through DATAPAC, the digital network operated by Bell Canada.

In addition to the computing facilities and services outlined above, the Department of Computing Services provides several “user services.” Programming consultation, non-credit courses and seminars, documentation, computer reference room facilities, and newsletters are provided by the user services personnel of the Department to help make using the computer an easier and more efficient process for all members of the University community.

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 785 computer and a network of IBM PC microcomputers. The VMS system is connected to the CMS system operated by the Department of Computing Services, enabling file transfer and electronic mail services between these systems.

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 Apple Laser printer or a Diablo 630 ESC daisy wheel printer.

Public terminals and microcomputer workstations reserved for use by members of the faculty are located in PAS 1098, PAS 1080, PAS 1084, PAS 1087, HH 236 and HH 237. Printer facilities are located in HH 236, HH 237, PAS 1099 and PAS 1077.
ENGINEERING MICROCOMPUTER NETWORKS (WATSTAR)

Director, Associate Dean of Engineering for Computing
B. L. Wills, BEng, MSc, PhD (Waterloo), PEng

Supervisors
J.G. Wilson, MSc (Waterloo)
- Operations & Information Systems
B.T. Campbell, BMath (Waterloo)
- Systems

The Faculty of Engineering operates an extensive network of microcomputers within the Engineering buildings. This network is called WATSTAR and was designed and developed by the staff of the WATSTAR Project Office. Students from the Co-operative program are normally employed to provide a WATSTAR Consultant service each term and several participated in the early design work.

WATSTAR is the designated general resource for all small scale computing in Engineering. It is intended specifically to serve the general computing needs of academic courses and programs within Engineering. The system also has good mid-range documentation production facilities and students are encouraged to use these resources for the essential report writing needs of an Engineering program. Other major computing needs for undergraduate Engineering courses are provided by the central facilities of the Department of Computing Services (DCS). The DCS consulting office in Engineering has a WATSTAR workstation.

The total WATSTAR network provides a comprehensive message and mail facility between user accounts. Group and system accounts have a broadcast capability. Mail can also be sent to any other on- or off-campus address having suitable permission. Systek access is also available through selected stations using MSKERMIT as the vehicle for terminal emulation or file transfer.

The first WATSTAR became operationally available in May 1982 and used the CP/M operating system. It was succeeded by WATSTAR/pc which came on line in September 1984 using IBM DOS and 10 MBytes Token Ring protocol. The total network is now very extensive and supports 220 workstations with 10 file servers in a Ring of Rings which is available 24 hours/day. In Arts, 50 WATSTAR stations have also been connected to form two additional rings giving an overall total of 270 workstations with common access to all facilities.

The Engineering WATSTAR rings, collectively, function as a mainframe computer and the network hosts over 4300 user accounts. All students registered in Engineering are automatically given permanent accounts for the duration of their time at Waterloo.

ENGINEERING EDUCATION RESEARCH CENTRE

Associate Dean of Engineering for Computing
B.L. Wills, BEng, MSc, PhD (Waterloo), PEng

The Engineering Education Research Centre has been established with the help of corporate sponsors. Initially, the resources include two VAX 11/785s, graphics workstations, several printers and plotters. This computing equipment, in conjunction with new developments in data communications at the University, will provide a very powerful and useful research facility for Engineering. The Centre will be able to support many graduate and undergraduate projects in areas such as CAD/CAM, Computer Aided Instruction, Computer Aided Engineering, and Computer Graphics.

ENVIRONMENTAL STUDIES MAPPING, ANALYSIS AND DESIGN COMPUTING

Director
R. T. Newkirk, BA, MSc, PhD (Western Ontario)

Systems Manager
M. Dumancic, BA (Waterloo)

Image Processing Manager
J. Piwowar, BA, MA (Waterloo)

Manager, Instruction Liaison
P. Winterbottom, BA, MA (Waterloo)

The Mapping, Analysis and Design (MAD) Facility provides a wide range of computing and consulting support for students, faculty and staff of Environmental Studies. All students are provided with authorization to use basic or very advanced computing equipment as required by their studies. Access is provided free of charge to data sets on deposit with the Data Resource Centre.

MAD supports two networks of microcomputers in addition to many computer terminals for accessing central services (IBM CMS) and Faculty computers (VAX VMS). Computing workrooms for graduate students (132 ES1) and for undergraduate students (163 ES2) are available on a drop-in basis throughout the week.

Computer graphics equipment (high resolution and colour) is available for mapping and design courses and research. Specialized equipment (Dipix Aries II and Perceptron) image processing systems supported by a VAX 11/785 and several microVAX systems are available for research in remote sensing.

Training sessions and consulting are provided on a regularly scheduled basis by the staff in MAD.

Access to the services in MAD is arranged by visiting the MAD general office in room 163B ES2.
MATHMATICS FACULTY COMPUTING FACILITY

Director
J. W. Wong, BS, MS, PhD (California - Los Angeles)

Manager - Hardware
K. L. Martin, BSc (New Brunswick), 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 supply a research tool for computer science research, 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.

Currently, the systems operated by MFCF include
- a Honeywell DPS/49
- five VAXes (an 8650, three 11/785's, and one 11/780)
- eleven microVAX II's
- a SUN 3/160, and
- a network of thirteen SUN 3/50's and a SUN 3/180 server
The Honeywell runs the GCOS8 operating system, the VAXes run Berkeley UNIX, and the SUN workstations run SUN's version of Berkeley UNIX. Software includes several text editors, electronic mail, user-controlled archiving, plotting, text formatting, and a wide range of general and special-purpose languages. Batch processing is also provided under GCOS8.

For the VAX systems and SUN workstations, communication between machines is primarily implemented with Ethertnets. High-speed dedicated links provide communication between the Honeywell, the VAXes, and the IBM mainframes (operated by the Department of Computing Services). Traffic between machines consists primarily of file transfers, electronic mail, print requests, and remote logins (between UNIX systems). MFCF has a number of UUCP connections and participates in the UNIX-based USenet which provides news and computer conferencing between on-campus UNIX systems and a world-wide collection of participating sites. Electronic mail connections exist (directly or indirectly) to several global mail networks, e.g., CSNET, CDNNET, BITNET, and ARPANET.

Users at terminals may access machines operated by MFCF via a campus-wide Sytek local area network, Gandalf modems, dial-up telephone lines, or Datapac. Most public terminals are connected to the Sytek network. Hard-copy output can be obtained from a variety of devices, e.g., line printers, laser printers, and an APS Micro 5 phototypesetter.

Computing Services on Campus

MFCF also provides software support (Berkeley UNIX on VAX and microVAX) in varying degrees to researchers in the Institute for Computer Research. Such support is performed jointly with staff members of that institute.

MICROCOMPUTER INFORMATION CENTRE

This centre (located in the Math and Computer building, room 2018C) has products from Apple, IBM, Olivetti, Toshiba and Zenith, all of which are available for demonstration and sale. In addition, the Computer Software and Information Centre (Math and Computer building, room 2018) has a variety of software, for IBM PC's and compatibles as well as for Apple Macintosh computers, available for sale. These products are available for purchase by any UW full- or part-time student.

SCIENCE FACULTY COMPUTING

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

Computer Liaison Officer
A. Fleming, BMath (Waterloo)

The Faculty of Science has a broad range of different computer facilities available to undergraduates. Many courses are taught using the IBM mainframes and each student in those courses is issued an account. In addition, there is a JANET network in each of the four departments and the School of Optometry and these networks are used by students in many courses. The JANET 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. There is also an experimental network in the Department of Earth Sciences which uses Digital Equipment Corporation Rainbow microcomputers. 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.

OTHER FACILITIES

In addition to these major centres, a number of other computer systems are located in various laboratories across the campus. Some of these are used in courses and others are dedicated to research.
The 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 the students' cumulative averages. Alternatively, students may elect to transfer all pertinent attempted courses (passed and failed). Under this option, these courses will be counted in the students' cumulative averages.

Arts

Arts Programs

All Arts programs should be drawn up in consultation with the Departmental Undergraduate Advisor.

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

The following four-year General BA programs are also available:

- Anthropology
- Classical Studies
- Drama
- Economics
- English
- Fine Arts
- French
- Geography
- History
- Philosophy
- Political Science
- Psychology
- Religious Studies
- Sociology
- Spanish

There are no minors or double majors in 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. The program of non-major General Arts students must be arranged through the Arts Faculty Undergraduate Office.

Note 1
It is recommended that students register in no more than five courses in a term unless they have achieved at least a B average in previous studies and have discussed their situation with an academic counsellor.
HONOURS PROGRAMS

1. **Regular Programs**
   An Honours Bachelor of Arts (BA) degree is offered by the University in the following disciplines:
   - Accounting
   - 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 programs. 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 p. 8:3.

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 alternates four-month terms on campus for academic studies with four months off campus for practical training in business, industry, or government.

   Students in departmental 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 1)
   - Co-op Honours Anthropology
   - Co-op Honours Applied Economics
   - Co-op Honours Chartered Accountancy Studies
   - Co-op Honours English
   - Co-op Honours English (Rhetoric and Professional Writing Option)
   - Co-op Honours Management Accountancy Studies
   - Co-op Honours Political Science (Administrative Studies Option)
   - Co-op Honours Psychology
   - Co-op Honours Sociology

   **Co-operative Programs are open to full-time students only.**

   **Notes:**

   1. 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, most Honours Programs in Arts at the University may be combined with the Applied Studies courses for this Co-operative program. See the section entitled "Departmental Programs" for details.

   2. It is recommended that students register in no more than five courses in a term unless their program requires six or they have achieved at least a B average in previous studies and have discussed their situation with an academic counsellor.

**MINOR PROGRAMS**

Students enrolled in Honours Programs in Arts or 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 OPTIONS**

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. Students in some General Programs may choose one of several available Options. Options are available in:

- Canadian Studies (Option or Minor, see Chapter 15)
- Gerontology (Minor, see Chapter 15)
- Iberoamerican Studies (Option, see Chapter 15)
- Legal Studies (Option, see Chapter 15)
- Management Studies (Minor, see Chapter 15)
- Middle East Studies (Option, see Chapter 15)
Peace and Conflict Studies (Option or Minor, see Chapter 15)
Personnel and Administrative Studies (Minor, see Chapter 15)
Society, Technology and Values (Option, see Chapter 15)
Studies in Personality and Religion (Option or Minor, see Chapter 15)
Studies in Sexuality, Marriage and the Family (Option or Minor, see Chapter 15)
Women’s Studies (Option, see Chapter 15)

Note: Normally a student may not double-count any course for more than one option or minor.

SELECTION OF YEAR 1 PROGRAMS
All Year One students are officially classified as being in the General Arts Program, the Arts Co-op Program or the Accounting Co-op Programs. Students in Accounting Co-op programs have a highly specified first year and should refer to the Accounting Program section. Students in General Arts and Arts Co-op do not select a specific major or Honours program until Year Two. The first year is a broad exploratory year, and the student should select a program of courses that keeps as many options as possible open for advanced work. Students admitted to Arts Co-op must select several required courses in Year One (see "Applied Studies," Departmental Programs). Students in Year One General Arts usually choose five term courses in both the fall and winter terms. In each term, students usually select two courses from disciplines in Group A and two from disciplines in Group B (see Degree Requirements), with one or two more courses as electives. In choosing courses, students are encouraged to select courses in any discipline in which they may hope to major. (Students are advised that a six-course work load may be quite heavy.) 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.

Arts
Arts Programs

COURSE 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 only with the signature of the Undergraduate Officer of the student’s major Department.

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 his/her case with reasons showing that such a change in his/her program will serve his/her 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 down in their schedule of courses just 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 (B.A. or B.Sc. or equivalent, three- or four-year General or Honours).

The Honours Specialist Qualification (HSQ) requires:
- An Honours Bachelor’s degree or equivalent; and
- a B average in the subject or subjects in which the HSQ is sought; including
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

i) a minimum of 16 term courses or their equivalent beyond the 100 level

and

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

General Non-Major Program
Students in the General program may graduate as non-majors upon completion of a minimum of 30 term courses with a passing mark in each including:

i) a minimum of 16 term courses beyond the 100 level,

ii) a minimum of 15 term courses in the Faculty of Arts,

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

A cumulative average of 60% is required for graduation with an average of 65% in Arts Faculty courses.

Honours Program
Students in an Honours program must complete 40 to 48 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
Over the past several years the Faculty of Arts has become concerned that some students may experience academic difficulties because they lack the basic writing skills required for university work. In order to help these students the Faculty 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 in the Faculty of Arts was Fall 1977, or thereafter, must demonstrate competence in written English in order to qualify for the Bachelor of Arts degree. Students may fulfill this requirement by achieving a mark of at least 50% on the English Language Proficiency Examination or by demonstrating this competence in their Writing Clinic assignments.

Students who receive a mark below 50% 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.

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 (i)  English, History, Philosophy
Group A (ii) Dutch, French, German, Greek, Italian, Latin, Polish, Russian, Spanish, Ukrainian. (See Notes)
Group A (iii) Classical Studies, Drama, Fine Arts, Music, Religious Studies
Group B  Anthropology, Economics, Geography, Political Science, Psychology, Sociology.

Only courses taken in the subjects listed above will satisfy the Group A and B requirements.

In order to complete the Group A and B requirements an Arts student must complete with passing marks a minimum of six term courses from Group A and a minimum of four term courses from Group B. Of the four term courses used to satisfy the Group B requirement, no more than two may be in the same discipline. A student may take more than two term courses in a specific discipline in Group B but only two of them will be applied to meet the four course requirement. The student should note that Group A is further sub-divided into Group A (i), Group A (ii), and Group A (iii). Of the six term courses from Group A, the student must complete with passing marks:

- a minimum of two term courses from Group A (i).
- a minimum of two term courses from Group A (ii).
- a minimum of two term courses from any of the subjects listed in A(i), A(ii) or A(iii).

Notes:
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, FR 292, GER 271, GER 272, RUSS 271, RUSS 272, SPAN 217, SPAN 218, CLAS 201, CLAS 202, or ITAL 291, ITAL 292. These courses are taught in English and are not open to first year Arts students. These courses are the only approved alternative to the A (ii) requirement.

- Other courses taught in English by language departments are not approved alternatives to the A(ii) requirement. This will be indicated after the course description with a note such as “Taught in English” or “Does not meet A(ii) requirement”.
3. ARTS 100A: Introduction to the Humanities A may be used as a term course in Group A(iii) and ARTS 100B: Introduction to the Humanities B may be used as a term course in Group A(i).
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 grades, 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 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.

5. There are a number of courses in the Faculty of Arts which are essentially year courses (of two terms duration) although they are listed as two separate term courses. Letter grades are not awarded until the second half of the course is complete and then the same grade is applied to both term courses. An In Progress (IP) grade is assigned to the first term course until a grade is designated for the second term course.

   The use of the IP grade is normally limited to 400-level courses which are Senior Honours Essay or Senior Seminar courses and which normally require eight months or so to complete. The grade may be used in other courses only with the prior approval of the Undergraduate Affairs Group of the Arts Faculty.

6. 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 refer to the following tables.

   The following tables indicate sets of courses all of 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*, ENV S 277, ISS 250R, KIN 222, P SCI 214, PSYCH 201*, PSYCH 292, REC 270*, REC 371A, SOC 202*, SOC 280, STAT 202, STAT 204, STAT 210*, STAT 221, STAT 231</td>
</tr>
<tr>
<td>* No longer offered</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Set B - Advanced Statistics Courses</th>
</tr>
</thead>
<tbody>
<tr>
<td>BIOL 461, KIN 330, PSYCH 202*, PSYCH 391, STAT 205*, STAT 304, STAT 321</td>
</tr>
<tr>
<td>* No longer offered</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Set C - Research Methods Courses</th>
</tr>
</thead>
<tbody>
<tr>
<td>* No longer offered</td>
</tr>
</tbody>
</table>
Course Load
Regular full-time students in both General and Honours Arts programs normally register for five, or occasionally six, term courses each academic term. Full-time students in General Arts programs may register for more than six term courses per academic term only with the consent of the Examinations and Standings Committee. Full-time students in Honours Arts programs may not enrol in more than one term course per academic term in excess of the number specified for their program (see Departmental Honours Programs) except with the permission of the Examinations and Standings Committee.

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 and the Examinations and Standings Committee 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 higher average), the student may be granted conditional status for two academic terms. 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 higher 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 Chairman, petition the Examinations and Standings Committee to review his/her 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 two terms’ absence. 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:
1. must have completed a minimum of ten UW courses which count in the cumulative average,
2. must have a cumulative overall average of 83.0 or higher,
3. may not have any INC’s or NMR’s.

A student on the Dean’s List receives a congratulatory letter from the Dean and the award is noted on the student’s transcript.

Grade Appeal Procedures
1. If an Arts student wishes to appeal a grade in a course administered by the Arts Faculty, the student should (as soon as possible and at the latest within six months of receipt of the grade) try to work the matter out informally with the instructor concerned. If the problem cannot be resolved in this way, the student may submit a formal, written appeal to the appropriate department chairman or head of the affiliated colleges or dean of the federated college. Because of their familiarity with problems specific to their disciplines, departmental
or collegial review bodies offer the appellant the best opportunity for a thorough and a fair review of the appeal.

If an Arts student wishes to appeal a grade in a course administered by a faculty other than Arts, the student should attempt to work the matter out informally with the course instructor. If the problem cannot be resolved in this way, the student may submit a formal written appeal to the Arts Faculty’s Examinations and Standings Committee. The Committee will refer the appeal to the appropriate committee in the other faculty.

Students registered in faculties other than Arts who wish to appeal a grade in a course administered by the Arts Faculty should try to work the matter out informally with the instructor concerned. If the problem cannot be resolved in this way, a written appeal may be made to the Standings Committee of the student’s faculty of registration. That committee will refer the appeal to the appropriate committee in Arts.

Whether or not a student wishes to proceed informally or formally, advice and assistance may be secured in the appeal either from the Undergraduate Office of the Faculty of Arts or from the officers of the Arts Student Union.

2. The review procedures adopted by departments and colleges in the Arts Faculty are critical. Departments and colleges must work out such procedures and have them easily available to anyone interested. When an appeal is made the department or college shall carefully discuss the procedures with the appellant to determine that they are clearly understood and acceptable to all parties. The review procedures used in a specific case, with any modifications agreed to should be signed by all parties to indicate they understand the procedures, and the procedures should then be ratified by the Arts Faculty Examinations and Standings Committee. The decision of the review committee and the reasons for the decision should be communicated in writing to the appellant. It is understood that the decision reached by the review committee on the substantive academic issues raised by the appeal is final and subject to change only under the following terms:

If an Arts student appeals beyond the department or college, he moves away from a pool of academic competence, and, in effect, formally requests a review of the procedures used in hearing his appeal. A written request should be submitted to the Arts Faculty Examinations and Standings Committee.

The Committee shall review the petition and transmit it with relevant documentation to the Arts Faculty Appeals Committee which shall comprise the Associate Dean (Undergraduate Affairs), a senior Professor appointed by the Arts Faculty Council Executive Committee, and a third or fourth year honours student designated by the Arts

Student Union. The Arts Faculty Appeals Committee shall review the departmental or collegial procedures and shall have access to all relevant documents and the right to interview persons concerned. The main purpose of the Committee is to ascertain that decisions were reached using appropriate procedures and that both sides had adequate representation and a fair hearing. The decisions and the reasons for them shall be reported to both the appellant and the Examinations and Standings Committee.

Departmental Programs

School of Accountancy

Students may earn a Bachelor of Arts degree in accounting in Honours Chartered Accountancy Studies or Honours Management Accountancy Studies.

The Honours Chartered Accountancy Studies or Honours Management Accountancy Studies

- Co-operative programs (hereinafter referred to as Honours Accountancy Studies Co-op), permit students to meet the minimum course requirements for the CA and CMA designations in a four-year honours program. In addition, the Honours Accountancy Studies Co-op programs can be used as a base from which to proceed to a Master of Accounting program which offers opportunities for both regular and professionally accredited graduate study. Students interested in professional accounting certification are advised to give careful consideration to completing the Professionally Accredited Stream (PAS) (see below).

Recommended Program - Honours Accountancy Studies

<table>
<thead>
<tr>
<th>Term 1A</th>
<th>Term 1B</th>
<th>Term 2A</th>
</tr>
</thead>
<tbody>
<tr>
<td>ACC 101</td>
<td>ACC 131</td>
<td>ACC 231</td>
</tr>
<tr>
<td>ECON 101</td>
<td>ECON 102</td>
<td>ECON 201</td>
</tr>
<tr>
<td>MATH 113A*</td>
<td>MATH 111B*</td>
<td>ECON 221</td>
</tr>
<tr>
<td>ENGL elective</td>
<td>Two Group A or B</td>
<td>Two electives</td>
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<tr>
<td>electives</td>
<td>electives</td>
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<table>
<thead>
<tr>
<th>Term 2B</th>
</tr>
</thead>
<tbody>
<tr>
<td>ACC 291</td>
</tr>
<tr>
<td>ECON 202</td>
</tr>
<tr>
<td>PSYCH 101</td>
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<td>Two electives</td>
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</table>

<table>
<thead>
<tr>
<th>Term 3A</th>
</tr>
</thead>
<tbody>
<tr>
<td>ACC 351</td>
</tr>
<tr>
<td>ACC 371</td>
</tr>
<tr>
<td>ACC 381</td>
</tr>
<tr>
<td>ACC 392</td>
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<tr>
<td>One elective</td>
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</table>

<table>
<thead>
<tr>
<th>Term 3B</th>
</tr>
</thead>
<tbody>
<tr>
<td>ACC 372</td>
</tr>
<tr>
<td>ACC 382</td>
</tr>
<tr>
<td>ACC 441</td>
</tr>
<tr>
<td>Two electives</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Term 4A</th>
</tr>
</thead>
<tbody>
<tr>
<td>ACC 461</td>
</tr>
<tr>
<td>ACC 491</td>
</tr>
<tr>
<td>Three electives</td>
</tr>
</tbody>
</table>

continued
Term 4B
ACC 401
ACC 462
Three electives

*Students who have not completed Grade 13 calculus may be required to take MATH 104 before taking MATH 113A. Students who have not completed Grade 13 algebra may be required to complete MATH 103 before taking MATH 111B.

**Honours Accountancy Studies – Co-operative Program**
(Honours Chartered Accountancy Studies and Honours Management Accountancy Studies)

Students may apply for direct admission to Year One Honours Accountancy Studies Co-op. Continued enrolment in this program is limited, based on academic performance.

There are five work terms available in the Co-operative program: students complete one, two or three terms on campus and then alternate work terms and academic terms until the program is completed (see p. 5:3 for specific sequences). Work-term placements are in accounting settings in the public and private sectors. Because of the nature of the Honours Accountancy Studies Co-operative program, which requires work experience, admission to this program requires Canadian Citizenship or Permanent Residence Status in Canada.

Eligibility for the degree of Bachelor of Arts in the Honours Accountancy Studies Co-op program requires:

1. Successful completion of a minimum of 42 term courses including the Faculty of Arts Group A and B requirements with an overall cumulative average of at least 60% and a cumulative average of at least 70% in all required courses listed under 2 below, and all electives labelled accounting (ACC).

2. The following courses are required for both CA and CMA:
   a) ACC 101, 131, 231, 281, 291, 351, 371, 372, 381, 382, 392, 401, 441, 461, 462, 491;
   b) ECON 101, 102, 201, 202, 221;
   c) MATH 113A, MATH 111B, and;
   d) either
      Specialization A – (Honours Chartered Accountancy Studies)
      ACC 132
      or
      Specialization B – (Honours Management Accountancy Studies)
      M SCI 211 or PSYCH 333

3. Those interested in qualifying as a Chartered Accountant should complete Honours Chartered Accountancy Studies Co-op by electing Specialization A above. At the end of this program the student will have completed all the formal university courses required at present by the Institute of Chartered Accountants of Ontario (ICAO). The other principal requirements for the qualification as a CA, as stated by the ICAO, are work experience with a public accounting firm, passing of the ICAO’s admission examinations, successful completion of the ICAO’s Professional Summer School (offered in May-June by the ICAO) and successful completion of the Uniform Final Examinations.

Those interested in qualifying as a Certified Management Accountant should complete Honours Management Accountancy Studies Co-op by electing Specialization B above. Of the 18 course requirements of the Society of Management Accountants of Ontario (SMAO), students can presently qualify for 15 complete course and examination exemptions. Two others qualify as SMAO course exemptions. The remaining course is offered by the SMAO. Students must write the SMAO’s Final Accreditation Examinations in these last three courses. They are offered twice yearly, once in early January and once in early July. The other principal requirement for qualification as a CMA is the completion of a minimum of two years of acceptable work experience.

**Professionally Accredited Stream (PAS)**
The Professionally Accredited Stream (PAS) commences in Year Three of the Bachelor of Arts, Honours Accountancy Studies program and concludes with the Master of Accounting degree.

It is a limited enrolment program which provides an integrated sequence of accounting, auditing, taxation and related studies. Year Three and Year Four required courses are set out below.

**Year Three and Year Four Required Courses - PAS**

<table>
<thead>
<tr>
<th>Fall Term</th>
<th>Winter Term</th>
<th>Spring Term</th>
<th>Required One-Year Internship</th>
<th>Fall Term</th>
</tr>
</thead>
<tbody>
<tr>
<td>3A</td>
<td>3B</td>
<td>4A</td>
<td>Internship</td>
<td>4B</td>
</tr>
<tr>
<td>ACC 231</td>
<td>ACC 351</td>
<td>ACC 372</td>
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<td>ACC 401</td>
</tr>
<tr>
<td>ACC 291</td>
<td>ACC 381</td>
<td>ACC 382</td>
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<td>ACC 463</td>
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<tr>
<td>ACC 371</td>
<td>ACC 392</td>
<td>ACC 441</td>
<td></td>
<td>ACC 491</td>
</tr>
<tr>
<td>ACC 461</td>
<td>ACC 432</td>
<td>ACC 451</td>
<td></td>
<td>2 electives</td>
</tr>
<tr>
<td>STAT 311</td>
<td>ACC 443</td>
<td>ECON 201</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ENGL 210</td>
<td>ACC 462</td>
<td>or 202</td>
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</tbody>
</table>

**Admission to the Professionally Accredited Stream (PAS)**
The PAS is a limited enrolment program. To be eligible for admission students must have completed at least two years of university studies which include the following courses:

- Two term courses in Introductory Economics
- One term course in each of:
  - Financial Accounting
  - Managerial Accounting
Statistics  
Computing  
Calculus (beyond Grade 13 or Ontario Academic 
Course in Ontario)  
Algebra (beyond Grade 13 or Ontario Academic 
Course in Ontario)  
Psychology or Sociology  
English  
Humanities elective (English, History, Philosophy or 
a foreign language)  
Intermediate Macro or Microeconomics

In addition, at some point within the PAS program, 
students must complete PSYCH 333 and PHIL 215.

In addition, students must ordinarily have achieved 
an excellent academic record in their university 
studied. In unusual situations, where warranted, 
consideration may be given to such factors as maturity 
and experience.

Special Recognition by the Accounting Profession 
of the Professionally Accredited Stream

This course of study is the only one in Ontario that 
has been accredited by the Institute of Chartered 
Accountants of Ontario as being sufficiently complete 
to justify special status for its graduates. Graduates 
are granted exemption from all ICAO education 
requirements (including the accounting, auditing and 
taxation admission examinations and the ICAO 
Professional Summer School) except the Uniform Final 
Examinations (UFE) which can be written at the first 
opportunity following graduation from the PAS.

Similarly, students receive maximum possible 
exemptions from the Society of Management 
Accountants of Ontario; the course of study is unique 
in Ontario in that students are exempted from all but 
the three Final Accreditation Exams (FAE).

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: 
a) 101, 201, 202, 260, 330; 
b) 102A or 102B; 
c) 103 or 283 or 290.

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, 201, 202, 260, 300, 330, 499A/B; 
b) 102A or 102B; 
c) 103 or 283 or 290; 
d) 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  
German  
History  
Political Science  
Psychology  
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, 201, 202, 260, 300, 330; 
b) 102A or 102B; 
c) 103 or 283 or 290; 
d) one 400-level term course. 
e) 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 either ANTH 102A or 102B. 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 8:12 and 8:13.

Minor in Anthropology
An Honours student may minor in Anthropology. The requirements for an Anthropology minor are identical to the requirements for a Three Year General BA in Anthropology.

Applied Studies Co-op
A student in the Applied Studies Co-op program must maintain good standing in an Honours program in Arts and must complete 14 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:

a) capable of clear and precise oral and written communication in English;
b) familiar with the history and political institutions of Canada;
c) familiar with the economic structure and economic institutions of Canada;
d) 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 (ARTS 090, ARTS 091), 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.

Arts
Applied Studies Co-op

Required Program

<table>
<thead>
<tr>
<th>Year 1A</th>
</tr>
</thead>
<tbody>
<tr>
<td>A second language</td>
</tr>
<tr>
<td>ACC 131</td>
</tr>
<tr>
<td>CS 100 or CS 102 or ARTS 198</td>
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<tr>
<td>ARTS 060</td>
</tr>
<tr>
<td>Proposed Major Subject and Electives</td>
</tr>
<tr>
<td>(three term courses).</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Year 1B</th>
</tr>
</thead>
<tbody>
<tr>
<td>A second language</td>
</tr>
<tr>
<td>ACC 132</td>
</tr>
<tr>
<td>ENGL 109</td>
</tr>
<tr>
<td>ARTS 091</td>
</tr>
<tr>
<td>Proposed Major Subject and Electives</td>
</tr>
<tr>
<td>(three term courses).</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Year 2A</th>
</tr>
</thead>
<tbody>
<tr>
<td>HIST 253X or P SCI 260A</td>
</tr>
<tr>
<td>ACC 121</td>
</tr>
<tr>
<td>Major Subject and Electives (three or four term courses).</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Year 2B</th>
</tr>
</thead>
<tbody>
<tr>
<td>HIST 254X or P SCI 260B; and PHIL 145</td>
</tr>
<tr>
<td>A Computer Science or approved Applied Studies course</td>
</tr>
<tr>
<td>Major Subject and Electives (three term courses).</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Year 3A</th>
</tr>
</thead>
<tbody>
<tr>
<td>Two approved courses in Applied Studies</td>
</tr>
<tr>
<td>Major Subject and Electives (four term courses).</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Year 3B</th>
</tr>
</thead>
<tbody>
<tr>
<td>An approved Applied Studies course</td>
</tr>
<tr>
<td>Major Subject and Electives (four term courses).</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Year 4A</th>
</tr>
</thead>
<tbody>
<tr>
<td>An approved Applied Studies course</td>
</tr>
<tr>
<td>Major Subject and Electives (four term courses).</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Year 4B</th>
</tr>
</thead>
<tbody>
<tr>
<td>An approved Applied Studies course</td>
</tr>
<tr>
<td>Major Subject and Electives (four term courses).</td>
</tr>
</tbody>
</table>

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 and French Teaching specializations are available for qualified applicants at the beginning of the 2A term. Details in ML 119.

4. A list of approved Applied Studies courses is available from the Director of the program in ML 119.

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 44 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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**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.

**Note**

All CLAS courses and general programs were formerly designated C CIV.

**Honours Programs**

Eligibility for graduation in the Honours Classical Studies, Classical Studies (Languages Option) 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 Option), 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>
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</tr>
</thead>
<tbody>
<tr>
<td>Two of CLAS 100/101/102</td>
<td>LAT 100A/B or GRK 100A/B</td>
<td>Six additional term courses</td>
</tr>
</tbody>
</table>

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

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

<table>
<thead>
<tr>
<th>Year Four</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Two CLAS including one senior seminar</td>
<td>CLAS 490A/B or Directed Study</td>
<td>Six additional term courses</td>
</tr>
</tbody>
</table>
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 Option), 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

| Year One | Two of CLAS 100/101/102  
LAT 100A/B or GRK 100A/B  
Six additional term courses |
|---|---|
| Year Two | CLAS 251/252; 265 or 266  
Two term courses in LAT/GRK  
Seven additional term courses |
| Year Three | One term course in LAT/GRK  
Three CLAS (one may be Directed Study)  
Eight additional term courses |
| Year Four | CLAS 490A/B or Directed Study  
One additional CLAS  
Seven additional term courses |
|### Joint Honours Classical Studies (Languages Option)

#### 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 490A/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 Option) 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 Assistant Undergraduate Advisor design proposals for Directed Study. Between two and five term courses in CLAS/LAT/GRK may be taken by Directed Study (between two and three in the case of Joint Honours), of which two would take the place of CLAS 490A/B (Senior Honours Thesis). For further details consult the Department.
3. In CLAS 490A/B a grade of B- or higher must be achieved. In Directed Study an average of B- or higher must be achieved in the equivalent of two 400-level courses.
4. 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 Theatre Arts

General Drama and Theatre Arts
Eligibility for graduation in the General Drama and Theatre Arts 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 and Theatre Arts, including:
   a) DRAMA 101A, 101B and 102 must be taken in the first year;
   b) any three of DRAMA 251, 252, 253, 254, 255, 258, 259, 301, 302, 351, 352, 353, 355, 356, 357, 358, ENGL 362, 363, 190;
   c) DRAMA 243, 244, 371 or 372, 409.

Four-Year General Drama and Theatre Arts
The requirements are the same as for the Drama section of the Joint-Honours program, with the following exceptions:
a) An overall cumulative average of 60%, and a cumulative major average of 70%.
b) Four-Year General students will not take DRAMA 499A/B, and will substitute two other Drama courses for the Senior Seminar.

Honours Drama and Theatre Arts
The Honours program is designed so that a student can work through a particular sequence of courses in one field (acting, academic, directing, technical) which would in effect become an area of specialization. The DRAMA 499 project in the fourth year would then presumably be centred on this specialization.
Eligibility for graduation in the Honours Drama and Theatre Arts 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 and Theatre Arts including:
   a) DRAMA 101A, 101B and 102 must be taken in the first year;
   b) six of DRAMA 251, 252, 253, 254, 255, 258, 259, 301, 302, 351, 352, 353, 355, 356, 357, 358, ENGL 362, 363;
   c) DRAMA 243, 244, 371, 372, 409, 499A/B.

Honours Drama and Theatre Arts (Applied Studies Co-op)
A student may combine an Honours Drama and Theatre Arts program with Applied Studies Co-op. The requirements in Drama and Theatre Arts are identical to the Honours requirements listed above. The Applied Studies requirements are listed on pages 8:12 and 8:13.

Drama and Theatre Arts Joint Honours Program
Eligibility for graduation in the Joint Honours Drama and Theatre Arts 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 and Theatre Arts including:
   a) DRAMA 101A, 101B and 102 must be taken in the first year;
b) three of DRAMA 251, 252, 253, 254, 255, 258, 259, 301, 302, 351, 352, 353, 355, 356, 357, 358, ENGL 362, 363;
c) DRAMA 243, 244, 371, 372, 409;
d) DRAMA 499A/B or 2 other DRAMA courses may be taken if the other department of the Joint Honours program does not have a Senior Seminar. If the other department requires the equivalent of a Senior Seminar of its Joint Honours students the Drama Group would waive the 499 requirement, and the student would take two other Drama classes.

Minor Program
DRAMA 101A and 101B and DRAMA 102 plus seven other term courses of which two must be in dramatic literature.

Notes For All Programs
1. A student who has taken ENGL 362/363 may not also take ENGL 190.

2. The Drama program offers two courses in Speech Communication, DRAMA 223 and 224, to students in all faculties.

Economics

Prerequisite
It is desirable that students planning to enter Economics should offer one OAC in mathematics (preferably calculus) or the equivalent.

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, plus 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 and 102 or (150), 201, 202, 231, 301, 302, 321, 401, 402;
   b) 310 or 361;
   c) Three additional term courses at the 300 level or above. (ECON 410 is recommended but not mandatory.)

Recommended Program

Year One
ECON 101 and 102 (or 150)
Eight (or nine) additional term courses
*Students without an OAC in Mathematics or equivalent should select MATH 103, 104 as electives.

Year Two
ECON 201, 202, 231
Three additional term courses in Economics
Four additional term courses.

Year Three
ECON 301, 302, 321
Three additional term courses in Economics
Four additional term courses.

Year Four
ECON 401, 402*
Two additional term courses in Economics
Six additional term courses.
*ECON 401, 402 need not be taken in the order as listed.
Honours Economics (Applied Studies Co-op)
A student may combine an Honours Economics program with Applied Studies Co-op. The requirements in Economics are identical to the Honours requirements listed above. The Applied Studies requirements are listed on pages 8:12 and 8:13.

Honours Applied Economics (Co-op)
Eligibility for graduation in the Honours Applied Economics (Co-op) program includes fulfillment of the following requirements:

1. Successful completion of a minimum of 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 18 term courses must be in Economics including ECON 101 and 102 (or 150), 201, 202, 221, 231, 301, 302, 310, 321, 361, 401, 402, 403, 410, 421, 422. In addition, students are required to complete one additional term course at the 300 level or above.

3. In addition, the following courses are required:
   a) MATH 111B, 113A
   b) ACC 121, 122
   c) CS 100 or 102.

Recommended Program for Honours Applied Economics (Co-op)

Year One
ECON 101 and 102 (or 150)
CS 100 or 102
ENGL 109 or 150
MATH 111B
Five (or six) additional term courses.

Year Two A
ECON 201, 221, 231
ACC 121
MATH 113A
One additional term course.

Year Two B
ECON 202, 361
ACC 122
Three additional term courses.

Year Three A
ECON 302, 310, 321
Three additional term courses.

Year Three B
ECON 301, 410, 421
Three additional term courses.

Year Four A
ECON 401, 402
One additional term course in Economics at the 300 level or above
Two additional term courses.

Year Four B
ECON 403, 422
Three additional term courses.

Note:
Students enter Honours Applied Economics in term 2A but should apply in term 1B. See Co-op Advisor in Economics.

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 major average (in Economics) of at least 75%.

2. At least 14 term courses must be in Economics including ECON 101 and 102 (or 150), 201, 202, 211, 221, 231, 301, 302, 401, 402. Students in the Faculty of Mathematics must take at least 12 term courses in Economics including ECON 101 and 102 (or 150), 201, 202, 231, 301, 401, 402, plus three additional ECON courses above the 300 level.

Notes For Joint Honours Programs:

1. Economics and Geography
   The degree requirements of the Faculty of Arts must be met for the BA Degree and those of the Faculty of Environmental Studies for the BES Degree. Students must take ECON 221 or ENV S 271 and the above core courses.

2. Economics and Mathematics
   Substitute ECON 311, 321, for ECON 211, 221. Students in Years One and Two may take this program in either Faculty, but at the end of the second year, they will decide whether to continue towards a degree in Arts or a degree in Mathematics. The program must then be approved by the Economics Department and by an appropriate department of the Faculty of Mathematics.

3. Economics and Political Science
   ECON 310 must be taken along with the above core courses.

4. Economics and Sociology
   Students may take either ECON 221 or SOC 280.
Minor Program in Economics
A total of ten term courses in Economics must be taken, and must include:

a) ECON 101, 102, 201, 202, 231;
b) ECON 211 or 221.

Math students should substitute ECON 211 or ECON 221 with ECON 311 or 321.

Economics Option
Students in Honours Earth Sciences may earn an Economics Option upon successful completion of the following six courses with a cumulative average (in Option courses) of at least 65%. Required courses are ECON 101 and (or 102), 201, 355. Two additional courses are required with no more than one from each of the following groups:

i) ECON 341 or 361
ii) BUS 111 or 121 (WLU)
iii) M SCI 211
iv) a course in entrepreneurship.

English

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, 108, 190 (see Note 1);
b) 200A, 200B (Survey of British Literature - see Notes 2 and 3);
c) 251A, 251B (Practice and Theory of Criticism - see Note 3);
e) one term course from 313, 314, 315, 316, 343, 344, 345, 346, 347, 445A (North American Literature);
f) three other English major term courses.

Students in the General program must gain a minimum of 16 term courses beyond the 100 level.

Four-Year General English
Successful completion of a minimum of 40 term courses including Faculty of Arts Group requirements, with specific English requirements the same as for the

Arts

English

Joint Honours Program. Students must maintain a minimum average of 70% in their English major courses and an overall cumulative average of 60%.

Honours English (Literature)
Eligibility for graduation in the Honours English program includes fulfillment of the following requirements:

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

2. At least 20 term courses must be in English, and these 20 courses are usually divided 2-6-6-6 among the four years. English courses must include:

a) two term courses from 102A, 102B, 103A, 103B, 105A, 105B, 108, 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 305A, 305B, 306A, 306B, 306C, 306D, 306E (Language and Early Literature);
e) four term courses from 310A, 310B, 330A, 330B, 350A, 350B, 362, 363, 410A, 410B (British Literature to 1800);
f) two term courses from 430A, 430B, 451A, 451B, 460A, 460B (British Literature since 1800);
g) two term courses from 313, 314, 315, 316, 343, 344, 345, 346, 347, 445A (North American Literature);
h) four other English major term courses (see Note 4).

Honours English (Rhetoric & Professional Writing Option)
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 44 term courses with an average of at least 75% in English courses and 70% in the Intensive Study area. In addition to English courses (English 103A/B is recommended), good course choices for first year include Arts Group B courses, a language other than English, 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 Office 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)
a) First Year (two courses): two 100-level English courses (103A, 103B recommended);
b) Literature (eight courses): 200A, 200B, 251A, 251B; four other Literature (at least two at 300- or 400-level);
c) RPW Core Course (one course): 292;
d) Linguistics (two courses): 306A, one other 306 course;
e) Writing and Rhetoric (six courses): two of 209, 210A, 210C, 219; two courses from 309 sequence (including at least one of 309A, 309B); 409A, 409B;
f) Linguistics or Rhetoric (one course): one other course from 306 sequence or 309 sequence.

Non-English Requirements (24 courses)
A Language other than English: minimum of two
Computer Science: minimum of two
Arts Group B requirements: four
Intensive Study area: minimum of five
Elective Areas: 11

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 and two term credits in computer science at the university level from any faculty.

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, and two term credits in computer science at the university level from any faculty. The Applied Studies requirements are listed on pages 8:12 and 13.

English Joint Honours Program (Literature)
Eligibility for graduation in the Joint Honours English program includes fulfillment of the requirements listed below.

1. Successful completion of a minimum of 44 term courses including Faculty of Arts Group requirements with an overall cumulative average of at least 60% and a cumulative average in English courses of at least 75%.

2. At least 16 term courses must be in English, including:
a) two term courses from 102A, 102B, 103A, 103B, 105A, 105B, 108, 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 (British Literature since 1800);
   iv) 313, 314, 315, 316, 343, 344, 345, 346, 347, 445A (North American Literature);
e) two other English major term courses (see Note 4).

English Joint Honours Program (Rhetoric and Professional Writing Option)
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)
a) First Year (two courses): two 100-level English courses (103A, 103B recommended);
b) Literature (six courses): 200A, 200B, 251A, 251B; two other courses at 300- or 400-level;
c) RPW Core Course (one course): 292;
d) Linguistics (one course): 306A;
e) Writing and Rhetoric (five courses): two of 209, 210A, 210C, 219; one course from 309 sequence (either 309A or 309B); 409A, 409B;
f) Linguistics or Rhetoric (one course): one other course from 306 sequence or 309 sequence.

Non-English requirements (28 courses)
Joint honours area: 14-16
Language other than English: minimum of two
Computer science: minimum of two
Arts Group B: four
Electives: four-six
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.

4. Students planning to go on to graduate work from the literature program are advised to choose the following English courses:
   b) two term courses from 305A, 305B, 310A, 310B;
   c) two term courses from 300A, 300B, 350A, 350B;
   e) two term courses from 211, 212, 232, 233;
   f) 343;
   g) one term course from 313, 314, 315, 316;

5. Students in the literature program who plan to teach high school are advised to choose the following English courses:
   a) 102A, 102B, 200A, 200B, 251A, 251B, 362, 363;
   c) two term courses from 305A, 305B, 310A, 310B;
   e) two term courses from 211, 212, 232, 233, 343, 344;
   f) two term courses from 313, 314, 315, 316.

Fine Arts

Three-Year General Fine Arts
Eligibility for graduation in the General Fine Arts program (Studio Option, Art History Option or Film Studies Option) includes fulfillment of the following requirements:

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

2. At least 12 term courses must be in Fine Arts. For the different Options, the required courses are as follows:
   Studio Option:
   a) FINE 110, 111, 120, 121, 220, 222, 224, 225;
   b) four additional Fine Arts courses, two of which must be Art History.
   Art History Option:
   a) FINE 110, 111, and six additional Art History courses;
   b) Fine 120 and three additional Studio courses.
   Film Studies Option:
   a) FINE 110, 111, 250, 251, 270W, 470, 471;
   b) at least three term courses from: FINE 350, 351, 352, 353, 360, 361;
   c) at least two term courses to be selected in consultation with the Fine Arts Film advisor, from: FINE 252, 253, 255R, 258W, 271W, 359, 380Z, 381Z.

Four-Year General Fine Arts
Eligibility for graduation in the Four-Year General Fine Arts program (Studio Option, Art History Option, or Film 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 of at least 65%.

2. At least 16 term courses must be in Fine Arts. For the different Options, the required courses are as follows:
   Studio Option:
   a) FINE 110, 111, 120, 121, 220, 222, 224, 225;
   b) four additional Fine Arts courses, two of which must be Art History;
   c) four term courses in Fine Arts at the third or fourth-year level.
Art History Option:
  a) FINE 110, 111, 120, 121, 210, 211, 212, 213, 219, 316;
  b) and three additional term Studio courses;
  c) four term courses in Fine Arts at the third or fourth-year level, two of which must be 390A and 490A.

Film Studies Option:
  a) FINE 110, 111, 250, 251, 270W, 470, 471, 49CA;
  b) at least four term courses from: FINE 350, 351, 352, 353, 360, 361;
  c) at least four term courses to be selected in consultation with the Fine Arts Film advisor, from: FINE 252, 253, 255R, 258W, 271W, 359, 380Z, 381Z.

Honours Fine Arts
To graduate with an Honours degree in Fine Arts, it is necessary to complete FINE 490/491. Admission to this course is by portfolio, Art History or Film Studies presentation, submitted after successfully completing third year. 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 third year courses or are otherwise qualified.

Eligibility for graduation in the Honours Fine Arts program (Studio Option, Art History Option or Film 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 of at least 75%.
2. At least 20 term courses must be in Fine Arts. For the different Options, the required courses are as follows:

   Studio Option:
   a) FINE 110, 111, 120, 121, 220, 222, 224, 225;
   b) six 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 226, 324, 325, 320, 321, 322, 323;
   d) FINE 490, 491.

   Art History Option:
   a) FINE 110, 111, 120, 121, 210, 211, 212, 213, 219, 316;
   b) two additional term studio courses;
   c) six term Art History courses on the second or third year level, one of which must be 390A;
   d) FINE 490, 491.

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Film Studies Option:
  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 identical to the Honours requirements listed above. The Applied Studies requirements are listed on pages 8:12 and 8:13.

Joint Honours in Fine Arts
Joint Honours programs are possible in combination with a number of Departments within the Arts Faculty. Consult with the Fine Arts undergraduate advisor for details of this program.

Minor in Fine Arts (Studio, Art History or Film Studies Option)
Eligibility for graduation with a Fine Arts Minor (Studio, Art History or Film Studies Option) 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 Options, the required Fine Arts courses are:

   Studio or Art History Option:
   FINE 110/111, 120/121.

   Film Studies Option:

Note For All Programs:
FINE 390, 391, 392, 393, 472, 474 and 475 may be taken only as electives.

Fine Arts in France:
In the Spring, term courses in studio, art history and film studies will be offered in Paris and Burgundy. A selection from the following courses will be announced each year: Fine 220A, 226, 324, 330, 380, 381, 390, 420.
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 also have completed French 301 and 302 or equivalent.

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 and 400 levels. Of the eight courses at the 300 and 400 level, two must be FR 401, 402. 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 one term course must be taken in each of the following areas: 17th, 18th, 19th, 20th century literature, French-Canadian literature, and either the Renaissance or the Medieval periods. The student must complete one course in linguistics and FR 402 or equivalent.


Recommended Program

Year One
FR 192 and/or FR 195/196.
Eight additional term courses.

Year Two
a) In language, a minimum of FR 251/252.
b) A minimum of four additional term courses in French literature or linguistics.
c) Additional courses.

Year Three
a) In language, a minimum of FR 301/302.
b) A minimum of four additional term courses in French literature or linguistics.
c) Additional courses.

Year Four
a) In language, a minimum of FR 401/402.
b) A minimum of four additional term courses in French literature or linguistics.
c) Additional 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 Honours requirements listed above. The Applied Studies requirements are listed on pages 8:12 and 8:13.

French Teaching Specialization
This is a special program of study within the Applied Studies Co-op program. Students graduate with an Honours French (Applied Studies) degree from Waterloo, a B.Ed. degree awarded by Brock University, and certification to teach French and a second subject at the secondary level, and must satisfy the respective requirements.

Candidates apply for admission to the Applied Studies program and are admitted to the French Teaching Specialization in the second year.

The following courses are required in Year One of the Applied Studies Program: ACC 131, ACC 132; one of CS 100, CS 102, ARTS 198; ENGL 109; ARTS 090, ARTS 091; two courses in a Second Language (including French).

After Year One, the requirements of the Specialization differ from those of the regular Applied Studies program. Two courses are required: SOC 207, PSYCH 212 (or one of PSYCH 207, 211, 213). N.B.: SOC 101 and PSYCH 101 are prerequisites for these courses. Students are advised to take these prerequisites in Year One.

Students who do not already have a native fluency in French are required to spend two terms (normally in Year Three) at a French-speaking University.
Students must complete all the requirements for the French Honours Degree as outlined above, but must also include the following courses: FR 203, 303, 403; a course in Quebec civilization if the third year is taken at a university in Europe; a course in French civilization if the third year is taken at a Quebec university.

Recommended Program

Year One
a) ACC 131, 132; CS 100 or CS 102 or ARTS 198;
   ENGL 109; ARTS 090, ARTS 091 (Requirements of
   the Applied Studies Program).
b) FR 192A, FR 192B, or FR 193, FR 293.
c) PSYCH 101, SOC 101.
d) Two term courses in a proposed second teaching
   subject.
e) Two elective term courses.

Year Two
a) FR 251, FR 252.
b) FR 203, FR 275, FR 232.
c) One of FR 263, FR 273, or HIST 203X.
d) SOC 207; PSYCH 212 (or one of PSYCH 207,
   PSYCH 211, PSYCH 213).
e) Two term courses in the second teaching subject.
f) 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 301, FR 302, FR 303, FR
354, FR 363, plus two half-courses in the second
Teaching subject or two elective half-courses. The
courses chosen should be approved by the
Department of French and by other departments in
whose discipline courses are taken.

Year Four
a) FR 401, FR 402.
b) FR 342, FR 403, one of FR 409, FR 410, FR 421,
   FR 422
c) One further half-course in French.
d) Two half-courses in the second teaching subject.
e) Two elective half-courses.
.f) Two non-credit tutorials in teaching techniques.

French Joint Honours Program
The Department of French recognizes combined
honours programs with the following disciplines:

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<tr>
<th>Discipline</th>
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<tbody>
<tr>
<td>Anthropology</td>
<td>History</td>
<td>Latin</td>
<td>Mathematics</td>
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<tr>
<td>Classical Studies</td>
<td>Economics</td>
<td>English</td>
<td>Philosophy</td>
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<td>Environment and</td>
<td>Political Science</td>
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<td>Resource Studies</td>
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<tr>
<td>Fine Arts</td>
<td>Geography</td>
<td>German</td>
<td>Russian</td>
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<td></td>
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<td></td>
<td>Sociology</td>
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</tbody>
</table>

Other combinations must be approved on an individual
basis with the departments concerned.

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

1. Successful completion of a minimum of 44 term
courses including Faculty of Arts Group
requirements with an overall cumulative average of
at least 60% and a cumulative major average of at
least 75%.

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, including FR 402. At least one term course
must be taken in each of the following areas: 17th,
18th, 19th, 20th century literature, French-Canadian
literature, linguistics and either the Renaissance or
the Medieval periods.

Recommended Program

Year One
FR 192 and/or FR 195/196.
Eight additional term courses.

Year Two
a) In language, a minimum of FR 251/252.
b) A minimum of four additional term courses in
   French literature or linguistics.
c) Additional courses.

Year Three
a) In language, a minimum of FR 301/302.
b) A minimum of two additional term courses in
   French literature or linguistics.
c) Additional courses.

Year Four
a) In language, a minimum of FR 401/402.
b) A minimum of two additional term courses in
   French literature or linguistics.
c) 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 demonstrate written and oral ability in
French equal to that expected in FR 301/302. FR151,
152, 155, 198 and 199 may not be counted as credits
towards a French minor.

Notes for All Programs

1. Students in a Major or Honours program may count
only one of FR 207, 208 in their French require-
ments, but may include any of these as elective
credits.
2. **Students who wish to major or honour in French are strongly urged to enrol in both FR 192A/B and FR 195/196.**

**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 under a special third-year program. As well, students may study at a French Language University in Quebec. More information may be obtained from the Department.

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**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 195, 200, 178, 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 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 65%.

2. At least 20 term courses in Geography which may include ENV S 195, 200, 178, 278, and must include five Regional Area term courses. Eligible courses are those listed under the heading Regional Geography (p. 10:20) plus GEOG 203.

**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 75%.

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**Arts**

**Geography**

2. At least 20 term courses in Geography which may include ENV S 195, 200, 178, 278, and must include five Regional Area term courses. Eligible courses are those listed under the heading Regional Geography (p. 10:20), plus GEOG 203.

**Recommended Four-Year Program – General or Honours**

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**Year One**
GEOG 101 Introduction to Human Geography
GEOG 102 Introduction to Physical Geography
GEOG 160 Introduction to Cartography and Map Analysis

One of:
GEOG 125R Introduction to the Third World
GEOG 127 Regional Problems of Europe
Six electives which should include some Arts Faculty Group A requirements.

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**Year Two**
GEOG 202 Location of Economic Activities
ENV S 178 Introduction to Environmental Research Methods

Two of:
GEOG 203 Regional Geography
GEOG 204 Soviet Union
GEOG 205 Africa
GEOG 220A The World Region I
GEOG 220B The World Region II
GEOG 221 U.S.A.

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

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**Year Three**
GEOG 381 The Nature of Geography
GEOG 390 Honours Thesis Proposal (Honours Only)
GEOG 391 Field Research (Honours Only)
Seven electives

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**Year Four**
GEOG 490A/B Honours Thesis (Honours Only)
Eight electives

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**Geography Joint Honours**
*(See p. 10:18)*

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**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 (p. 16:49), ENGL 109, 129R, 140R or 150 may be taken in Year One; ENGL 209 or 210 may be taken in Year Two.

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, e.g. GEOG 391 (Field Research). 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. Students considering graduate work should take at least two term courses in a foreign language related to their field of interest.

5. 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
- Honours Program in German
- Honours German (Applied Studies Co-op)
- Joint Honours Program with German
- Minor Program in German

Students entering German programs are normally placed in one of two streams (A or B), depending upon their knowledge of the German language.

<table>
<thead>
<tr>
<th>Stream A</th>
<th>Stream B</th>
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<tr>
<td>Students with little or no knowledge of German</td>
<td>Students with at least Grade 12 standing in German or equivalent</td>
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First Year

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<th>Course</th>
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<tr>
<td>GER 101/102</td>
<td>GER 121/122 and/or GER 251/252</td>
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Second Year

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<th>Course</th>
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<tr>
<td>GER 201/202</td>
<td>GER 351/352</td>
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<td>GER 291/292</td>
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</tbody>
</table>

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.

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 (Applied Studies Co-op)

A student may combine an Honours German program with Applied Studies Co-op. The requirements in German are identical to the Joint Honours requirements listed below. The Applied Studies requirements are listed on pages 8:12 and 8:13.

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.
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:

a) not more than four term courses may be chosen from courses at the 100 level, and
b) at least two term courses must be chosen from courses above the 200 level.

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 Semester (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 must complete GER 291/292, normally in Year Two.
3. GER 271/272, GER 355, and GER 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 credit weights) must be in History. No more than two term courses may be at the 100 level. History courses must include:
   a) HIST 250 or 300
   b) One of HIST 260, 261, 262, 263
   c) One of HIST 253, 254, 273, 274
   d) One of HIST 255, 256, 257, 258.
3. The 20 term courses in History are usually divided 2:5:5:8 among the four years.
Honours History (Applied Studies Co-op)
A student may combine an Honours History program with Applied Studies Co-op. The requirements in History are identical to the Joint Honours requirements listed below. The Applied Studies requirements are listed on pages 8:12 and 8:13.

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

- Anthropology
- Classical Studies
- Drama
- Economics
- English
- Fine Arts
- French
- Geography
- 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 90% 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’s Undergraduate Officer. They must maintain a 65% average in History courses.

Notes For All Programs
1. CLAS 251 and CLAS 252 will be accepted for credit as term courses in History provided that the student does not have credit for HIST 237 or HIST 238.

Italian

Minor Program
Students enrolled in Honours Programs in Arts or other faculties may elect a Minor in Italian, which requires the successful completion of at least ten term course equivalents with an overall cumulative average of 65% or more in those credits. Students are required to take the following six term courses:

ITAL 101, 102, 191, 192, 251, 252

Four additional term courses must be chosen from any of the following courses:

ITAL 291, 292, 311, 312, 391, 392, 396, 397

Note
Those students with Grade 13 Italian or whose competency in the language excludes them from ITAL 101, 102 must substitute ITAL 291, 292 for this requirement.

Latin

See Classical Studies.
Medieval Studies

Students interested in an interdisciplinary approach to university education and to an examination of the Middle Ages may take either a General or an Honours BA in Medieval Studies. Such a degree is designed to provide a general awareness of our cultural heritage. In addition, the program is flexible enough to prepare students for careers in teaching, or for the pursuance of a graduate degree.

The Medieval Studies program is administered jointly by the English Department at St. Jerome's College (Dr. D. Letson) and by the Department of Classical Studies (Dr. P. Forsyth). 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 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 16 term courses must be from an approved list of Medieval Studies or related courses, including at least two term courses from each 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.


Arts
Medieval Studies
Music

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 8:12 and 8:13.

Music

Three-Year General Music

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

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

2. At least 14 term courses in Music, including MUSIC:
   a) 100, 250, 251;
   b) at least three of 253, 254, 353, 354.

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

In addition, students must demonstrate competence on one instrument (or voice) equal to Grade Ten standing at the Royal Conservatory of Music of Toronto. Normally this is attained through taking Music Studio Courses - MUSIC 266, 267, 366, 367.

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, 250, 251, 253, 254, 353, 354, 370, 371, 490A/B;
   b) 466, 467 or two other 300-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 266, 267, 366, 367.

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
The following Joint Honours programs have already been approved with Music:

- Geography
- German
- Mathematics
- Philosophy
- Psychology
- Recreation and Leisure Studies
- Social Development Studies

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

1. Successful completion of a minimum of 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, 353, 354;
   c) at least three of 250, 251, 370, 371;
   d) nine additional term courses of which at least six must be above the 100 level;
   e) 490A/B or a senior honours essay 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 266, 267, 366, 367.

**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, 250;
   b) eight additional term courses selected in consultation with the Music Department.

2. Participation in at least two terms of Music Ensemble.

**Note For All Programs**

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.

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**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, 241, 242, 243, or 440A/B;
   b) 221;
   c) any two of 380 - 387.

St. Jerome’s Philosophy students must meet the basic requirements as listed above, and their PHIL courses must include:

   a) one of 200J, 140, 145, 241, 242, 243, or 440A/B;
   b) 218J or 221;
   c) any two of 380 - 387.

**Four-Year General Philosophy**

Eligibility for graduation in the Four-year General Philosophy program includes fulfillment of the following requirements:

1. Successful completion of a minimum of 40 term courses including Faculty of Arts Group requirements with an overall cumulative average of at least 60% and a cumulative major average of at least 68%.

2. At least 14 term courses must be in Philosophy, and must include the courses required in the Three-Year General program.

**Honours Philosophy**

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

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

2. At least 20 term courses must be in Philosophy, including PHIL:
   a) one of 241, 242, 243, or 440A/B;
   b) 221, 322, 499A/B;
   c) any four of 380 - 387.
St. Jerome's Philosophy students must meet the basic requirements as listed above, and their PHIL courses must include:

a) one of 241, 242, 243, or 440A/B;
b) 218J or 221;
c) 322;
d) any four of 380 - 387;
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 8:12 and 8:13.

Philosophy Joint Honours Program
A Joint Honours program with Philosophy may be taken in combination with any other discipline in which an Honours program is offered, subject to approval by the Departments concerned. Joint Honours programs have been approved with:

| Economics | Political Science |
| English | Psychology |
| French | Religious Studies |
| German | Russian |
| History | Social Development |
| Latin | Studies |
| Mathematics | Sociology |

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, 241, 242, 243, or 440A/B (depending on program);
   b) 221, 322;
   c) any four of 380 - 387;
   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.

Arts
Philosophy
Political Science

Minor Program in Philosophy
To be eligible for a Minor in Philosophy, students must successfully complete ten term courses in Philosophy that have been approved by the Department.

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 p. 8:32).

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 discipline 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 discipline 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 discipline listed above must be taken. At least four term courses must be taken at the 400 level.

Recommended Program

Year One
P SCI 101/102
Eight other term courses.

Year Two
Six term courses in Political Science (see Note)
Four other term courses.

Year Three
Six term courses in Political Science (see Note)
Four other term courses.

Year Four
Six term courses in Political Science at least four of which must be at the 400 level (see Note)
Four other term courses.

Honours Political Science
(Administrative Studies Option)
Eligibility for graduation in the 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 the Honours Political Science with an Administrative Studies Option, plus the following courses must be taken:
   a) ECON 101, 102, P SCI 260A/B, 331;
   b) one of P SCI 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, Lberoamerican Studies, Legal Studies, Peace and Conflict Studies, Personnel and Administrative 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 average 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.
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 8:12 and 8:13. Students planning to enrol in Honours Political Science (Applied Studies Co-op) should consult the Department's Co-op Officer.

Political Science Joint Honours Program
Students who wish to combine a study of Political Science with a broad training in a related discipline such as Sociology or History, or in fact in any other discipline in which they are interested, can do so in a Joint Honours program.
Joint Honours programs have been approved between Political Science and:
- Anthropology
- French
- Drama
- Geography
- Economics
- History
- English
- Philosophy
- Environment and
- Psychology
- Resource Studies
- Sociology

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 discipline as defined above. Two term courses must be at the 400 level.

Recommened Program

Year One
P SCI 101/102
Two introductory term courses in the other discipline.
Six other term courses.

Year Two
Four term courses in P SCI (see Note)
Four term courses in the other discipline.
Four other term courses.

Year Three
Four term courses in P SCI (see Note)
Four term courses in the other discipline.
Four other term courses.

Arts
Political Science
Psychology

Year Four
Four term courses in P SCI, at least two of which must be at the 400 level (see Note)
Four term courses in the other discipline.
Four other term courses.

Minor Program
Any student in an Honours program may qualify for a Minor in Political Science by completing ten term courses in Political Science before graduation with a cumulative average of 65% or better. Courses must be selected to meet the following requirements:

a) at least one term course in each of three different fields of the discipline;
b) 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 P SCI 291 or 292 to meet program requirements.

Psychology

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

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

2. At least ten term courses must be in Psychology, including PSYCH:
   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, 341.
   f) five electives in PSYCH.

Four-Year General Psychology
The purpose of this program is to enable Honours Psychology students who do not wish to complete their Honours Thesis in Psychology, or who are below the 75% average requirement in Psychology to enter their fourth year of study or to graduate in Honours Psychology, to receive recognition for their four years of study.

Students in Honours Psychology who have completed 12 term courses in Psychology, have met Honours requirements 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 which is normally expected for admission to graduate programs in Psychology. Also, students may not combine this program with Honours or Minors in another discipline, with Co-op or Applied Studies, or with certain Options.

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

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

2. At least 16 term courses must be in Psychology, including PSYCH:
   a) 101;
   b) 291, 292, 391 (check overlapping courses on pg. 6:7 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) two Honours Seminars in PSYCH;  
   h) four PSYCH electives.

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>
</tr>
</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>
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<tr>
<th>Year Two</th>
</tr>
</thead>
<tbody>
<tr>
<td>PSYCH 291/292</td>
</tr>
<tr>
<td>One Natural Science Course.</td>
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<tr>
<td>One Social Science Course.</td>
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<tr>
<td>Six additional term courses</td>
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<tr>
<th>Year Three</th>
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<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>
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<tr>
<td>Four additional term courses</td>
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</tbody>
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<tr>
<th>Year Four</th>
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</thead>
<tbody>
<tr>
<td>PSYCH 499A/B.</td>
</tr>
<tr>
<td>One Honours Seminar in PSYCH.</td>
</tr>
<tr>
<td>Three PSYCH electives</td>
</tr>
<tr>
<td>Four additional term courses.</td>
</tr>
</tbody>
</table>
Honours Psychology (Applied Studies Co-op)
A student may combine an Honours Psychology program with Applied Studies Co-op. Students must complete the Honours Psychology requirements a-g, two PSYCH electives, and PSYCH 499A/B. Please refer to the Honours Psychology section for application information. The Applied Studies requirements are listed on pages 8:12 and 8:13.

Honours Psychology Co-operative Program
The Department of Psychology offers a Co-operative Honours program in Psychology, in which academic studies are combined with relevant work experience. 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.

The Co-op program consists of six academic terms beyond the first year, and four paid work terms. Each work term is of four months duration. The program requirements are the same as listed for the Honours Psychology program. Additionally, 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.

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.

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

- Anthropology
- Classical Studies
- Dance
- Drama
- Economics
- English
- Environment and Resource Studies
- Fine Arts
- French
- Geography
- German
- History
- Kinesiology
- Mathematics
- Music
- Philosophy
- Political Science
- Recreation
- Religious Studies
- Russian
- Social Development
- Studies
- Sociology
- Spanish
- Statistics

Please refer to the Honours Psychology section for application information.

Eligibility for graduation in the Joint Honours Psychology program requires successful completion of a minimum of 44 term courses including the Faculty of Arts Group requirements with a cumulative overall average of at least 60%, and a minimum cumulative Psychology average of 75%. 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 must complete the Honours Psychology requirements a-g, two PSYCH electives, plus an Honours thesis in either program (in Psychology - PSYCH 499A/B). Students are advised that unless they elect to do their Honours Thesis in Psychology, their Psychology component would not be equivalent to the Honours program normally expected for admission to graduate programs in Psychology. If both majors require research methods and statistics courses, consult the list of overlapping courses on p. 8.7 and the undergraduate secretary.

Early Childhood Education and Care Programs
The Department of Psychology offers both a Four-Year General and an Honours program with the Early Childhood Education and Care Option. At the end of both programs, students will have completed all of the formal university training required by the Association of Early Childhood Education (Ontario), and the Ministry of Community and Social Services for working in a preschool and day care setting. The other principal requirement for the Early Childhood Education Certificate is one year of full-time teaching experience in the Ontario preschool setting. Interested persons are encouraged to consult the program handbook available from the Undergraduate Secretary before preregistering for second year. This brochure will assist you in making your decision between the General and Honours programs.

Students may apply to the Early Childhood Education and Care Option during the second term of Year Two, to begin the program in Year Three (Sept. entrance only). Application forms and program handbooks may be obtained from the Undergraduate Secretary. Applications are accepted from the start of the March preregistration period until March 31st. Applicants must have some previous work experience with children. An interview with the Director of the Early Childhood Education Centre is also required. Applicants will be contacted before the end of the Winter term to arrange an appointment time.

Students in General Psychology must have successfully completed PSYCH 101, 200, 203, 207, 211, 212, 213, have achieved a minimum cumulative Psychology average of 65% and a minimum cumulative overall average of 60% to be considered for admission to the Four-Year General Psychology/Early Childhood Education and Care Option program.
Students in Honours Psychology must have successfully completed PSYCH 101, 203, or 207, 211, 212, 213, 291, 292, have achieved a minimum cumulative Psychology average of 75%, and a minimum cumulative overall average of 60% to be considered for admission to the Honours Psychology/Early Childhood Education and Care Option program.

Owing to resource limitations, some students who meet the minimal requirements for admission may not be accepted into the program. Applicants will be notified of our admission decision once grades are available for the Winter term.

Four-Year General Psychology with Early Childhood Education and Care Option

Eligibility for graduation in the General Psychology program with the Early Childhood Education and Care Option 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%, a cumulative Psychology average of at least 65%, and at least a B grade in each of PSYCH 322A/B, 325A/B, 341, 422A/B, and 425A/B.


DANCE 264B is also required.

It is further recommended that students take at least two undergraduate seminars or special topics courses (300 or 400 level) in child psychology, from their PSYCH elective choices.

Honours Psychology with Early Childhood Education and Care Option

Eligibility for graduation in the Honours Psychology program with the Early Childhood Education and Care Option 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 75%, a cumulative Psychology average of at least 75%, and at least a B grade in each of PSYCH 322A/B, 325A/B, 341, 422A/B and 423A/B.

2. Students must complete 22 term courses in Psychology including PSYCH:
   b) 203 or 207;
   c) 499A/B.

DANCE 264B is also required.

In addition, it is recommended that students take at least one additional seminar or special topics course (300 or 400 level) in child psychology.

Honours Psychology with a BSc Degree

An Honours Psychology degree program is also available in the Faculty of Science on both a Regular and Co-operative basis. See Chapter 14.

Minor Program in Psychology

Students choosing a Minor program in Psychology must successfully complete ten term courses 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, 341;

f) five PSYCH electives.

A minimum cumulative Psychology average of at least 65% is required.

Religious Studies

Purpose of the Program in Religious Studies:

a) 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;

b) 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.

c) 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 fulfilment 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 General Religious Studies program includes fulfilment 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 fulfilment 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 8:12 and 8:13.

Arts
Religious Studies
Russian and Slavic Studies

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

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

The requirements in Joint Honours programs are the same as the Honours program, except the overall number of Religious Studies courses is 14 instead of 20. The RS 490 requirement 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
Requirements:
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 Literatures offers the following programs in Russian and Slavic Studies:

- Three-Year General Program in Russian
- Honours Program in Russian
- Honours Program in Slavic Studies
- Honours Slavic Studies (Applied Studies Co-op)
- Joint Honours Program with Russian
- Minor Program in Russian

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 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 and Polish.

**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 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 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:

a) not more than four term courses may be chosen from courses at the 100 level, and
b) 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 16.75.

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**Social Development Studies**
Social Development Studies, administered by Renison College, is an integrated multidisciplinary program providing a liberal education with concentration in certain pure and applied social sciences. The interrelated courses of this Major are used to help the student 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 the Departments of the University, Renison or the other Colleges to serve 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 a number of local agencies. Through this volunteer work students are given an opportunity to increase the experience which they can bring to their studies and to test and apply their theoretical understanding in practical settings. In the case of those following the Diploma in Social Work, a program co-ordinator assists the students and the agencies to fulfill placement expectations.

The Social Development Studies program stands as a sound liberal and general education; however, it also provides an excellent background for further study in
Social Work, Education, Religion, the Ministry, Journalism, and for work in various helping professions, community organizations, communications and international service organizations.

**Major Courses**
Listed below are courses from the four subject areas which combine in the Social Development Studies Major.

<table>
<thead>
<tr>
<th>Interdisciplinary</th>
<th>Social Work</th>
<th>Sociology</th>
<th>Psychology</th>
</tr>
</thead>
<tbody>
<tr>
<td>ISS 131R</td>
<td>SOCWK 120R</td>
<td>SOC 120R</td>
<td>PSYCH 120R</td>
</tr>
<tr>
<td>150R</td>
<td>121R</td>
<td>121R</td>
<td></td>
</tr>
<tr>
<td>ISS 220R</td>
<td>SOCWK 220R</td>
<td>SOC 220R</td>
<td>PSYCH 220R</td>
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<td>231R</td>
<td>221R</td>
<td>221R</td>
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<tr>
<td>240R</td>
<td>222R</td>
<td>223</td>
<td></td>
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<tr>
<td>250R</td>
<td>230R</td>
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<tr>
<td>251R</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ISS 320R</td>
<td>SOCWK 320R</td>
<td>SOC 327R</td>
<td>PSYCH 322R</td>
</tr>
<tr>
<td>350(A-L)</td>
<td>321R</td>
<td>328R</td>
<td>323R</td>
</tr>
<tr>
<td>398R</td>
<td>322R</td>
<td>367R</td>
<td>334(R)</td>
</tr>
<tr>
<td>399R</td>
<td>326R</td>
<td>368R</td>
<td>369R</td>
</tr>
<tr>
<td>499A/B</td>
<td>350(A-L)</td>
<td>369R</td>
<td>398R</td>
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<tr>
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<td>355R</td>
<td>398R</td>
<td>399R</td>
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<td></td>
<td>356R</td>
<td>399R</td>
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<td>357R</td>
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<td>365R</td>
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<td>367R</td>
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<tr>
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<td>390A/B</td>
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<td>398R</td>
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<td>399R</td>
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</tbody>
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**General Social Development Studies**
Eligibility for graduation in the General Social Development 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 the Major with the following stipulations:
   a) in the first year students must register in the Fall term for SOCWK 120R, PSYCH 120R, and ISS 150R. In the Winter term which follows, students must register in SOC 120R, ISS 131R and PSYCH 121R.
   b) in the second year, all students are required to take ISS 250R and 251R.
   c) at least four term course equivalents from the Major must be completed in the second and third years.
   d) the 14 term course equivalents must be distributed over the four subject areas in the Major with a maximum of six term course equivalents within a single area counting towards the requirement.

**Arts**
Social Development Studies

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

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

2. At least 18 term course equivalents must be from the Major.

The normal sequence of courses is:

**Year One**
ISS 131R, 150R
PSYCH 120R, 121R
SOC 120R
SOCWK 120R.

**Year Two**
ISS 220R, 251R
At least two of:
ISS 220R, 231R, PSYCH 220R, 221R
SOCWK 220R, 221R, 222R
SOC 220R, 223R.

**Year Three**
ISS 320R, SOCWK 326R
At least two of:
PSYCH 322R, 323R
SOCWK 320R, 321R, 322R
SOC 327R, 328R, 368R, 369R

**Year Four**
ISS 499A/B

3. An additional eight term courses must be taken to explore a multidisciplinary theme area that has been selected in consideration of the students' own needs and plans. In consultation with Renison's Undergraduate Officer, courses are chosen which will explore a topic in depth.

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

<table>
<thead>
<tr>
<th>English</th>
<th>Recreation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Music</td>
<td>Religious Studies</td>
</tr>
<tr>
<td>Philosophy</td>
<td>Sociology</td>
</tr>
<tr>
<td>Psychology</td>
<td></td>
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</tbody>
</table>

Eligibility for graduation in the Social Development Studies Joint Honours program typically includes fulfillment of the following requirements (variations may occur depending on the other discipline being considered):
1. Successful completion 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 Social Development Studies including:
   a) four term courses from ISS 131R, ISS 150R, PSYCH 120R, SOC 120R, SOC WK 120R;
   b) ISS 250R, 251R (Methodology);
   c) ISS 320R, plus five term course equivalents beyond the first-year level;
   d) ISS 499A/B (Senior Honours Essay).

   The equivalent courses to ISS 250R/251R and ISS 499A/B may be taken in the other discipline, subject to approval by both departments. If such replacement occurs, sufficient Social Development Studies electives must be taken to meet the 14 term course minimum requirement.

3. In addition to the courses taken to fulfill the requirements for the Major areas in Social Development Studies and the second discipline, at least six term courses relating to a chosen theme area must be completed (see number 3 under Honours program).

Course selection for a Joint Honours program with Social Development Studies should only be made after consultation with Renison’s Undergraduate Officer.

The Social Work Stream
Within the Social Development Studies program, the College has developed a stream to meet the particular needs of 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, the College’s requirements for the Major and in addition include a range of courses particularly appropriate to the needs of such students (see details in Renison College calendar). Course selection should be made in consultation with Renison’s Undergraduate Officer.

Diploma in Social Work
Students following the Social Work Stream within the Social Development Studies program may additionally apply at the end of Year One for admission to the Diploma in Social Work administered by the College. To qualify for the diploma, students must successfully complete 400 hours of supervised and evaluated field placement, attend seminars of the College, and in their final year write an essay synthesizing their field work with their studies.

Minor Program
A Minor in Social Development Studies consists of ten term courses which have been approved for the Major.

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 all Minors in Social Development Studies:
   a) ISS 131R, ISS 150R, SOC WK 120R;
   b) 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.

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

General Sociology
Eligibility for graduation in the General Sociology 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 Sociology, including SOC:
   a) 101 (introductory course); 321 (sociological methods course);
   b) one of 305, 405, 406 (sociological theory);
   Students are strongly encouraged to select SOC 280, although this is not required.

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:
   a) 101, 280, 321, 322, 405, 406, 499A/B.

**Recommended Program**

<table>
<thead>
<tr>
<th>Year One</th>
<th></th>
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</thead>
<tbody>
<tr>
<td>SOC 101</td>
<td></td>
</tr>
<tr>
<td>One other term course in Sociology.</td>
<td></td>
</tr>
<tr>
<td>Eight term course equivalent electives.</td>
<td></td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Year Two</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>SOC 280</td>
<td></td>
</tr>
<tr>
<td>Four term courses in Sociology.</td>
<td></td>
</tr>
<tr>
<td>Five term course equivalent electives.</td>
<td></td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Year Three</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>SOC 321, 322</td>
<td></td>
</tr>
<tr>
<td>Four term courses in Sociology.</td>
<td></td>
</tr>
<tr>
<td>Four term course equivalent electives.</td>
<td></td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Year Four</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>SOC 405/406</td>
<td></td>
</tr>
<tr>
<td>SOC 499A/B</td>
<td></td>
</tr>
<tr>
<td>Two term courses in Sociology.</td>
<td></td>
</tr>
<tr>
<td>Four term course equivalent electives.</td>
<td></td>
</tr>
</tbody>
</table>

**Honours Sociology Co-operative Program**
The Department of Sociology is a participating Department in the Co-operative program in the Behavioural Sciences. This is an Honours program into which students may be admitted at the start of the winter term of their second year. Students interested in applying for admission to this program should consult with the Department’s Co-op advisor sometime in their first year so that they may select their courses to maximum advantage.

**Honours Sociology (Applied Studies Co-op)**
A student may combine an Honours Sociology program with Applied Studies Co-op. The requirements in Sociology are identical to the Honours requirements listed above except only 16 term courses in Sociology are required. The Applied Studies requirements are listed on pages 8:12 and 8:13.

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

<table>
<thead>
<tr>
<th>Anthropology</th>
<th>Political Science</th>
</tr>
</thead>
<tbody>
<tr>
<td>Economics</td>
<td>Psychology</td>
</tr>
<tr>
<td>English</td>
<td>Recreation and Leisure</td>
</tr>
<tr>
<td>French</td>
<td>Studies</td>
</tr>
<tr>
<td>Geography</td>
<td>Social Development</td>
</tr>
<tr>
<td>History</td>
<td>Studies</td>
</tr>
<tr>
<td>Mathematics</td>
<td>Spanish</td>
</tr>
<tr>
<td>Philosophy</td>
<td></td>
</tr>
</tbody>
</table>

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 (405, 406);
   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.

**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;
   b) two term courses are Survey of Spanish Literature;
   c) two term courses are Survey of Spanish American Literature;
   d) one term course in Golden Age.

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

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

2. At least 20 term courses must be in Spanish, and ten of these 20 term courses must be in courses as outlined above under the Four-Year General program.

Recommended Program

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

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

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

Year Four
A minimum of six term courses in Spanish. Four additional term courses.

Honours Spanish (Applied Studies Co-op)
A student may combine an Honours Spanish program with Applied Studies Co-op. The requirements in Spanish are identical to the Joint Honours requirements listed below. The Applied Studies requirements are listed on pages 8:12 and 8:13.

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>

Other combinations must be approved on an individual basis with the departments concerned.

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

1. Successful completion of a minimum of 44 term courses including Faculty of Arts Group requirements with an overall cumulative average of at least 60% and a cumulative major average of at least 75%.

2. At least 16 term courses must be in Spanish, and ten of these ‘6 term courses must be in courses as outlined above under the Four-Year General program.

Recommended Program

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

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

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

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

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

Notes For All Programs
1. By agreement, students at the University of Waterloo and Wilfrid Laurier University can be expected to take courses in Spanish at either university. While most language courses are taught
concurrently every year at both universities, most other courses are taught either at one university or the other, and a few courses may rotate from year to year.

2. With the permission of the Department, students may spend the third year enrolled in an acceptable university in Spain or Spanish America.

3. Students in Years Three and Four must have the permission of the home department to enrol in Spanish courses at the 100 or 200 level.
Faculty of Engineering
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.

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.

Engineering

The Co-operative Engineering Program

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 7-10.

Electrical Engineering and Systems Design Engineering students start in September with four months of school (Stream 4) before going out on the first work term in January. Computer Engineering 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, 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 one of the five specific course requirements 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 Ontario Grade 13 or Ontario Academic Course Mathematics and Science or their equivalent. The University has developed special pre-university physics and chemistry courses which can be taken by correspondence and which are recommended for Adult Students. To discuss admissibility and appropriate qualifying work applicants are advised to contact the Director of Admissions for the Faculty of Engineering.
Admission to Advanced Standing
Because of 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.

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.
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.
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, which may be reviewed by the Engineering Faculty Council. 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. Such students must satisfy the Faculty, before the beginning of the second succeeding academic term in the student’s program, that their knowledge in these courses is sufficient. This may be done through one of the following, subject to the approval of the department in which the student is enrolled:
   a) A department may permit, at its discretion, a re-examination of certain of its courses in which the student received a grade of less than 50%, by either oral or written examination. Such re-examination will not affect the student’s term average. There is a non-refundable re-examination fee of $25.00 for each such examination.
   b) The student may repeat those courses in which a grade of less than 50% was received and must achieve a grade of more than 50% in each such course. These grades will not affect the student’s term average.
   c) The student may enrol in and take other courses as required by the Faculty or Department which may be equivalent to or replacements of the failed courses. The student must achieve a grade of at least 50% in each such course. These grades will not affect the student’s term average.
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 normally 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 1A ONLY, students may Proceed on Probation if they achieve a term average of 50% or better with no more than two courses having a grade of less than 50%. If this is not the case, all other conditions apply.

8. A student may withdraw voluntarily from the program at any time prior to 4 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 Associate Chairman of the department. 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 General 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 - Aeogrotat. 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>Grade</th>
<th>Numerical Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>A+</td>
<td>95</td>
</tr>
<tr>
<td>A</td>
<td>89</td>
</tr>
<tr>
<td>A−</td>
<td>83</td>
</tr>
<tr>
<td>B+</td>
<td>78</td>
</tr>
<tr>
<td>B</td>
<td>75</td>
</tr>
<tr>
<td>B−</td>
<td>72</td>
</tr>
<tr>
<td>C+</td>
<td>68</td>
</tr>
<tr>
<td>C</td>
<td>65</td>
</tr>
<tr>
<td>C−</td>
<td>62</td>
</tr>
<tr>
<td>D+</td>
<td>58</td>
</tr>
<tr>
<td>D</td>
<td>55</td>
</tr>
<tr>
<td>D−</td>
<td>52</td>
</tr>
<tr>
<td>F+</td>
<td>46</td>
</tr>
<tr>
<td>F</td>
<td>38</td>
</tr>
<tr>
<td>F−</td>
<td>32</td>
</tr>
</tbody>
</table>

15. Students who have reason to believe that a grade, term average, or academic decision is incorrect or unjust may launch an Appeal. Reasons in support of the appeal including medical certificates and similar documents must be submitted with the appeal. All appeals should be addressed to the Chairman of the Engineering Examinations and Promotions Committee, Registrar’s Office, University of Waterloo. Appeals should be received prior to four weeks after the date of issue of the marks for the term in order to facilitate entry into the immediately following term if so desired by the student. Appeals which are launched later than six months after the end of the term being appealed will not be considered.

16. 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.

17. 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).

English Language Proficiency Requirements
All students with an initial registration in the Faculty of Engineering in the Fall 1986 term or later must satisfy the English Language Proficiency Requirement before graduation. This requirement may be satisfied by writing and obtaining a grade of 60% or better in the English Language Proficiency Examination (ELPE). Students who obtain a grade of less than 50% in the ELPE must attend the Writing Clinic.

Students who have not obtained a grade of at least 60% in the ELPE by the beginning of the 2A term, must satisfy the Proficiency Requirement by taking an approved English course and obtaining a grade of 60% (C−), or better. The list of approved courses is maintained by the Director of General Studies of the Faculty of Engineering. (The current list includes the following English courses; ENGL 109, 129R, 150, 210A and 210C). 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.

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 4 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 are considered unacceptable.

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 with an "NCR" designation on any work report will not be promoted until they have cleared this condition. (See booklet titled Regulations & Procedures for Co-operative Programs.)

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, must, in the normal case, be in the top 5% of the class, and must, normally, attain a term average of at least 85%. This designation will be reflected on the student's mark report and official university transcript.

Students with outstanding records throughout their undergraduate careers in Engineering will "Graduate on the Dean's Honours List" if their overall cumulative average for the last six terms of the program is at least 85% and if they have completed at least two work-term reports which have been graded as "Outstanding". 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.

General Studies Requirements, Options, and Electives for Engineering Students

Each of the Engineering undergraduate programs consists of the compulsory core program and elective courses, both of which are described below:

1. The compulsory core program within the Department prepares the student for practice in that particular branch of engineering and comprises 70 to 80 percent of the course load.

2. Elective courses comprise 10 to 20 percent of the course load. Of these elective courses a minimum of five must be chosen from subjects outside engineering, the physical sciences and mathematics. This GENERAL STUDIES requirement gives students some breadth of studies related to their role as educated professionals in society. (See General Studies Requirement section of this chapter).

Engineering
General Studies Requirements, Options, and Electives for Engineering Students

In the elective courses, students with special interest may, with the approval of their department Associate Chairman, 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.

3. The remaining elective courses are usually chosen from engineering departmental courses which give some depth in a particular technical discipline appropriate to a student's branch of engineering. (See engineering departmental program descriptions for listings of suggested elective course groupings of this type.)

4. 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 they are:

a) Option in Mathematics (Faculty Option)
b) Option in Physics (Faculty Option)
c) Option in Computer Engineering (Faculty Option)
d) Option in Statistics (Faculty Option)
e) Management Sciences Option (Faculty Option)
f) Society, Technology and Values Option (University Option)

Because Designated Options can require up to eight courses, it may be necessary for students in some departments 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 Chairman must be obtained.

For a designation to appear on the transcript a student must achieve an average of 60% on the Option courses and a grade of 50% on each of the courses in the option. (Details follow later in this section.)

5. Many departments of the University offer "MINORS" in their discipline. 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, courses in a Minor can often be used to satisfy some of the requirements of the technical elective or general studies course groups. Successful completion of a Minor will not appear on the diploma but will appear on the transcript.

6. 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 General 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 Departmental Associate Chairman or the Director of General Studies for Engineering, and the Associate Dean of the Faculty of Arts for Undergraduate Affairs.

7. 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 receive academic credit towards their program requirements. Such exchanges are currently active with the L'Université de Technologie de Compiègne, Technische Universität Braunschweig, the New South Wales Institute of Technology, and the New University of Ulster.

**GENERAL STUDIES REQUIREMENTS**

The requirement that a minimum of five courses must be chosen from outside the engineering, physical sciences and mathematics disciplines can be met by either developing a self-planned grouping of courses or by following a pre-scheduled and recommended course grouping.

**a) Self-Planned General Studies**

A student may plan an individual general studies grouping provided it meets these criteria:

1. It should consist of five courses which are clearly non-engineering, mathematics or other closely related subjects.
2. It should include courses beyond the introductory level.
3. It is chosen from a University-wide master list of courses approved for engineering students. (Department Undergraduate Associate Chairmen have the list.)
4. The choice of courses is approved by the Associate Chairman of the student's department.

With the university-wide master list, Department Associate Chairmen have groupings of suggested courses which concentrate on discipline areas such as French, Environmental Studies, History, etc. However these groupings are not pre-scheduled and students who plan their own option package may have considerable difficulty with timetable conflicts.

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

**b) 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 as not to 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 the advanced level. A student's program must include at least two courses beyond the introductory level.

In the following,

(i) Indicates introductory level. F - Fall, W - Winter, S - Spring.

(P) Indicates courses which will be scheduled into 11:30-12:30 MWF, 7:00-10:00M or 7:00-10:00T.

The choices are:

**Social Sciences-based Courses**

(P) Economics: (I) ECON 101(F,W,S); ECON 201(F,W,S)

(P) Management: (I) M SCI 211(F,W,S); M SCI 311(F,W); M SCI 481(F,W); GEN E 352(W)

(P) Political Science: (I) POL SCI 102M(W,S); P SCI 260A(F); P SCI 260B(W,S)

(P) Psychology: (I) PSYCH 101(F,S,W); PSYCH 253(F,W)

(P) Sociology: (I) SOC 101(F,W); SOC 265(F,W)

**Humanities-based Courses**

(P) English (I) ENGL 105A(F,W,S); ENGL 214(F,W,S)

(P) French (I) FR 195(F); (I) FR 196(W); FR 275(F); FR 232(W,S); FR 253(W,S)

(P) History: (I) HIST 130(F,W,S); HIST 253(F); HIST 254(W,S)

(P) Philosophy: (I) PHIL 200A(F,S); PHIL 200B(W); PHIL 300X(W); PHIL 315(W)(Cross-listed as GEN E 412)

General Engineering: GEN E 351(W); 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 Department Associate Chairman for the approved list.

**c) Other Pre-scheduled General Studies Groupings**

Other groupings which would be scheduled conflict-free are being considered in areas such as Health and Bio-medical Studies, Business Studies and Environmental Studies. Interested
students are advised to check with their department Associate Chairman.

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 have their choice. Changes at the beginning of a term are likely to cause conflicts and thus 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

a) 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 Calculus 2 (or equivalent)
- MATH 212 Advanced Calculus (or equivalent)
- MATH 234A Linear Algebra 2
- MATH 234B Abstract Algebra 1
- EL E 316 Probability and Statistics (or equivalent)
- PMATH 331 Real Variables or MATH 332B Complex Variables

A student must additionally take two courses from the following, subject to availability and timetable constraints.
- PMATH 334 Abstract Algebra 2
- PMATH 340 Elementary Number Theory
- PMATH 360 Geometry
- PMATH 365 Differential Geometry and Tensor Analysis
- PMATH 367 Set Theory and General Topology
- AM/PMATH 380A Introduction to Information Theory
- AM/PMATH 380B Information Theory with Applications
- PMATH 430A Introduction to Mathematical Logic
- PMATH 430B Introduction to Mathematical Logic

b) 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 263 Classical Mechanics and Special Relativity
- PHYS 354 Atomic and Molecular Physics
- M E 250 Thermodynamics (or equivalent) of PHYS 358

A student must additionally take three electives from Group A or three electives from Group B, subject to availability and timetables constraints.

Group A
- PHYS 259 Crystallography & X-Ray Diffraction
- PHYS 359 Statistical Mechanics
- PHYS 364 Mathematical Physics 1
- PHYS 365 Mathematical Physics 2
- PHYS 434 Introductory Quantum Mechanics
- PHYS 435 Solid State Physics
- PHYS 442 Structure of Solids
- PHYS 443 Continuum Mechanics
- PHYS 455 Nuclear & Particle Physics

Group B
- PHYS 350 Astrophysics 1
- PHYS 364 Mathematical Physics 1
- PHYS 365 Mathematical Physics 2
- AM 372 Introduction to General Relativity
- PHYS 445 Modern Optics
- PHYS 449 Radio Astronomy
- PHYS 451 Astrophysics 4
The list of courses in Groups A and B will be subject to change from time to time. For further information, contact Professor S.K. Chaudhuri, Department of Electrical Engineering.

c) 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 Engineering and Systems Design sections of this calendar.

d) 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.

- 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 333)
- STAT 335 Statistical Process Control
- STAT 430 Experimental Design

A student must take three (3) 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 411 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 & 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 Process
- M E 448 Production Engineering or M SCI 432 Introduction to Production Management

- M SCI 452 Behavioural Decision Analysis
- SY DE 372 Pattern Recognition
- SY DE 433 Conflict Analysis

Of the seven courses, five must be taken outside the student’s home department. For further information contact the Associate Chairman (Undergraduate), Department of Statistics and Actuarial Sciences, Prof. R.J. MacKay.

e) 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 general studies courses. The option is available in all engineering programs except Geological Engineering. 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 I
  - M SCI 331 Operations Research I
  - *M SCI 211 Organizational Behaviour I (General Studies Course)

  plus three of the following or equivalent:

  - *M SCI 311 Organizational Behaviour II (General Studies Course)
  - M SCI 431 Operations in Research II
  - M SCI 432 Introduction to Production
  - M SCI 452 Behavioural Decision Analysis
  - *M SCI 461 Managerial and Engineering Economics II (General Studies Course)

  * These courses count toward General Studies requirements.

For further information see the Management Sciences section in this chapter of the calendar or contact the Associate Chairman of the Management Sciences Department.

f) Option in Society, Technology and Values
(This is a University Option, open to all students at UW)

What impact do modern technologies have on society’s well-being? How can we guide technology so that it contributes to human betterment? What values should shape the direction and pace of technological change?

These and other crucial questions are explored in the UW undergraduate option in Society, Technology and Values (STV). The option provides students with an opportunity to examine a wide range of issues centering on the human context of science and technology.
The option consists of six courses:

STV 100  Society, Technology and Values, Introduction
STV 200  Project Course
STV 400  Senior Project

plus: three theme area courses taken after STV 100. Theme packages are regular offerings of various UW departments. Theme areas currently available are:
- Value and Ethics
- Technological Issues in War and Peace
- History of Technology
- Impact Assessment Studies
- Economic and Management Issues (The Engineering core course on Engineering Economics is part of this package.)
- Technology and Artistic Expression

For example, a theme area grouping for engineers could be:
1. The core course in Engineering Economics.
2. GEN E 351 Information Technology and Society.
3. GEN E 412 (Cross-listed as PHIL 315) Ethics and the Engineering Profession.

A complete list of courses in theme areas and other information is available from the Centre for Society, Technology and Values (E.S.1, Rm.301, UW, ext. 8215) or contact the Director of General Studies, Faculty of Engineering in the Associate Dean's Office. The three required courses in this option are scheduled so as not to conflict with engineering core courses. Students who take this option will meet the General Studies requirement of their program, subject to the approval of the departmental Associate Chairman.

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.

II. 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 contrast 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:

A) 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:
1. 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;
2. the graduate program must include at least four (graduate) courses and a thesis, or eight courses and a MASC project.
3. the Co-operative work-term requirements of the BASc program must be met.

B) There must be complete freedom of transferability from the combined programs to the regular programs.

C) 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.

D) The culmination of the combined program is the Master’s degree; this may be attained either through the completion of a Master’s degree project or research thesis.

E) A combined program normally functions on the Co-operative basis.

F) 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.

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**Combined Bachelor’s - Master’s Program In Engineering**

**I. INTRODUCTION**

The Faculty of Engineering offers a combined Bachelor’s - Masters’ 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.
III. ORGANIZATIONAL STRUCTURE FOR THE COMBINED BACHELOR'S - MASTER'S PROGRAM

A) 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.

1. 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 Chairman for Undergraduate and Graduate Studies.

B) Course Programs
The courses chosen by the student (with the advice of the Supervisor and approval of the Associate Chairman) 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 (2 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 3 courses in each of the 5A and 5B terms (with the advice of the Supervisor and approval of the Associate Chairman).

C) Co-operative Work Terms
The combined Bachelor's - Master's program includes two work terms. These may take two forms:

1. "Special" Off-Campus Work Terms
   It is expected that most of the students proceeding to the MAsc degree by course work and project will be involved in off-campus work terms. Because of the calibre of these students it should be possible to make special arrangements for significant projects to be completed in these terms, so that they form a coherent pair, and that the students have special supervision in industry. The "work reports" generated on the "special" work terms will form the basis for the MAsc project report. The Faculty Supervisor will be expected to maintain liaison with the off-campus organization in which the student works during these terms.

2. "Special" On-Campus Work Terms
   It is expected that most of the students proceeding to the MAsc degree with a research thesis will be involved in on-campus work terms. During these work terms they will not be registered students; they may be hired as associate researchers for the purposes of various research grants, without the restriction of student salaries. They may also work as teaching assistants during these terms. This combination can be attractive from the various points of view of available research time, income generation for the student, total research cost from a grant and effective teaching assistantships.

D) 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.

E) 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.

F) 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.

G) Withdrawal or Failure
Students may remain in the combined Bachelor's - Master's program provided they maintain sufficiently high academic standards. The minimum is a cumulative B average (73% to the end of 4B, 70% thereafter).

A student who fails to maintain this standard will be required to withdraw from the combined degree program. In such a case, all courses taken up to the end of 4B, including those originally intended to fulfill part of the Master's degree requirements, will be counted towards the Bachelor's degree program and marks therefrom included in the 4A and 4B averages as appropriate. Should the student have then satisfied the requirements for the BAsc degree, it will be granted at the next convocation. Such a student will not be permitted to enter the regular MAsc program.
If a student does maintain at least the minimum standard mentioned above, but decides to withdraw voluntarily from the combined Bachelor's - Master's program, the 4A and 4B results will be calculated including the courses originally intended to fulfill part of the Master's degree requirements, and if the requirements for the Bachelor's degree are then satisfied, the BASc will be granted at the next Convocation. Such a student will be allowed, at a later date, to enter the regular MASc program, but the graduate courses taken in the final undergraduate year may not be applied to the Master's degree.

Year One Engineering Programs

All students enrolling in Year One are required to choose one of the following programs:

a) Chemical Engineering
b) Civil Engineering
c) Computer Engineering
d) Electrical Engineering
e) Geological Engineering
f) Mechanical Engineering

g) Systems Design Engineering

Students enrolling in a Year One Engineering program (other than Chemical and Systems Design) must register in the courses indicated in the following table:

(Course descriptions can be found in Chapter 16).

**Term 1A**
- MATH 110A
- MATH 114
- CH E 102
- PHYS 115
- GEN E 115

**Term 1B**
- MATH 110B
- PHYS 125
- GEN E 121
- GEN E 123*  

One technical option from the following:
- CIV E 126
- EL E 126
- GEO E 126
- M E 126

One General Studies elective (to be chosen from the list of recommended courses which will be published each year)

*Computer Engineering students and Electrical Engineering students must take EL E 123 in lieu of GEN E 123.

*Mechanical Engineering students must take GEN E 124 in lieu of GEN E 123.

Students enrolling in Chemical Engineering register for the same courses as above except in the 1A term they take CH E 100 in lieu of GEN E 115, and CH E 101 in lieu of the technical option in the 1B term.

Engineering

Year One Programs
Chemical Engineering

Transfer between programs is possible. Interested students should consult with the staff of the Engineering section of the Registrar's Office.

Chemical Engineering

This is an Honours Co-op program that prepares Professional Engineers for technical and leadership roles in industries or agencies which design, manufacture, use or regulate processes that transform chemical or biological materials for the benefit of society.

Technical preparation is provided by training and education in the application of knowledge and the scientific method to the analysis and solution of progressively more difficult problems, culminating in the design of a unique integrated processing system and further study in one of the several core areas represented by Faculty members in or adjunct to the Department.

A large number of courses in Chemistry, Biochemistry, Physics and Mathematics provide the foundation for the general and theoretical principles required in subsequent Chemical Engineering courses. The significant number of General Studies Electives develops the sensitivity, perspective, social concern and communication skills expected of those who aspire to professional status in the community of man.

Courses in economics, statistics, optimization and the science of management strengthen the graduates' capabilities for rational application of the fundamentals of science, engineering and design.

The Department expects that this program, diligently pursued, will convocate a proud graduate confidently qualified to enter the Engineering profession, to proceed to further professional training in Business, Government, Education, Medicine or Law, or to continue the pursuit of engineering science in a graduate program within this Department or elsewhere.

AREAS OF SPECIALIZATION

Transport Processes
Of basic concern in Chemical Engineering is the design of equipment which contact, separate or deliver materials, energy and components of chemical systems for the transformation process.

Mathematical Analysis and Control
To understand complex systems and to develop consistent reliable processing plants, mathematical analysis, simulation and the use of computers are continuously evolving as sophisticated and integrated components in design.
Reaction Processes
At the heart of Chemical Engineering is the chemical or biochemical reaction, for which kinetic pathways need to be studied, enhanced, altered and even invented to provide useful and more economical materials in an everchanging world.

Polymer Science and Engineering
Modern materials invented and structured from primitive materials continue to be a leading area of study, and the development of new polymers for plastics and synthetic fibres is essential if an industrialized nation is to maintain its prestige, relevance and usefulness.

Extractive and Process Metallurgy
High-temperature processes, ingenious solution techniques and electrolytic methods are some of the various ways in which useful metals are won from the generous earth, and these are fundamental to Canada’s technological prosperity.

Biochemical and Food Engineering
Fermentation, biofuels, food processing, organic waste treatment and utilization are only some of the advancing areas where microbes, enzymes, bacteria, fungi and other micro-organisms are mobilized and manipulated to help satisfy the needs and wants of man.

Pollution Control Engineering
No longer will a mature society abide the destruction of quality of its habitat and many intellectual inventions are needed in the continuing efforts to regenerate, abate and prevent the pollution of air and water as an increasing demand for production competes for a decreasing supply of resources.

GENERAL STUDIES ELECTIVES (GSE's)
As for all engineering students, Chemical Engineering requires five one-term courses in non-technical areas. Many of these courses are pre-scheduled to be conflict free. These are usually recommended as well as approved by the Faculty General Studies Committee. Other courses may be taken with the approval of the Associate Chairman, Undergraduate, but scheduling is not guaranteed. A GSE may be satisfied by correspondence or from other institutions on Letters of Permission, but each term's minimum course load must be maintained by substituting an approved “free” elective (technical or non technical). Second or third-level courses are required for GSE's in third and fourth year.

TECHNICAL ELECTIVES (CH E 5XX)
These 500-level courses in the various areas of specialization are normally available in the 4B Winter term only, and two must be taken in one area. A third is required from another area or it may be (with the approval of the Associate Chairman, Undergraduate) a senior level technical course outside the Department.

OPTIONS AND MINORS
Options are fully described in the preceding pages. Example minimum requirements for a degree with the designation BASc in Chemical Engineering - Management Sciences Option, are shown in brackets in the Academic Program outlined below. This popular option requires taking one of the courses as an extra and permits the possibility of entering the MBA program at Wilfrid Laurier University.

Minors are sequences of courses, usually totalling ten, which are arranged in conjunction with another department such as Economics, Biology or Psychology and lead to an appropriately designated degree. Approval from both Chemical Engineering and the other department is required.
# Engineering
## Chemical Engineering

### Academic Program

#### Term 1A, Fall
- **CH E 100**: Chemical Engineering Concepts 1 (units and mass balances)
- **CH E 102**: Chemistry for Engineers (stoichiometry to kinetics)
- **MATH 110A**: Calculus 1A (derivatives to applications of integration)
- **MATH 114**: Algebra and Vector Geometry (matrices to vector spaces)
- **PHYS 115**: Mechanics (statics, kinematics to angular momentum)

#### Term 1B, Winter and Spring
- **CH E 101**: Chemical Engineering Concepts II (units and energy balances)
- **GEN E 121**: Digital Computation (computers and Fortran programs)
- **GEN E 123**: Electrical Engineering (electricity, circuits and motors)
- **MATH 110B**: Calculus 1B (power series, O.D.E.’s and multiple integrals)
- **PHYS 125**: Waves (oscillations, optics and quantum physics)
- **GSE XX1**: ECON 101K, SOC 101, PSYCH 101, ENGL 105A, FR 196, HIST 130, PHIL 200B, STV 100 or other approved elective

#### Term 2A, Fall and Winter
- **CH E 021**: Transport Processes 1 (separation processes)
- **CH E 022 (M SCI 251)**: Applied Mathematics 1 (statistics)
- **CH E 023**: Physical Chemistry 1 (thermodynamics to phase equilibria)
- **CHEM 026, 026L**: Organic Chemistry 1 (aliphatic compounds and preparations)
- **MATH 210**: Calculus 2 (gradients to integral theorems)

#### Term 2B, Spring and Fall
- **CH E 025, 025L**: Transport Processes 2 (fluid mechanics)
- **CH E 026, 026L**: Physical Chemistry 2 (thermodynamics to kinetics)
- **CHEM 036**: Organic Chemistry 2 (industrial organic processes)
- **MATH 216**: Differential Equations (O.D.E.s and Laplace transforms)
- **GSE XX2 (M SCI 211)**: ENGL 210C or other approved elective

#### Term 3A, Winter and Spring
- **CH E 030**: Transport Processes 3 (heat transfer)
- **CH E 031**: Process Flowsheeting (modelling and CAD)
- **CH E 032**: Introductory Biotechnology (foods to genetic engineering)
- **CH E 033**: Chemical Engineering Thermodynamics (applications)
- **CH E 034, 034L**: Inorganic Process Principles 1 (acids to metallurgy)
- **(M SCI 331)**: Extra for the Management Science Option

#### Term 3B, Fall and Winter
- **CH E 035**: Transport Processes 4 (mass transfer)
- **CH E 036**: Chemical Reaction Engineering (theory of reactor design)
- **CH E 037**: Applied Mathematics 2 (applied ordinary and partial D.E.S.)
- **CH E 038, 038L**: Inorganic Process Principles 2 (electrolysis to corrosion)
- **GSE XX3 (M SCI 311)**: Approved elective

#### Term 4A, Spring and Fall
- **CH E 040**: Unit Operations Laboratory (separators and reactors)
- **CH E 041**: Introduction to Process Control (transfer fns. to comp. cont.)
- **CH E 043**: Individual Research Project begins
- **CH E 044 (M SCI 261)**: Engineering Economics (money value to optimal analysis)
- **CH E 045**: Process Equipment Sizing and Selection
- **GSE XX4**: GEN E 411 or other approved elective

#### Term 4B, Winter
- **CH E 047 or 048**: Team Project or continuation of 043
- **CH E 051**: Technical elective from 1 area of specialization below
- **CH E 052**: Technical elective from same area
- **CH E 053 (M SCI 432)**: Technical elective from another area or another department
- **GSE XX5 (M SCI 461)**: Approved elective

1) **Transport Processes**
2) **Mathematical Analysis and Control**
3) **Reaction Processes (not offered in 1988)**
4) **Polymer Science and Engineering**
5) **Extractive and Process Metallurgy**
6) **Biochemical and Food Engineering**
7) **Pollution Control Engineering**

### Additional Courses
- CH E 512 Separation Processes
- CH E 514 Fundamentals of Petroleum Production
- CH E 522 Advanced Process Control
- CH E 524 Process Control Laboratory
- CH E 542 Polymerization and Polymer Properties (2 course credits)
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 practise 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, and therefore specialized programs in each of the following Options can be offered.

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.

Water and Waste Management Engineering
Addresses water and wastewater treatment, surface and groundwater pollution and control, solid and hazardous waste management, contaminant transport and behaviour in the environment. Support areas involving aquatic chemistry, computer modelling, simulation and laboratory experimentation as examples are also stressed.

Transportation Engineering
Deals with the planning, design, construction, traffic operation and evaluation of streets, highways, airports, and transit systems. Emphasis is placed on planning, design, operation and evaluation, particularly as related to demands.

Geotechnical Engineering
Familiarizes the student with the engineering properties of soils, the fundamentals of soil mechanics, and the application of geotechnical data and fundamentals to the design of foundation elements, earth-retaining structures, excavations, earth embankments and highway pavements.

Engineering Mechanics
For students with a strong interest in a rigorous study of Mechanics, applied mathematics and related fields, leading to an understanding of advanced analysis and serving as a preparation for graduate study in structural engineering, hydraulics, mechanics of solids and fluids, or properties of materials.

Water Resources Engineering
Deals with the planning, management, design and operation of water supply and distribution systems, in flood control and flood hazard mapping, in the hydrologic and hydraulic aspects of environmental issues, and in the application of remotely-sensed data to hydrologic and environmental problems.

Experimental Mechanics
Intended for students with an interest in experimental investigations of the static and dynamic response of structures and machines, and in the development of improved techniques to obtain and analyse experimental data.

Materials
An option intended to provide the student interested in structural engineering, mechanics or properties of materials with a background in materials science.

Additional Programs
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 Chairman 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.

A) Core Program

a) Credit Courses

CIV E 126 Civil Engineering Concepts
203 Statics
204 Mechanics of Solids 1
205 Mechanics of Solids 2
221 Calculus 2
222 Differential Equations
223A Computer Workshop A
223B Computer Workshop B
224 Probability and Statistics
253 Geology for Engineers
265 Structure and Properties of Materials
280 Fluid Mechanics and Thermal Sciences
291 Survey Camp
292 Engineering Economics
300 Civil Engineering Project 1
303* Structural Analysis 1
342* Transport Principles and Applications
353* Geotechnical Engineering 1
375* Water Quality Engineering
400 Civil Engineering Project 2
491 Engineering Law

Plus one of:
CIV E 313 Structural Concrete Design 1
CIV E 413 Structural Steel Design

*In the 3A term one of CIV E 303, 342, 353, or 375 may be delayed to a later term but must be taken before graduation. This would allow the student to take a course prerequisite to senior courses in a non-Civil Engineering option program. The permission of the Associate Chairman for Undergraduate Studies is required.

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 practise of Civil Engineering and the role of the engineer in society.

B) 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
Design and Synthesis
Humanities and Social Sciences

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
313 Structural Concrete Design 1
343 Traffic Engineering
344 Urban Transport Planning
354 Geotechnical Engineering 2
381 Hydraulics
401 Civil Engineering Project 3
403 Structural Analysis 2
404 Structural Analysis 3
405 Structural Dynamics
407 Building Science & Technology
413 Structural Steel Design
414 Structural Concrete Design 2
415 Structural Systems
422 Finite Element Analysis
430 Experimental Mechanics
440 Transport Systems Analysis
442 Pavement Structural Design
CIV E 454 Geotechnical Engineering 3
460 Orthopaedic-Biomechanics
472 Waste Water Treatment
473 Contaminant Transport
480 Water Resources Management
486 Hydrology
493 Engineering in the Canadian North
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) Social Sciences and Humanities Electives
Five courses in non-technical subjects, including the General Studies’ elective in the 1B term, 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 General Studies in the Faculty of Engineering.

C) Academic Program for Each Term

Term 1A (Fall)
MATH 110A, MATH 114, CH E 102, PHYS 115, GEN E 115

Term 1B (Winter and Spring)
MATH 110B, PHYS 125, GEN E 121, GEN E 123, CIV E 126, one Social Sciences or Humanities elective. (Students who wish to take the Management Sciences Option package in upper years should choose a course from Humanities.)

Term 2A (Fall and Winter)
CIV E 203, CIV E 204, CIV E 221, CIV E 223A, CIV E 224, CIV E 265, CIV E 292, CIV E 298, CIV E 291 +

Term 2B (Spring and Fall)
CIV E 205, CIV E 222, CIV E 223B, CIV E 253, CIV E 280, CIV E 299; one social sciences or humanities elective, CIV E 291 +

Term 3A (Winter and Spring)
CIV E 300, CIV E 303*, CIV E 342*, CIV E 353*, CIV E 375*, CIV E 398; one social sciences or humanities elective. Any one of the courses marked with * may be delayed to another term but must be taken before graduation and must be replaced with another technical course approved by the Assoc. Chairman. (Delaying such a course may deny the student an opportunity to take an advanced course in that subject area later.)

Term 3B (Fall and Winter)
CIV E 399; four technical electives; one social sciences or humanities elective. At least one of CIV E 313 and CIV E 413 must be taken before graduation.

Engineering
Civil Engineering
Computer Engineering

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

Term 4B (Winter)
CIV E 491, CIV E 499; four technical electives. A total of ten courses are required in 4A and 4B.

+CIV E 291 Survey Camp is taken at the commencement of the Fall term, preceding either 2A or 2B.

Civil Engineering with an Option in Management Sciences
A student may acquire a BASc in Civil Engineering with an Option in Management Sciences by taking 8 M SCI courses as electives. These courses are specified in this Calendar in the section “Engineering – Management Sciences”. Note that M SCI 251 and M SCI 261 are equivalent to CIV E 224 and CIV E 292 respectively, for the purposes of this Option. The student must achieve a grade of at least 50% in each of the 8 courses and must obtain a cumulative average of 60% or more in these courses. A student who wishes to follow the Management Sciences Option must declare his or her intent before embarking on the 2B term and must obtain the approval of the Civil Engineering Department.

Computer Engineering

The Computer Engineering program is controlled and administered by the Department of Electrical Engineering.

Computer Engineering is a branch of engineering that deals with the design and development 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 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 the fourth year the students must take a minimum of eight technical courses. Seven of these are selected
as set out below in the section on Technical Electives. In addition, students must satisfy Faculty of Engineering general studies requirements by choosing suitable elective courses.

The normal recommended program shown below involves a course load (excluding seminars) of five or six courses per term. Laboratory exercises are compulsory where they form part of a course. 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 9:3).

Students must register their course load at the start of each term. Departmental permission at the time of registration will be required for departures from the normal load in any one term.

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 will be as laid down in the Faculty rules (see page 9:3).

General Studies Electives
Five courses, including the general studies course in the 1B term, must satisfy the General Studies Program described on page 9:6. GEN E 351 "Information, Technology and Society" is recommended for all students.

Options in Computer Engineering
The normal Computer Engineering program shown has been designed to offer a well balanced and rewarding education. Students wishing to enrich their education may elect to take one of the three 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 9:23) designed for those students with an interest in the management of technology. Further details are made available at the beginning of the 2A term.

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 9:8) designed to give students a broad background in either pure or applied mathematics. Further details are made available during the 1B term.

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 9:8) designed to give students an enriched background in the fundamentals of physical science. Further details are made available during the 2A term.

The successful completion of these courses results in a designation on the transcript "Option in Physics."

ACADEMIC PROGRAM 1988/89

Note
The laboratory hours are approximate indications of the average time the student will spend in the laboratory.

The 1A term is as described on page 9:12.

Term 1B, Winter
Course
No. | Name | C | T | L
---|------|---|---|---
MATH 110B Calculus 1B | 3 | 2 | —
GEN E 121 Digital Computation | 3 | 2 | —
EL E 123 Electrical Engineering | 3 | 1 | 3*
Circuits | 3 | 1 | 3*
EL E 126 Electricity & Magnetism | 3 | 1 | 3*
PHYS 125 Physics for Engineers | 3 | 2 | —
General Studies Elective | 3 | — | —

Term 2A, Fall
Course
No. | Name | C | T | L
---|------|---|---|---
EL E 201 Seminar | 1 | — | —
MATH 211 Advanced Calculus for (EL E 206) Electrical Engineers 1 | 3 | 1 | —
EL E 222 Digital Computers | 3 | 1 | 3*
EL E 234 Microelectronic Circuits & Devices I | 3 | 1 | 3*
EL E 251 Programming Languages | 3 | 1 | 3*
& Translators | 3 | 1 | 3*
M SCI 261 Managerial and Engineering Economics | 3 | 1 | —

Term 2B, Spring
Course
No. | Name | C | T | L
---|------|---|---|---
EL E 202 Seminar | 1 | — | —
MATH 212 Advanced Calculus for (EL E 206) Electrical Engineers 2 | 3 | 1 | —
EL E 224 Numerical Methods | 3 | 1 | —
EL E 252 Data Structures | 3 | 1 | 3*
EL E 323 Digital Circuits & Systems | 3 | 1 | 3*
General Studies Elective | 3 | — | —
<table>
<thead>
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<th>Term 3A, Winter</th>
<th>Course</th>
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<tbody>
<tr>
<td><strong>No.</strong></td>
<td><strong>Name</strong></td>
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<tr>
<td>EL E 301</td>
<td>Seminar</td>
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<tr>
<td>EL E 316</td>
<td>Probability and Statistics</td>
</tr>
<tr>
<td>EL E 333</td>
<td>Microelectronic Circuits &amp; Devices II</td>
</tr>
<tr>
<td>EL E 342</td>
<td>Electrical Networks</td>
</tr>
<tr>
<td>EL E 353</td>
<td>Microprocessor Systems and Interfacing</td>
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<tr>
<td>EL E 354</td>
<td>Real-time Operating Systems</td>
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<th>Course</th>
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<tbody>
<tr>
<td><strong>No.</strong></td>
<td><strong>Name</strong></td>
</tr>
<tr>
<td>EL E 302</td>
<td>Seminar</td>
</tr>
<tr>
<td>EL E 318</td>
<td>Communications Systems</td>
</tr>
<tr>
<td>EL E 360</td>
<td>Electromagnetic Devices</td>
</tr>
<tr>
<td>EL E 380</td>
<td>Systems and Control</td>
</tr>
<tr>
<td>EL E 427</td>
<td>Digital Systems Engineering</td>
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<td>General Studies Elective</td>
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<thead>
<tr>
<th>Term 4A, Spring</th>
<th>Course</th>
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<tbody>
<tr>
<td><strong>No.</strong></td>
<td><strong>Name</strong></td>
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<tr>
<td>EL E 401</td>
<td>Seminar</td>
</tr>
<tr>
<td>EL E 455</td>
<td>Software Engineering</td>
</tr>
<tr>
<td>General Studies Elective**</td>
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</tbody>
</table>

Three Technical Electives from the following:

| EL E 371 | Transmission Lines and Basic Field Theory | 3 | 1 | 3* |
| EL E 411 | Data Communications | 3 | 1 | |
| EL E 428 | Computer Communications Networks | 3 | 1 | | (1) |
| EL E 435 | Semiconductor Devices | 3 | 1 | |
| EL E 438 | Switching and Digital Circuits | 2 | 1 | 3* |
| EL E 446 | Linear Systems | 3 | 1 | |
| EL E 463 | Power Electronics | 2 | 1 | 3* |
| EL E 481 | Design of Analog and Digital Control Systems | 2 | 1 | 3* |
| EL E 499A | Project | | | 9 |

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<thead>
<tr>
<th>Term 4B, Winter</th>
<th>Course</th>
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<tbody>
<tr>
<td><strong>No.</strong></td>
<td><strong>Name</strong></td>
</tr>
<tr>
<td>EL E 402</td>
<td>Seminar</td>
</tr>
<tr>
<td>EL E 456</td>
<td>Database Systems</td>
</tr>
<tr>
<td>General Studies Elective**</td>
<td></td>
</tr>
</tbody>
</table>

Three Technical Electives from the following:

| EL E 408 | Robot Dynamics and Control | 3 | | 3* |
| EL E 412 | Digital Communications | 3 | 1 | |
| EL E 413 | Digital Signal Processing | 3 | 1 | 3* |
| EL E 429 | Computer Structures | 3 | 1 | | (1) |
| EL E 436 | Design of Integrated Circuits and Devices | 2 | 1 | 3* |
| EL E 437 | Integrated VLSI Systems | 2 | 1 | 3* |
| EL E 439 | Analog Electronic Circuits | 2 | 1 | 3* |
| EL E 443 | Electrical Networks 2 | 2 | 1 | 3* |
| EL E 459 | Sound, Noise and Electroacoustics | 2 | 1 | 3* |
| EL E 464 | High Voltage and Insulation Engineering | 3 | | 3* |
| EL E 465 | Power Systems | 3 | 1 | |
| EL E 473 | Microwave Engineering | 2 | 1 | 3* |
| EL E 475 | Guided Wave Engineering | 3 | 1 | 3* |
| EL E 482 | Multivariable Control Systems | 2 | 1 | 3* |
| EL E 485 | Computer Control Applications | 2 | 1 | 3* |
| EL E 499B | Project | | | 9 |

Notes:

(1) At least one of EL E 428 or EL E 429 must be selected.

(2) With the approval of the department in terms 4A and 4B, students may take technical courses offered by other departments.

*Indicates laboratory every second, every third week, or open lab. See Course Descriptions.

**Of the two General Studies Electives taken in fourth year, at least one must be a 2nd level course or higher.
Electrical Engineering

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 and a minimum of eight technical electives (taken during the last two terms). These technical electives include the working on a design or research project. In addition, students must satisfy Faculty of Engineering general studies requirements by choosing suitable elective courses.

The normal recommended program shown below involves a course load (excluding seminars) of five or six courses per term. Laboratory exercises are compulsory where they form part of a course.

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 9:3).

Students must register their course load at the start of each term. Departmental permission at the time of registration will be required for departures from the normal load in any one term.

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 will be as laid down in the Faculty rules (see page 9:3).

General Studies Electives

Five courses, including the general studies course in the 1B term, must satisfy the General Studies Program requirements described on p. 9:6.

Options in Electrical Engineering

The normal Electrical Engineering program shown has been designed to offer a well balanced and rewarding education. Students wishing to enrich their education 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 Computer Engineering, Mathematics or Physics Options.

Computer Engineering Option

This is a sequence of eight courses designed to give Electrical Engineering students a greater training in software to augment their digital hardware capabilities. Two courses are part of the regular program. The other courses and the terms in which they are taken are:

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Term</th>
</tr>
</thead>
<tbody>
<tr>
<td>CS 240</td>
<td>Programming Principles, Languages and Techniques</td>
<td>2B</td>
</tr>
<tr>
<td>CS 340</td>
<td>Data Structures</td>
<td>3A</td>
</tr>
<tr>
<td>CS 354</td>
<td>Software Systems</td>
<td>3B</td>
</tr>
<tr>
<td>EL E 427</td>
<td>Digital Systems Engineering</td>
<td>4B</td>
</tr>
</tbody>
</table>

In addition to these courses, two other computer science courses, chosen from a list, will be taken in the fourth year. Further details are made available at the beginning of the 2A term.

The successful completion of these courses results in a designation on the transcript "Option in Computer Engineering."

Management Sciences Option

This is a sequence of seven courses (see page 9:23) designed for those students with an interest in the management of technology. Further details are made available at the beginning of the 2A term.

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 9:6) designed to give students a broad background in either pure or applied mathematics. Further details are made available at the beginning of the 2A term.

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 9:6) designed to give students an enriched background in the fundamentals of physical science. Further details are made available during the 1B term.

The successful completion of these courses results in a designation on the transcript "Option in Physics."

ACADEMIC PROGRAM 1988/89

Note 1

With the approval of the department in terms 4A and 4B, students may take technical courses offered by other departments.

Note 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 9:12.

### Term 1B, Spring

<table>
<thead>
<tr>
<th>Course</th>
<th>No.</th>
<th>Name</th>
<th>C</th>
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<td>Calculus 1R</td>
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<td>Physics for Engineering</td>
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<tr>
<td>EL E 126</td>
<td></td>
<td>Electricity &amp; Magnetism</td>
<td>3</td>
<td>1</td>
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### Term 2A, Winter

<table>
<thead>
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<td>Electrical Engineers 1</td>
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<tr>
<td>EL E 208</td>
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<td>Electronic Circuit Analysis</td>
<td>3</td>
<td>1</td>
<td>3*</td>
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<tr>
<td>EL E 222</td>
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<td>Digital Computers</td>
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<td>1</td>
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<tr>
<td>EL E 261</td>
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<td>Energy Systems &amp; Components 1</td>
<td>3</td>
<td>1</td>
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<tr>
<td>M SCI 261</td>
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<td>Managerial and Engineering Economics</td>
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### Term 2B, Fall

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<td>EL E 224</td>
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### Term 3A, Spring

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<td>EL E 371</td>
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<td>Transmission Lines &amp; Basic Field Theory</td>
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### Term 3B Winter

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<td>Communications Systems</td>
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<tr>
<td>EL E 323</td>
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<td>Digital Circuits &amp; Systems</td>
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<td>EL E 380</td>
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### Term 4A Fall

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<td>EL E 435</td>
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<td>Semiconductor Devices</td>
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<td>Switching and Digital Circuits</td>
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<td>Linear Systems</td>
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<td>EL E 463</td>
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<td>Power Electronics</td>
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<tr>
<td>EL E 474</td>
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<td>Design of Analog and Digital Control Systems</td>
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<td>EL E 499A</td>
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<td>Project</td>
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### Term 4B, Winter

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<th>Course</th>
<th>No.</th>
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<td>EL E 408</td>
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<td>Robot Dynamics and Control</td>
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<td>EL E 412</td>
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<td>EL E 413</td>
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<td>1</td>
<td>3*</td>
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<tr>
<td>EL E 436</td>
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<td>Design of Integrated Circuits &amp; Devices</td>
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<tr>
<td>EL E 437</td>
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<td>Integrated VLSI Systems</td>
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<td>1</td>
<td>3*</td>
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<tr>
<td>EL E 439</td>
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<td>Analog Electronic Circuits</td>
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<td>1</td>
<td>3*</td>
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<td>3*</td>
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<td>Sound, Noise and Electroacoustics</td>
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<td>1</td>
<td>3*</td>
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<td>EL E 464</td>
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<td>High Voltage and Insulation Engineering</td>
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<td>3*</td>
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<td>EL E 465</td>
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<td>Power Systems</td>
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<td>EL E 473</td>
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<td>Microwave Engineering</td>
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Term 4B, Winter (Continued)

Course

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<th>Name</th>
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<tr>
<td>EL E 475</td>
<td>Guided Wave Engineering</td>
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<tr>
<td>EL E 482</td>
<td>Multivariable Control Systems</td>
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<td>EL E 485</td>
<td>Computer Control Applications</td>
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<tr>
<td>EL E 499B</td>
<td>Project</td>
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</table>

Any 600-level courses taken by students in fourth year can only be counted toward the BASc. The combined Bachelor’s - Master’s program in Electrical Engineering has the same number of courses as the BASc program plus the MASc program.

*Indicates laboratory every second, every third week, or open lab. See Course Descriptions.
†General electives may be General Studies Electives, or if the General Studies requirements have been satisfied, Electrical Engineering technical electives or any course that is approved by the Undergraduate Officer. If two General Studies Electives are taken in fourth year, at least one must be a second-level course or higher. The normal requirement in fourth year is eight technical electives, and two general electives. For students taking an option, it is permissible to take seven technical electives, of which at least five must be from Electrical Engineering, and three General Studies Electives if the requirements of the option forced the delaying of the General Studies Electives until fourth year.

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.

There are four areas of specialization within Geological Engineering:

1. geotechnical engineering and geohydrology
2. petroleum geology and engineering
3. rock mechanics and mine design
4. applied geophysics and exploration

Engineering

Geological Engineering

The program offered at Waterloo concentrates on environmental aspects, but some specialization is available in rock mechanics and petroleum engineering as well. A special program in geohydrology beginning in 3A is available, but written permission from the Program Chairman is required to take it.

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 developments, 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.

ACADEMIC PROGRAM

Term 2A, Fall

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
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<tbody>
<tr>
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<td>EARTH 235</td>
<td>Stratigraphy</td>
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<tr>
<td>EARTH 260</td>
<td>Applied Geophysics I</td>
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<tr>
<td>CIV E 203</td>
<td>Statics</td>
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<td>CIV E 204</td>
<td>Mechanics of Solids I</td>
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<td>CIV E 221</td>
<td>Calculus 2</td>
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<td>CIV E 291</td>
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Term 2B, Spring

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<td>Computer Workshop</td>
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<td>CIV E 280</td>
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<td>EARTH 221</td>
<td>Geochemistry 1</td>
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<td>EARTH 232</td>
<td>Petrology</td>
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<td>EARTH 238</td>
<td>Intro. Structural Geology</td>
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### Term 3A, Winter
- CIV 300 Civil Engineering Project 1
- CIV 353 Geotechnical Engineering 1
- EARTH 333 Sedimentology
- EARTH 370 Economic Geology
- EARTH 390 Field Methods
- EARTH 438 Engineering Geology
  (CIV E 375 Water Quality Eng. is available to those in the geohydrology option)
- Social Sciences & Humanities Elective (SCI 209 Technical Writing is strongly recommended)

### Term 3B, Fall
- EARTH 437 Rock Mechanics
- CIV E 224 Probability and Statistics
- CIV E 292 Engineering Economics
- CIV E 354 Geotechnical Engineering 2
- Social Sciences & Humanities Elective.
  Elective from:
  - EARTH 331 Igneous Petrology
  - EARTH 342 Geomorphology
  - CIV E 381 Hydraulics (Geohydrology option only)

### Term 4A, Fall
- EARTH 440 Quaternary Geology
- EARTH 456 Numerical Meth. in Geoscience
- EARTH 458 Physical Hydrogeology
- EARTH 490 Field Trip
- GEO E 400 Geological Engineering Project 1
- Social Sciences & Humanities Elective.
  Elective from:
  - EARTH 421 Geochemistry 2
  - EARTH 470 Metallic Mineral Deposits
  (Courses for geohydrology option:
  - CIV E 472 Wastewater Treatment
  - CIV E 486 Hydrology)

### Term 4B, Winter
- GEO E 401 Geological Engineering Project 2
- Social Sciences & Humanities Elective.
  Electives from:
  - EARTH 332 Metamorphic Petrology
  - EARTH 427 Crustal Evolution
  - EARTH 432 Precambrian Geology
  - EARTH 433 Applied Sedimentology
  - EARTH 435 Advanced Structural Geology
  - EARTH 460 Applied Geophysics 2
  - CIV E 422 Finite Element Analysis
  - CIV E 430 Experimental Mechanics
  - CIV E 440 Transport Systems Analysis
  - CIV E 454 Geotechnical Engineering 3
  - CIV E 491 Engineering Law
  - CIV E 493 Engineering in the Canadian North
  - CH E 502 Fundamentals of Petroleum Production
  - CH E 550 Introduction to Extractive Metallurgy
  (For the geohydrology option, students take
  - CIV E 473 Contaminant Transport
  - CIV E 480 Water Resources Management
  - EARTH 459 Chemical Hydrogeology)

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**Engineering**

**Geological Engineering**

**Management Sciences**

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1) This program satisfies the Social Sciences & Humanities elective program of the Engineering Faculty. Students will not be able to take the Management Sciences Option.

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**Management Sciences**

**Introduction**

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, including part-time studies in Mississauga, 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 operations research, manufacturing systems and organizational behaviour.

**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 certain 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, EL E 316, ME 202, SY DE 213)

M SCI 261 Managerial and Engineering Economics I (F,W,S)
  (equivalents CH E 044, CIV E 292, SY DE 131, correspondence F,W)

+ * M SCI 211 Organizational Behaviour (F,W,S)
  (correspondence F,W)

* M SCI 331 Operations Research I (F,W,S)
  (equivalent SY DE 311)

Plus three of the following or equivalents

M SCI 452 Behavioural Decision Analysis, (W) (equivalent SY DE 333)

+ * M SCI 461 Managerial and Engineering Economics II (S,F) (equivalent ECON 201)

M SCI 431 Operations Research II (W)
  (equivalent SY DE 411)

* M SCI 432 Introduction to Production (F,W,S)
  (equivalent M E 448)

+ * M SCI 311 Organizational Behaviour II (F,W)
  (correspondence W)

+ These courses can be counted as part of the General 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 M.B.A.

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 industries throughout Canada. 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. In the last few years, because of the need to develop alternative energy sources, mechanical engineers have taken a major role in the development of new methods of energy conversion. 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 satisfaction of the work experience requirement and upon passing the Association exams in law and ethics.

The Mechanical Engineering undergraduate program contains a core of basic subjects that must be taken by all students. The first year is virtually common with Civil and Electrical Engineering. The second and third years provide courses in Mechanical Engineering and Electrical Engineering with further development in mathematics and physics. Opportunities for specialization exist during the fourth year, where a choice of elective courses arranged into different option areas is available. Non-technical (general studies) courses are distributed throughout the program and do not appear in all years.

Each student is responsible for selecting his own program of electives, in keeping with his 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 option areas. The Options are:

a) Fluid Mechanics and Thermodynamics Option
The courses in this Option 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.

b) Environmental (Geophysical) Fluid Dynamics Option
This Option is closely linked with Option (a), 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.

c) Machine Design and Solid Mechanics Option
The courses offered in this Option 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.

d) Engineering Materials Option
This Option consists of a comprehensive series of courses in metallurgy, including heat treatment, casting, welding, cold and hot forming. Nonmetallic materials, including plastics and ceramics. Composites, such as fiberglass and sandwich structures are also considered.

e) Production and Automation Option
The courses in this Option 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.

f) 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 taking, completing and passing seven specific Management Science courses as electives (see elective course listing under Department of Management Sciences). Students interested in this option must carefully plan their choice of general studies courses very early in order to ensure that the general studies requirements will be met. (See note on following page, under elective courses).
A) Core Program

a) Credit Courses
M E 201 Advanced Calculus
M E 203 Ordinary Differential Equations
M E 212 Dynamics
M E 215 Structure and Properties of Materials
M E 219 Mechanics of Deformable Solids 1
M E 220 Mechanics of Deformable Solids 2
M E 250 Thermodynamics 1
M E 262 Introduction to Microprocessors and Digital Logic
M E 304 Numerical Analysis
M E 305 Partial Differential Equations
M E 321 Kinematics and Dynamics of Machines
M E 322 Mechanical Design 1
M E 330 Control of Properties of Materials
M E 340 Manufacturing Processes
M E 351 Fluid Mechanics 1
M E 353 Heat Transfer 1
M E 354 Thermodynamics 2
M E 360 Introduction to Control Systems
M E 362 Fluid Mechanics 2
M E 370 Mechanical Engineering Laboratory
M E 482 Mechanical Engineering Projects
M SCI 251 Probability and Statistics (Equivalent to M E 202)
M SCI 261 Managerial and Engineering Economics 1
EL E 269 Electrical Engineering 2

b) Non Credit Courses
M E 200 Introduction to Mechanical Engineering 1
M E 300 Introduction to Mechanical Engineering 2
M E 400 Introduction to Mechanical Engineering 3

B) Elective Courses

a) General Studies Electives
Students entering the program will take five General 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 General Studies in the Faculty of Engineering.

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 his own program of electives, and project.

During the term, certain faculty members are designated to give advice to students and to approve their final selection by signing their pre-registration form. 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 Options, 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 designated faculty member. The designated faculty member must be convinced of the validity of the student's selection of electives. If the faculty member refuses to sign the pre-registration form the student must reconsider his or her selection or must discuss the choices with the Associate Chairman for Undergraduate Studies.

As a guide, typical lists of electives for the five Option areas available from within the Department of Mechanical Engineering are given below:

a) Fluid Mechanics and Thermodynamics Option:
M E 452 Energy Transfer in Buildings
M E 456 Heat Transfer 2
M E 459 Energy Conversion
M E 463 Tribology 1
M E 557 Combustion 1
M E 559 Finite Element Methods
M E 563 Turbomachines
M E 565 Gas Dynamics
M E 566 Fluid Mechanics 3
M E 568 Noise Analysis and Control
M E 569 Fluid Mechanics-Design Topics

b) Environmental Fluid Mechanics Option:
M E 469 Introduction to the Environmental Sciences
M E 559 Finite Element Methods
M E 566 Fluid Mechanics 3
M E 568 Noise Analysis and Control
M E 571 Air Pollution 1

c) Machine Design and Solid Mechanics Option
M E 423 Mechanical Design 2
M E 435 Industrial Metallurgy
M E 463 Tribology 1
M E 524 Advanced Dynamics and Stress Analysis in Design
M E 525 Mechanical Vibrations in Machines
M E 527 Mechanics of Deformable Solids 3
M E 544 Welding
M E 559 Finite Element Methods
M E 568 Noise Analysis and Control
M E 626 Fatigue and Fracture Analysis (See Graduate Calendar)
d) Engineering Materials Option
M E 432 Physical Metallurgy of Deformation and Fracture
M E 435 Industrial Metallurgy
M E 527 Mechanics of Deformable Solids 3
M E 531 Physical Metallurgy of Structures and Transformations
M E 533 Composite Materials
M E 534 Non-metallic Materials
M E 541 Deformation Processes
M E 543 Metal Casting Processes
M E 544 Welding
M E 559 Finite Element Methods

e) Production and Automation Option
M E 435 Industrial Metallurgy
M E 443 Metal Casting Processes
M E 447 Automation and Robotics
M E 448 Production Engineering; Design of Manufacturing Systems
M E 463 Tribology 1
M E 541 Deformation Processes
M E 542 Metal Cutting
M E 544 Welding
M E 548 Numerical Control of Machine Tools 1
M E 559 Finite Element Methods
M E 561 Fluid Power Control Systems
M E 568 Noise Analysis and Control

f) 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 Department of Management Sciences.

1A (F) - none
1B (W,S) none
2A (F,W) M SCI 251†, M SCI 211*
2B (S,F) M SCI 261†
3A (W,S) none
3B (F,W) none
4A/4B M SCI 331 plus three of the following or equivalents: M SCI 311, M SCI 431, M SCI 432 (or M E 448), M SCI 452, M SCI 461.

†course is part of existing Mechanical Engineering core
*course is a General Studies course.
The Mechanical Engineering curriculum structure is summarized in the following table:

<table>
<thead>
<tr>
<th>Term</th>
<th>Courses</th>
</tr>
</thead>
<tbody>
<tr>
<td>1A (F)</td>
<td>CH E 122</td>
</tr>
<tr>
<td>1B (W,S)</td>
<td>GEN E 121</td>
</tr>
<tr>
<td>2A (F,W)</td>
<td>ME 200</td>
</tr>
<tr>
<td>2B (S,F)</td>
<td>M E 203</td>
</tr>
<tr>
<td>3A (W,S)</td>
<td>ME 300</td>
</tr>
<tr>
<td>4A (S,F)</td>
<td>M E 400</td>
</tr>
<tr>
<td>4B (N)</td>
<td>5 TECH ELECT</td>
</tr>
</tbody>
</table>

†A project course, ME 482, may be taken in the 4A and 4B terms as a technical elective for each of these terms.
Introduction
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 economics, 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$^1$), the Systems Design Engineer may apply for registration as a Professional Engineer. If a Masters degree (MASC$^2$) in Systems Design is also obtained only one year of work experience is required before application.

Each province within Canada has its own professional Engineering Association. The Canadian Engineering Accreditation Board (CEAB) is a national organization that has representation from all of the Provincial Professional Engineering Associations. The CEAB determines what types of courses must be contained in a university engineering program in order for the program to meet the standards of Canadian engineering. The Systems Design Engineering program satisfies the strict standards of the CEAB and is therefore acknowledged as a fully qualified Engineering Program. In fact, the Department of Systems Design Engineering at the University of Waterloo is the only department of its kind in all of Canada.

The Systems Design Engineering program is specifically oriented towards developing graduates who can solve problems lying at the interface of technology and the human environment. Therefore, if you are technically oriented and also have a strong parallel interest in social and human problems, Systems Design Engineering may be the right program for you.

The Department of Systems Design Engineering also offers programs leading to MASC and PhD$^3$ degrees, and in the past many Systems Design Engineering students have gone on to successfully 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-Masters 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 of 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-Economics Systems, and absorbs the implications of the tremendous growth of electronic computing systems.

Further information is available from:
Associate Chairman for Undergraduate Studies
Department of Systems Design Engineering
University of Waterloo
Waterloo, Ontario, N2L 3G1
(519) 885-1211 Ext. 3021

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
$^2$MASC Master of Applied Science
$^3$PhD Doctor of Philosophy
Employment Opportunities
Graduates of Systems Design Engineering will find employment opportunities in a number of diverse fields. To some extent, the technical option 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 his 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).

Systems Design Engineering Undergraduate Core Curriculum
Listing by Terms

1A (Fall Term)
SY DE 101 Tutorial
SY DE 111 Calculus 1
SY DE 113 Linear Algebra
SY DE 121 Digital Computation
SY DE 131 Engineering Economics
SY DE 161 Introduction to Systems Design Engineering
SY DE 181 Statics

1B (Spring Term)
SY DE 102 Tutorial
SY DE 112 Calculus 2
SY DE 122 Introduction to Computer Systems
SY DE 142 Introduction to Ergonomics
SY DE 182 Dynamics
SY DE 184 Introduction to Chemical Systems
1 General Studies Program Elective
Additionally there are Option programs called Management Sciences, Computer Engineering, Mathematics and Physics, offered in conjunction with the Management Sciences, Electrical Engineering, Mathematics and Physics Departments, respectively. Students who elect any of these Options will receive a final academic transcript from the University with a statement that the Option has been successfully completed.

It is also possible for a student to organize an elective package to suit his or her own special requirements. This is done by choosing a set of technical elective courses which, if approved by the Associate Chairman of Systems Design Engineering, will constitute an individual technical package for that student.

Each technical package or option in Systems Design Engineering consists of a specified set of technical elective courses taken in the 3A, 3B, 4A and 4B terms. The third and fourth year curriculum is structured as shown:

3A
- 6 mandatory courses
- 1 technical elective course

3B
- 4 mandatory courses
- 2 technical elective courses
- 1 General Studies Program elective

4A
- 2 mandatory courses
- 3 technical elective courses
- 1 General Studies Program elective
- 1 Free elective

4B
- 2 mandatory courses
- 3 technical elective courses
- 1 General Studies Program elective

SUMMARY OF THE SYSTEMS DESIGN ENGINEERING TECHNICAL ELECTIVES AND OPTIONS

Design and Human Systems Package
The Design and Human Systems package embraces in whole or in part in a wide spectrum of "professional" areas known as human factors engineering, human engineering, ergonomics, occupational health and safety, biomedical engineering, and elements of various technical and non-technical disciplines such as aesthetics, perceptual psychology, marketing, mechanics, materials, etc.

However, the concentration within the Systems Design Engineering program is on the human problem to be solved rather than on one of these professional or discipline areas. Thus, courses will be selected, under supervision, to provide the knowledge and
Socio-Economic Systems Package
When planning, designing and operating a large-scale engineering project, the various interactions between the project and its social environment must be considered. For example, the James Bay hydroelectric project in Northern Quebec has had important economic, social and political consequences upon the population affected by the undertaking. The purpose of the socio-economic package is to equip the students with a specific set of tools and also a general philosophical approach for tackling socio-economic problems that Systems Design Engineers are often confronted with.
To familiarize the students as quickly as possible with socio-economics, an engineering economics course is given during the first term of classes. Fundamental mathematics courses such as probability and statistics are taken during the first two years and they form the foundation stones for socio-economic courses which are available in later terms. Techniques are taught for analyzing socio-economic situations by use of operations research, optimization, game theory, time series analysis and the social sciences. By selecting additional elective courses, students may pursue further topics in the social sciences and operations research. Furthermore, illustrative application problems are presented within each course so that the students may fully appreciate how these methods work in practice. Additional experience in studying the socio-economic aspects of engineering design may be obtained by doing workshop projects in this area.

Physical and Computer Systems Package
In this elective package the student is provided an opportunity to study in some depth a unified approach of Physical Systems Theory to mathematical modelling, analysis, simulation and design of a variety of engineering systems such as electrical, mechanical, hydraulic, structural systems and their combinations. Essential concepts and tools from linear systems theory, transform methods, frequency and time domain modelling and analysis, control systems, graph theory and computer simulation techniques are given in the earlier years followed by technical electives dealing with such topics as large-scale systems, algorithms for computer-aided-analysis and design in the final years. Students may also take technical courses in specific areas in other departments. The Department recognizes the tremendous growth and impact of electronic computing systems on technology and society. For those students concerned with the application of computers this package provides several courses and opportunities to learn about computer hardware (structure of digital and analog computers, microcomputers and micro-processors), computer software (algorithmic, simulation and problem-oriented software), and principles of computer-aided design.

Engineering
Systems Design Engineering

Option in Management Sciences
The Management Science Department of the Engineering Faculty has a course package available whereby a student from another Engineering Department, such as Systems Design Engineering, can obtain a background in Management Science in addition to the Engineering degree. The Management Sciences program for a Systems Design Engineering student consists of the following optional courses:

M SCI 211 Organizational Behaviour I (F,W,S)

Plus three of the following courses:
SY DE 333 Applied Statistics (S)
(S or M SCI 452)
SY DE 411 Probabilistic Modelling (F)
or
SY DE 433 Conflict Analysis (F)
M SCI 461 Managerial and Engineering Economics II
(F,W)
M SCI 432 Introduction to Production (F,W,S)
(or M E 448)
M SCI 311 Organizational Behaviour (F,W)

In order to successfully complete this option, students must obtain at least 50% in each of the option courses and an overall average in them of at least 60%.

For more information on this Faculty Option, refer to the earlier section on "General Studies Requirements, Options and Electives for Engineering Students".
Option in Computer Engineering

The aim of this option is to augment the Systems Design Engineering curriculum with technical elective courses from Systems Design Engineering, Electrical Engineering and Computer Science Departments so that students can acquire a strong background in both hardware and software aspects of computer systems. The focus in this option will be 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:

<table>
<thead>
<tr>
<th>Academic Term</th>
<th>Option in Computer Engineering</th>
</tr>
</thead>
<tbody>
<tr>
<td>3A S</td>
<td>CS 240 Programming Principles, Languages and Techniques</td>
</tr>
<tr>
<td>3B W</td>
<td>*SY DE 352 Fundamentals of Data Structures and Algorithms or Data Structures</td>
</tr>
<tr>
<td>4A F</td>
<td>SY DE 423 Computer Algorithm Design and Analysis</td>
</tr>
<tr>
<td>4B W</td>
<td>EL E 427 Digital Systems Engineering</td>
</tr>
</tbody>
</table>

*Students who wish to take other Computer Science electives should check the Undergraduate Calendar regarding prerequisites for these courses before deciding on their 3B elective, as CS 340 is a required prerequisite in some instances.

Options in Mathematics, Physics and Statistics

Faculty options in Mathematics, Physics and Statistics are also available to Systems Design students. Interested students should refer to the earlier section on "General Studies Requirements, Options and Electives for Engineering Students" for further information. Certain courses listed in this section are required for a particular option may be replaced by courses which have been approved as equivalent. This approval is at the discretion of the Associate Chairman for Undergraduate Studies in the Department of Systems design.

Special Individual Elective Package

Some Systems Design Engineering students may wish to design their own elective program which consists of technical courses drawn from the wide variety of subjects taught at the University. Special Individual elective packages must be organized in conjunction with a faculty advisor in the Department of Systems Design Engineering by the 3A term and must be approved by the Associate Chairman for Undergraduate Studies of the Department.

As an example, a student who wishes to study water resources or transportation engineering could take some of the socio-economic courses from Systems Design in conjunction with the appropriate subjects from the Civil Engineering Department.

Note

Transitional graduate courses (numbered in the 500's) are available for credit to senior undergraduate students registered in departments other than Systems Design Engineering.
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 mankind, and 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 mankind 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.

Environmental Studies
Faculty of Environmental Studies
Degrees

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) in Industrial 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).

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 Industrial Development
- PhD Geography
- PhD Regional Planning and Resource Development

The student should apply to the unit most suited to his/her 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 School of Urban and Regional Planning is not normally permitted above Year Two.

To be selected for the Dean's Honours List, full- and part-time students must attain a minimum cumulative overall average of at least 80% at the completion of each academic year.
The Faculty has several awards granted to students for meritorious performance, e.g. Dean’s Honour List, Alumni Gold Medal, monetary prizes. Further information on this can be obtained from the office of the Associate Dean, Undergraduate Studies.

Admission

The admission categories, requirements and procedures for all programs are outlined in detail in Chapter 2 of this Calendar. The following points emphasize some of the admission requirements which relate specifically to programs in the Faculty of Environmental Studies.

Applicants to Geography and Environment and Resource Studies are required to present a Grade 13 or Ontario Academic Course credit in English.

Because of the increasing use of statistics and quantitative methods in environmental research it is recommended, but not required, that students present at least one Grade 13 or Ontario Academic Course credit in Mathematics or equivalent for admission to programs in Environmental Studies; Grade 13 or Ontario Academic Course credit in Geography or equivalent is similarly recommended for those applying to the Geography Department. For applicants to the School of Architecture, English (Francais), Physics, Calculus and one of Algebra, Relations and Functions or Finite Mathematics at the Ontario Grade 13 or Ontario Academic Course level or equivalent are required.

Interviews

Students being seriously considered for admission to the School of Architecture are normally required to participate in an interview as part of the admissions process. In addition, a test in the form of a précis will be required of applicants on the day of their scheduled interview. A portfolio of creative work must also be submitted at the time of the interview. Contact the School of Architecture for further details.

Transfer Credit

Generally transfer credit is given for courses in which a grade of 50% (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% (C−) or better without including these in 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.

Environmental Studies

Admission

Examinations and Standings

English Language Proficiency Requirement

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). Students may demonstrate their competence in writing by achieving a passing grade on this Examination as determined by the students’ Department/School. If students do not achieve a passing grade on this examination, they must successfully complete the assignments of the University of Waterloo Writing Clinic and/or by completing course work. The English Language Proficiency Requirement is recorded on students’ academic record as Arts 000 Y.

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 16 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 10 term courses will be considered Year One students; those who have passed at least 10 but fewer than 20 will be considered Year Two students; those with at least 20 but fewer than 32, Year Three; and those with 32 or more, Year Four.

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 from work during term are used in part in determining standing. At the discretion of the
chairperson 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.

b) 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.

c) A student will be eligible for make-up examinations only when failure to pass is attributable to extraordinary circumstances. In addition, students:
1. 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;
2. must have secured the permission of the professor concerned.

2. Appeals
Appeals against Departments/Schools decisions are handled at three progressive levels:
1. Disputes between students and instructors should be fully discussed at that level;
2. Problems not resolved to either party’s satisfaction should be referred to the Department/School Undergraduate Affairs Committee;
3. Lack of mutual satisfaction at that level would involve the dispute being forwarded to the Associate Dean, Undergraduate Studies, for discussion with the Faculty Undergraduate Studies Committee.

3. 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 his/her 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 his/her 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.

4. Standing
a) 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.

b) 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 designation.

c) Students receiving an incomplete (INC), did not write (DNW), 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.

d) To be considered in good standing in the Honours programs, a student must maintain a cumulative overall average of at least 65.0% and an average in the chosen field of specialization as specified in the regulations of the relevant Department/School. 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 (e) below will apply.

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

f) The only general programs in the Faculty are the
General Geography programs. The BES program in the School of Architecture is a pre-professional program. A regular (full-time) student in the General Geography programs must in each academic year enrol in 10 term courses. A regular student in the Honours programs must each year enrol in at least 10 term courses (unless otherwise specified in a departmental Honours program). Full-time students may be enrolled for additional or fewer courses only after obtaining the approval of the appropriate Undergraduate Officer.

g) 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 his/her cumulative average.

h) 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.

i) 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.

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**Academic Programs**

Students who have not determined the field or subject in which they wish to concentrate should study the Calendar carefully. After examining the suggested departmental program, the student should read the descriptions of individual courses in order to have a more comprehensive idea of what the content of any program would include. Students should consult their High School Guidance Officer, Chairperson 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.

**Note:** Environmental Studies students wishing to take courses where full enrolment might be expected, such as ENV S 200, should study their scheduling carefully to ensure that the courses can be fitted, at some time, into their undergraduate program.

**Course and Program Changes**

a) Students may add and drop courses before and during the first two weeks of classes in the term in which the courses begin.

b) After the two week periods, 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.

c) After the two week periods, and before November 1, March 1, and July 1, a student may drop courses only with the written permission of 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.

d) All schedule changes at any time must be submitted to the designated department/school office.

e) Students are encouraged not to register for more courses than their programs require unless exceptional circumstances can be demonstrated.

f) Full-time students may reduce their programs below the specified minimum only upon the recommendation of the undergraduate officer of the major department/school.

g) Courses not dropped by the deadlines specified in c) will be graded and included in the calculation of the student’s average.
Voluntary Withdrawals

Students may voluntarily withdraw from their program of study without incurring academic penalty, provided that the appropriate Notice of Withdrawal form is completed, received and signed by the Undergraduate Officer, no later than: November 1 (Fall Term), March 1 (Winter Term), July 1 (Spring Term). After these deadlines, students who withdraw will normally be held responsible for the term’s courses in the sense that such courses will be recorded with a grade of “NMR” and subsequently will be recorded as failures. Students who voluntarily withdraw may be eligible for tuition fee and residence refunds depending on the effective date of withdrawal. (See the Calendar of Important Dates).

Correspondence Courses

Only in exceptional cases would correspondence courses be taken by a student during a term in which he or she was a full-time student on campus.

Special Programs

A student exchange agreement between Waterloo and the School of Australian Environmental Studies at Griffith University, Brisbane, Queensland came into effect in 1985-86. Another is about to begin with the environmental studies program at Victoria College, Clayton (near Melbourne), Victoria. Under this arrangement, a small number of students from the University of Waterloo could take one or two semesters of courses at Griffith or Victoria during their third year which would be credited towards their degree at Waterloo, and vice versa. For additional information, contact the Associate Dean, Undergraduate Studies.

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.

Environmental Studies

Architecture

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 Cooperative 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 Cooperative work terms leading to the degree, Bachelor of Environmental Studies (BES Pre-Professional Architecture). This degree, combined with a cumulative average of C- in design studio theme courses, indicates appropriate preparation for four subsequent academic terms of study and two Cooperative 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 RAIC Certification Board for assessment. For further information concerning mandatory work experience and other requirements for registration contact the Registrar, O.A.A., 50 Park Road, Toronto, Ontario M4W 2N5. 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 purpose of the BES program is 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 a clarification of the interaction of seemingly unrelated disciplines, and to know the principles and values that surround the creation of any artifact; to a comprehension of the many forms of creative expression; and to an understanding of the present as part of an historical process. The program aims to build knowledge and expertise in various aspects of building and architectural design through:

1. The design studio, theories and methods, and practice of architectural design.
2. Approaches in the study of technology including computer, physical and material sciences.
3. Environmental studies, including natural and human ecology.

THEME AREA DESCRIPTIONS

Technology
Courses in this theme area give preparation leading to the application of mathematics, statistics and computer science as tools for analysing quantitative and behavioural problems as prerequisites for ensuing studies; to develop an understanding of the qualities of materials and structural behaviour; to propose alternatives in structural engineering; and to perform independent mathematical checks on simple, statically determinate and indeterminate structures.

Ecology
Courses in this Theme Area prepare the student to understand the structure and function of Man in the pre-existing environment as an individual and as a social animal; to recognize and be critical of the human/physical complex and its management for desirable human goals and quality in the natural and man-made Environments.

Culture
Courses in cultural history give the student a critical and creative 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. Open to any University student upon consent of instructor. No prerequisites are required for these courses except for Architecture students.

Design
The courses in design studio combine design fundamentals and design concepts, along with the opportunity to involve analysis and synthesis, professional and scientific insights, application of tools and methods for designing artifacts for man, and an awareness of the inherent physical characteristics and limitations of media and materials. The objectives of the studio are: (1) to guide the student in observing aspects of the physical and social environment; to find, categorize and associate the information into fundamental structures and patterns of relationships; (2) to apply theories generated in the lecture courses to situations in the physical environment, implementing by categorizing the courses into behaviour materials, structures and mechanical systems, behaviour of man, and communications; (3) to provide the student with an opportunity to develop skill in using different “techniques” for analyzing and synthesizing problems in the physical environment; (4) to establish a relationship between faculty and students; (5) to provide a vehicle for persons from faculties of different disciplines and from outside of the University to discuss with students their problems and projects from different points of view.

Bachelor of Architecture Program
The Bachelor of Architecture program increases the emphasis on architectural design and professional aspects of architecture. There are opportunities for students to develop their own areas of interest, and the final two terms of the program are normally devoted to a design thesis.

The courses for the Bachelor of Architecture Program are intended to prepare the student to demonstrate professional skill in separating, organizing, and conceptualizing actual problems in the man-made environment in his/her role as an architect, alone and in a team; to synthesize mechanical, structural and functional systems into architectural expressions which adapt to social needs and aspirations of society, user, client and community, alone and with the help of others; to adapt his/her skills to (a) real world constraints; (b) to the evolution of social economic and technological changes, and (c) to influence change both in constraints and environmental problems and know the current methods and procedures in professional practice for defining and solving environmental problems; to organize patterns of behaviour which assure continuing development for professional competence and relevance at all times; and to pass the examination for registration as an architect if he/she aspires to become a practising professional.

Note
Students are expected to defray costs of materials in connection with studio projects. There is a $25.00 studio/course fee for each term.

See Recommended Core Program for course arrangement, page 10:8.
Program for the Degree of Bachelor of Environmental Studies  
(Pre-Professional Architecture)

<table>
<thead>
<tr>
<th>Year/Term</th>
<th>Technology Theme Area</th>
<th>Ecology Theme Area</th>
<th>Culture Theme Area</th>
<th>Design Theme Area</th>
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</thead>
<tbody>
<tr>
<td>1-A</td>
<td>ARCH 112 Mathematics</td>
<td>ARCH 195 Introduction to Architecture</td>
<td>ARCH 142 Iconography I (1 credit)</td>
<td>ARCH 192 Design Fundamentals (1.5 credits)</td>
</tr>
<tr>
<td>Fall</td>
<td>ARCH 171 Theories and Technologies of Building</td>
<td>ARCH 195 Introduction to Architecture</td>
<td>ARCH 142 Iconography I (1 credit)</td>
<td>ARCH 192 Design Fundamentals (1.5 credits)</td>
</tr>
<tr>
<td>Sept-Dec</td>
<td>ARCH 171 Theories and Technologies of Building</td>
<td>ARCH 195 Introduction to Architecture</td>
<td>ARCH 142 Iconography I (1 credit)</td>
<td>ARCH 192 Design Fundamentals (1.5 credits)</td>
</tr>
<tr>
<td>TOTAL 4 cr</td>
<td>CS 100 Introduction to Computer Usage</td>
<td>ARCH 171 Theories and Technologies of Building</td>
<td>ARCH 195 Introduction to Architecture</td>
<td>ARCH 193 Design Fundamentals and Studio (1.5 credits)</td>
</tr>
<tr>
<td>1B</td>
<td>ARCH 163 Statics and Structural Analysis</td>
<td>ARCH 143 Iconography II (1 credit)</td>
<td>ARCH 193 Design Fundamentals and Studio (1.5 credits)</td>
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<tr>
<td>Winter</td>
<td>ARCH 172 Building Construction I</td>
<td>ARCH 143 Iconography II (1 credit)</td>
<td>ARCH 193 Design Fundamentals and Studio (1.5 credits)</td>
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<tr>
<td>Jan-Apr</td>
<td>ARCH 172 Building Construction I</td>
<td>ARCH 143 Iconography II (1 credit)</td>
<td>ARCH 193 Design Fundamentals and Studio (1.5 credits)</td>
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<tr>
<td>TOTAL 4 cr</td>
<td>A student is free to use the off-term as he wishes. The Department of Co-ordination does not provide their normal services to arrange employment for students in this term. (See Chapter 5)</td>
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<tr>
<td>Off-Term</td>
<td>ARCH 262 Strength of Materials</td>
<td>ARCH 246 Foundations of Europe (1 credit)</td>
<td>ARCH 292 Design Concepts and Studio (1.5 credits)</td>
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<tr>
<td>Spring</td>
<td>ARCH 266 Building Construction II</td>
<td>ARCH 246 Foundations of Europe (1 credit)</td>
<td>ARCH 292 Design Concepts and Studio (1.5 credits)</td>
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<tr>
<td>May-Aug</td>
<td>ARCH 262 Strength of Materials</td>
<td>ARCH 246 Foundations of Europe (1 credit)</td>
<td>ARCH 292 Design Concepts and Studio (1.5 credits)</td>
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<tr>
<td>2A</td>
<td>ARCH 266 Building Construction II</td>
<td>ARCH 246 Foundations of Europe (1 credit)</td>
<td>ARCH 292 Design Concepts and Studio (1.5 credits)</td>
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<tr>
<td>Fall</td>
<td>ARCH 262 Strength of Materials</td>
<td>ARCH 246 Foundations of Europe (1 credit)</td>
<td>ARCH 292 Design Concepts and Studio (1.5 credits)</td>
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<tr>
<td>Sept-Dec</td>
<td>ARCH 266 Building Construction II</td>
<td>ARCH 246 Foundations of Europe (1 credit)</td>
<td>ARCH 292 Design Concepts and Studio (1.5 credits)</td>
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<tr>
<td>TOTAL 4 cr</td>
<td>For all Co-op terms, job interviews are arranged on campus during the preceding study term by the Department of Co-ordination, who maintain liaison with prospective employers. The experience a student may get during the work term may include: introduction to office procedures; assisting in design presentation and model building; minor drafting assignments.</td>
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<tr>
<td>Co-op Work Term 1 Winter</td>
<td>ARCH 276 Timber: Design, Structure and Construction</td>
<td>ARCH 224 An Introduction to Landscape Design</td>
<td>ARCH 247 Renaissance to Revolution (1 credit)</td>
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<tr>
<td>Jan-Apr</td>
<td>ARCH 276 Timber: Design, Structure and Construction</td>
<td>ARCH 224 An Introduction to Landscape Design</td>
<td>ARCH 247 Renaissance to Revolution (1 credit)</td>
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<td>2B</td>
<td>ARCH 276 Timber: Design, Structure and Construction</td>
<td>ARCH 224 An Introduction to Landscape Design</td>
<td>ARCH 247 Renaissance to Revolution (1 credit)</td>
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<td>Spring</td>
<td>ARCH 276 Timber: Design, Structure and Construction</td>
<td>ARCH 224 An Introduction to Landscape Design</td>
<td>ARCH 247 Renaissance to Revolution (1 credit)</td>
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<tr>
<td>May-Aug</td>
<td>ARCH 276 Timber: Design, Structure and Construction</td>
<td>ARCH 224 An Introduction to Landscape Design</td>
<td>ARCH 247 Renaissance to Revolution (1 credit)</td>
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<tr>
<td>TOTAL 4 cr</td>
<td>The type of experience a student may obtain in this term includes assisting in design presentation and model buildings; assisting in preparation and corrections to site plans, floor plans, and elevations, and on-site measurements.</td>
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<tr>
<td>Co-op Work Term 2 Fall</td>
<td>ARCH 362 Steel: Design, Structure and Construction</td>
<td>ARCH 247 Renaissance to Revolution (1 credit)</td>
<td>ARCH 293 Design Concepts and Studio (1.5 credits)</td>
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<tr>
<td>Sept-Dec</td>
<td>ARCH 362 Steel: Design, Structure and Construction</td>
<td>ARCH 247 Renaissance to Revolution (1 credit)</td>
<td>ARCH 293 Design Concepts and Studio (1.5 credits)</td>
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<tr>
<td>TOTAL 3.5 cr</td>
<td>The type of experience a student may obtain in this term includes design research; detailed design developments; design presentation; assisting in preparation of site plans, floor plans, elevations, building cross-sections.</td>
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<tr>
<td>Co-op Work Term 3 Spring</td>
<td>ARCH 363 Concrete: Design, Structure and Construction</td>
<td>ARCH 372 Building Services I</td>
<td>ARCH 392 Design Concepts and Studio (2 credits)</td>
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<tr>
<td>May-Aug</td>
<td>ARCH 363 Concrete: Design, Structure and Construction</td>
<td>ARCH 372 Building Services I</td>
<td>ARCH 392 Design Concepts and Studio (2 credits)</td>
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<tr>
<td>3B</td>
<td>ARCH 363 Concrete: Design, Structure and Construction</td>
<td>ARCH 372 Building Services I</td>
<td>ARCH 392 Design Concepts and Studio (2 credits)</td>
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<tr>
<td>Fall</td>
<td>ARCH 363 Concrete: Design, Structure and Construction</td>
<td>ARCH 372 Building Services I</td>
<td>ARCH 392 Design Concepts and Studio (2 credits)</td>
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<tr>
<td>Sept-Dec</td>
<td>ARCH 363 Concrete: Design, Structure and Construction</td>
<td>ARCH 372 Building Services I</td>
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<td>TOTAL 23 cr</td>
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### Program for the Degree of Bachelor of Architecture

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<th>Year/Term</th>
<th>Systems and Measures</th>
<th>Culture</th>
<th>Design</th>
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<td>Theme Area</td>
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<td>Co-op Work Terms</td>
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<td>decide about his future</td>
<td>research;</td>
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<td>development</td>
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<td>time a student may continue</td>
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<tr>
<td>4-A</td>
<td>ARCH 348 Italian Renaissance</td>
<td>ARCH 446 Italian</td>
<td>ARCH 492 Design</td>
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<td>Fall</td>
<td>Architecture</td>
<td>Urban History</td>
<td>Studio</td>
</tr>
<tr>
<td>Sept-Dec</td>
<td>ARCH 448 Rome and the</td>
<td></td>
<td>(2 credits)</td>
</tr>
<tr>
<td>TOTAL 3½ cr.</td>
<td>Campagna</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4-B</td>
<td>ARCH 452 Specifications</td>
<td>FE</td>
<td>ARCH 493 Design</td>
</tr>
<tr>
<td>Winter</td>
<td>FE</td>
<td></td>
<td>Studio</td>
</tr>
<tr>
<td>Jan-Apr or</td>
<td>FE</td>
<td></td>
<td>(2 credits)</td>
</tr>
<tr>
<td>Spring May-Aug</td>
<td>ARCH 499</td>
<td></td>
<td></td>
</tr>
<tr>
<td>TOTAL 3½ cr.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Co-op Work Terms</td>
<td>This is the last Co-op</td>
<td>Schematics and</td>
<td>Small project</td>
</tr>
<tr>
<td>6 &amp; 7</td>
<td>term of eight months</td>
<td>small project</td>
<td>design on large</td>
</tr>
<tr>
<td>Winter or</td>
<td>before the final year of</td>
<td>design;</td>
<td>projects and</td>
</tr>
<tr>
<td>Spring, and</td>
<td>study. On the basis of</td>
<td>preparation of</td>
<td>assisting</td>
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<tr>
<td>Fall</td>
<td>previous experience in a</td>
<td>site plans and</td>
<td>construction</td>
</tr>
<tr>
<td>May-Dec</td>
<td>variety of jobs, a student</td>
<td>details;</td>
<td>superintendent</td>
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<td></td>
<td>is capable of handling</td>
<td>development of</td>
<td>on large</td>
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<td></td>
<td>somewhat advanced work in</td>
<td>special details;</td>
<td>projects.</td>
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<td></td>
<td>professional offices such as:</td>
<td>co-ordination of</td>
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<td></td>
<td>design research; preparation</td>
<td>consultants'</td>
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<td></td>
<td>of design</td>
<td>work, assisting</td>
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<td></td>
<td>of site plans and details;</td>
<td>site architect</td>
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<td>development</td>
<td>on small</td>
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<td>of special details; co-</td>
<td>projects and</td>
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<td>ordination of</td>
<td>assisting</td>
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<td></td>
<td>consultants' work, assisting</td>
<td>construction</td>
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<td></td>
<td>site architect on small</td>
<td>superintendent</td>
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<td></td>
<td>projects on large projects.</td>
<td>on large</td>
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<tr>
<td>5-A</td>
<td>FE</td>
<td>ARCH 592 Design</td>
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<tr>
<td>Winter</td>
<td></td>
<td>Studio</td>
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<tr>
<td>Jan-Apr</td>
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<td>(3 credits)</td>
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<tr>
<td>TOTAL 3½ cr.</td>
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<tr>
<td>5-B</td>
<td>ARCH 555 Architectural</td>
<td>ARCH 593 Design</td>
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<tr>
<td>Spring</td>
<td>Practice</td>
<td>Studio</td>
<td></td>
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<tr>
<td>May-Aug</td>
<td></td>
<td>(3 credits)</td>
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<tr>
<td>TOTAL 3½ cr.</td>
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<tr>
<td>TOTAL 14 credits.</td>
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### Electives
Students are permitted to study courses given by the University at large which are in the area of the student's individual interest, with the aim of providing better orientation and more interdisciplinary communications.

### Notes
1. Department approval is mandatory for a FE.
2. Students enrolled in 4A in Waterloo are required to take three half-credit, approved electives in addition to Architecture studio requirements.
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:

a) Maintain a minimum cumulative overall average of C– (60.0) calculated at the end of each term of study.

b) Pass the studio course.

c) 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 two requirements will receive the academic decision “May not Proceed.” At the discretion of the Promotions Committee such students must raise their cumulative average to a minimum of C– (60.0) by repeating the term or by repeating courses which are detrimental to their average and/or by taking approved elective courses before enrolling in the next higher level core or studio courses. The minimum cumulative average must be attained in the next calendar year. Failing this, the student will be required to withdraw. Failure to maintain the minimum cumulative average of C– (60.0) by the end of the next higher level term will result in the academic decision “Required to Withdraw.”

2. Studio Courses

Students who fail a studio course (ARCH 192, 193, 292, 293, 392, 393, 492, 493, 592, 593) but who satisfy the other requirements will receive the academic decision “May not Proceed.” Such students must repeat and pass the studio course. Failure to pass the studio in question on the second attempt will result in the academic decision “Required to Withdraw.” Students may not register in any higher level studio course or core courses until the failed studio course is passed. Credit will be retained for courses passed in a term in which a studio course is failed.

3. Elective Courses

Students who fail more than one half 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 two or more one-term core courses or equivalent in any single term (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 a, b, c, above.

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 a, b, c, above.

6. Course Loads

Normally students of the School are permitted to take only one more or one fewer half-courses than that prescribed for the particular year and term in which they are registered. Any further addition or reduction to the student’s program must be approved by the Undergraduate Officer of the School of Architecture.

7. Appeals

See Faculty procedure, p. 10:4.
Co-operative Programs
The Bachelor of Environmental Studies program includes six terms of study, three four-month co-operative work-terms and one "off-term." The subsequent Bachelor of Architecture program consists of four terms of academic study and two co-operative work-terms, of eight months each. The work-terms must be approved by the Department of Co-ordination and Placement.

Note
The "off-term" in the Bachelor of Environmental Studies pre-professional program follows the first two terms of study (from September to April) in Year One. Students may use the "off-term" as a vacation period or they may seek temporary employment. Any employment arrangements made for the "off-term" are the student's own responsibility.

The terms are arranged as indicated in the charts in Chapter 3.

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 interrelationships with various environments, including natural and managed landscapes, buildings and cities, small groups, communities, and whole societies. Through problem- and issue-oriented inquiry into such complex relationships, along with related study in contributing academic disciplines, ample scope is provided for acquiring a broad-based education, as well as technical knowledge and skills.

The current emphases in research and scholarship among the faculty fall into three major thematic areas:
1. Sustainable Environmental and Resource Systems
2. Environmental, Social and Technological 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 co-operation 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 multi-disciplinary 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)

The formal admission requirements of the program are listed beginning on page 2:2 of this Calendar. No specific Grade 13 courses are required, but some science or mathematics would be helpful.

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). The English Language Proficiency Program is recorded on the student's academic record as Arts 000 Y. Because of the necessity of communicating research and project results, both in the program and in careers after graduation, ability in English is 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.

Most required courses are taken in the first two years. The first year introductory courses examine major environmental themes from the viewpoints of the natural and social sciences. They also introduce techniques for investigating environmental questions and provide experience in conducting a systematic enquiry through the device of small group projects. In the second year, further work in natural ecology and social sciences 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 required and each student also conducts an individual or group project selected from a wide range of possible topics and problem areas.

The core requirements for years three and four are also project-oriented, comprising a "Seminar-workshop" and senior honours assignment respectively. 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 fourth year also requires participation in a senior honours seminar course which provides the occasion for students to draw together what they have learned and direct it to one of the broad sub-areas within Environment and Resource Studies.

The stress 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. **Themes**

   Students can specialize in one of three themes within the Department by taking the required core program and the identified electives for one of three themes.

   a) Sustainable Environmental and Resource Systems
   b) Environmental, Social and Technological Impact Analysis
   c) Natural Area Management

3. **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.

4. **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.

5. **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 under "Interdisciplinary Options".

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6. **Field Study Program (FSP)**

   In 1980, 1983 and 1987, under the direction of a faculty member, ERS students had the opportunity to spend a term in India studying various environment/development issues. Such Field Study Program opportunities in India and elsewhere will continue to be available to ERS students on an intermittent basis.

   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

<table>
<thead>
<tr>
<th>Year One</th>
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<tbody>
<tr>
<td>ENV S 195</td>
<td>Introduction to Environmental Studies</td>
</tr>
<tr>
<td>ERS 100(F)</td>
<td>Issue Analysis and Problem-Solving 1</td>
</tr>
<tr>
<td>ERS 101(W)</td>
<td>Issue Analysis and Problem-Solving 2</td>
</tr>
<tr>
<td>ERS 150(F)</td>
<td>Environmental Methods &amp; Techniques</td>
</tr>
<tr>
<td>ENV S 178</td>
<td>Introduction to Environmental Research Methods</td>
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<tr>
<td><strong>plus electives for a total of five term courses for the Fall term and five term courses for the Winter term.</strong></td>
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<table>
<thead>
<tr>
<th>Year Two</th>
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<tbody>
<tr>
<td>ENV S 200</td>
<td>Field Ecology</td>
</tr>
<tr>
<td>ERS 290/291</td>
<td>Seminar-Workshop</td>
</tr>
<tr>
<td>ERS 295</td>
<td>Development of Environmental Thought 1</td>
</tr>
<tr>
<td><strong>plus electives for a total of five term courses for the Fall term and five term courses for the Winter term.</strong></td>
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<tr>
<td>Note that 200, and/or 295 may be taken in years other than Year Two.</td>
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<th>Year Three</th>
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<tbody>
<tr>
<td>ERS 390A/390B</td>
<td>Seminar-Workshop (with consent of Faculty, 391A, 391B, may be taken in place of 390A, 390B.)</td>
</tr>
<tr>
<td>ERS 396</td>
<td>Development of Environmental Thought 2</td>
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<tr>
<td><strong>plus electives for a total of five term courses for the Fall term and five term courses for the Winter term.</strong></td>
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Environmental Studies
Environment and Resource Studies

**Note:** Students who would like additional flexibility in fourth year, such as being off campus for the year, MUST take ERS 295 in second year, ERS 396 and ERS 400 in third year.

**Year Four**
ERS 400 Senior Honours Seminar
ERS 490A/490B Senior Honours Assignment (with consent of Faculty, 491A/491B or 492A/492B may be taken in place of 490A/490B).

*plus electives for a total of ten term courses for the Fall/Winter Session.*

**The Honours Co-operative Program**
Terms 1A, 1B, and 4A, 4B are the same as Years One and Four respectively of the Regular program. During Fall term of Year One, those interested may apply to enter the Co-operative program effective with the beginning of Term 1B. The remainder of the Co-operative program is as follows:

**Term 2A**
ENV S 200 Field Ecology
ERS 290 Seminar-Workshop
ERS 295 Development of Environmental Thought 1
*plus electives for a total of five term courses. With consent of Undergraduate Officer, 200 may be taken in Term 3A or Term 3B.*

**Term 2B**
ERS 291 Seminar-Workshop
*plus electives for a total of five term courses.*

**Term 3A**
ERS 390A Seminar-Workshop
ERS 396 Development of Environmental Thought 2
*plus electives for a total of five term courses*

**Term 3B**
ERS 391A Seminar-Workshop
*plus electives for a total of five term courses.*

**Note 1**
The arrangement of academic and work terms, and further information on Co-operative study generally, are given in Chapter 5 of the Calendar.

**The Theme Programs**

*a) Sustainable Environmental and Resource Systems*
Theme Coordinators: Faculty
This theme is intended to introduce students to the broad range of environmental, social, political and economic factors affecting the development and implementation of resource policy and management in Canada. A particular focus exists on the technical and economic potential for, impacts of, and implementation strategies for conservation alternatives. Other areas of interest include water and solid waste management. The program is as follows:

**Year One**
 Required: Regular Program

**Year Two**
 Required: Regular Program
**Theme Core**
ERS 218 Introduction to Sustainable Environmental and Resource Systems

**Year Three**
 Required: Regular Program
**Theme Core**
ERS 318 Case Studies in Sustainable Environmental and Resource Systems

Two elective courses (see note below)

**Year Four**
 Required: Regular Program
**Theme Core**
ERS 418 Seminar on Strategies for Sustainable Development

**Note**
Electives are suggested from a range of economic, political science, planning and geography courses. See Themes Coordinators for up-to-date listing.

*b) Environmental, Social and Technological Impact Assessment*
Theme Coordinators: R. Gibson, S. Lerner, G. Michalenko
This theme prepares students to identify, analyse, manage and monitor the wide range of complex effects that human activities have on natural and social environments. This mix of skills and interests is referred to as technology, environmental or social impact assessment (TA/EIA/SIA). The program is as follows:

**Year One**
 Required: Regular Program

**Year Two**
 Required: Regular Program
**Theme Core**
ERS 241 Introduction to Environmental & Social Impact Assessment

**Year Three**
 Required: Regular Program
**Theme Core**
ERS 337 Environmental Impact Assessment
ERS 336 Social Impact Assessment

**Year Four**
 Required: Regular Program
**Theme Core**
ERS 445 Practicum in TA/EIA/SIA
Note
Electives in each year are chosen from a variety of courses including some in communication skills, and may be selected to emphasize the social sciences or the natural/physical sciences, depending upon a student's interests. See Theme Coordinators to discuss suggested electives.

c) Natural Area Management
Theme Coordinator: G. Priddle
This theme has been developed for students aspiring to be professional managers of natural areas, that is parks, reserves or recreational areas that require protective management and/or sensitive uses of their major natural features. The theme is as follows:

Year One
Required: Regular Program

Year Two
Required: Regular Program
Theme Core
ENV S 202 Social Science Approaches to Environmental Problems
ENV S 334 Park Management (Cross-listed as REC 334)

Year Three
Required: Regular Program
Theme Core
ENV S 433 People in Natural Areas (Cross-listed as REC 433)
ENV S 417 Land Use History & Landscape Change

Year Four
Required: Regular Program
Theme Core
ENV S 434 Ecological Resources of Parks
REC 410 Planning of Recreation Facilities
GEOG 461 Land Dereliction & Rehabilitation 1
GEOG 462 Land Dereliction & Rehabilitation 2

Note
Students may want to develop their own particular specialties for protected area management. Specialization with this theme could be accommodated by concentrating on options from the earth and life sciences, history and anthropology, management studies or public administration. Consult the Theme Coordinator about these possibilities as well as about suggested electives.

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.

Environmental Studies
Environment and Resource Studies
Geography

Minor Programs
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 Environment and Resource Studies. A Minor can be in any area such as Anthropology, Canadian Studies, Chemistry, Management Studies, Personnel and Administrative Studies, Psychology, etc.

Options
Students can elect to take one of the recognized Options within the Faculty of Environmental Studies or outside the Faculty in Society, Technology and Values (STV), Legal Studies, Canadian Studies, Gerontology, Iberoamerican Studies, Management Studies, Peace and Conflict Studies, Studies in Personality and Religion or Women's Studies. Consult the Calendar under these headings for more information.

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 10:18.

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 known as the Senior Honours Thesis.

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 10:19). 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 are admitted only after first year on the basis of academic standing and interviews. 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 10:18. 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. Co-op students may transfer to the regular Honours Geography program at any time, if they are in good standing.

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 8:24).

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 Doctoral (PhD) graduate programs. At the graduate level course work and research are concentrated on a specific subfield of Geography. Areas of research specialization include applied physical geography, air photo interpretation and remote sensing, urban and economic geography, agricultural geography and rural development, regional planning and development, resources management, Canada and Europe.

Environmental Studies
Geography

Bachelor of Environmental Studies

(geography program)

A) Three Year Program

Year One
GEOG 101 Introduction to Human Geography
GEOG 102 Introduction to Physical Geography
GEOG 160 Introduction to Cartography and Map Analysis

Electives: (see notes below)

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

One of:
GEOG 208 Applied Climatology
GEOG 309 Physical Climatology

One of:
GEOG 203 Regional Geography
GEOG 204 Soviet Union
GEOG 205 Africa
GEOG 220A World Regions
GEOG 221 The United States and additional courses so that a student should have completed by the end of the second year 20 term courses including one English course from ENGL 109, 129R, 140R, 150, 209, 210.

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 Chairman (Undergraduate Studies). Normally, approval for a 6th course will be considered only if the cumulative Geography average is B+ or higher.
Environmental Studies
Geography

3. Average Requirements
Students must maintain an overall cumulative average of 60% and a major cumulative average of 65%. All required courses must be passed.

4. Other Comments
See notes 4, 5, 6, and 7 on Four Year programs.

B) FOUR YEAR PROGRAMS (HONOURS REGULAR AND CO-OP, GENERAL)

Year One
GEOG 101 Introduction to Human Geography
GEOG 102 Introduction to Physical Geography
GEOG 160 Introduction to Cartography and Map Analysis
ENV S 173 Introduction to Environmental Research Methods

Electives including Geography and one of ENGL 109, 129R, 140R, 150 taken in Year One or ENGL 209, 210 taken in Year Two.

Year Two
ENV S 203 Field Ecology
GEOG 201 Geomorphology and Soils
GEOG 202 Economic and Urban Geography
GEOG 275 Introductory Air Photo Analysis and Remote Sensing
ENV S 273 Advanced Environmental Research Methods

One of:
GEOG 208 Applied Climatology
GEOG 309 Physical Climatology

One of:
GEOG 203 Regional Geography
GEOG 204 Soviet Union
GEOG 205 Africa
GEOG 229A World Regions
GEOG 221 The United States
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 391 Field Research (not required for Co-op)

One of:
GEOG 307 Social Survey Techniques
GEOG 316 Multivariate Statistics
GEOG 317 Nonparametric Statistics
GEOG 318 Spatial Analysis

GEOG 319 Economic and Social Techniques for Regional Planning
GEOG 360 Preparation of Maps and Illustrations
GEOG 375 Air Photo Interpretation
GEOG 376 Environmental Remote Sensing
ENV S 378 Applications of Computer Programming in Environmental Studies

Honours students take:
GEOG 390 Senior Honours Thesis Proposal

Electives: see notes below.

Year Four
Honours students take:
GEOG 490A/B Senior Honours Thesis

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. 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 Chairman (Undergraduate Studies). Normally, approval for a 6th 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 program must maintain an overall cumulative average of 65.0 and a major cumulative average of 70.0. All required courses must be passed.

4. Foreign Language Requirement
Students considering graduate work should take at least two term courses in a foreign language.

5. 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.
6. 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.

7. 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, GEOG 391 and GEOG 475A, B, C. Such a program must be arranged with the Associate Chairman (Undergraduate Studies) and the faculty members involved.

8. Honours Co-operative Program
Students are admitted to the Co-op program only after the first year and enter their first work term in the winter of the second year. The Honours Co-op program has the same academic requirements as the Honours Regular program. Admission to the Honours Co-op program follows after Honours standing is attained in Year One and after interviews by the Geography Department in the week after lectures end in the Winter term. Normally, all students achieving Honours standing are admitted.

Co-op Course Scheduling Recommendations

<table>
<thead>
<tr>
<th>Year One</th>
<th>GEOG 101, 102, 160, 275, ENV S 178</th>
</tr>
</thead>
<tbody>
<tr>
<td>Year Two</td>
<td></td>
</tr>
<tr>
<td>Fall Term 2A</td>
<td>ENV S 200 and 278</td>
</tr>
<tr>
<td>One of: GEOG 208, 309 Electives, one of which must be ENGL 109, 129R, 146R, 150 taken in Year One or ENGL 209,210A, 210C preferably taken in spring term 2B</td>
<td></td>
</tr>
<tr>
<td>Winter Work Term 1</td>
<td></td>
</tr>
<tr>
<td>Spring Term 2B</td>
<td>GEOG 201, 202, and one of: 203, 204, 205, 220A, 221</td>
</tr>
<tr>
<td>One of: GEOG 307, 316, 317, 318, 319, 360, 375, 376 Electives</td>
<td></td>
</tr>
<tr>
<td>Fall Work Term 2</td>
<td></td>
</tr>
<tr>
<td>Year Three</td>
<td></td>
</tr>
<tr>
<td>Winter Term 3A</td>
<td>GEOG 381 Electives</td>
</tr>
<tr>
<td>Fall Term 3B</td>
<td>GEOG 390 Electives</td>
</tr>
</tbody>
</table>

Environmental Studies
Geography

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.

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 GEOG 490A, B are accepted. Required courses are GEOG 101, 102, 160, 201, 202, 275, a 200 level Regional course (see page 10:17), a 300 level Technique course (see page 10:17), 381 and ENV S 200. If scheduling difficulties arise in meeting required courses, contact the Associate Chairman (Undergraduate Studies) in Geography for possible substitute courses.

Notes on Joint Honours Programs

1. Number of Credits
The minimum number of term courses in Geography/Environmental Studies for students registered in Joint Honours programs is 14.

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. Courses designated as “Environmental Studies” 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 below).

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 303 Geographical Hydrology
GEOG 304 Field and Laboratory Techniques in Geomorphology
GEOG 308A Physical Climatology
GEOG 400 Climatic and Periglacial Morphology
GEOG 401 Glacial Geomorphology and Contemporary Applications
GEOG 406 Tropical Geomorphology
GEOG 408 Atmospheric Resource Management
GEOG 409 Energy Balance Climatology
GEOG 451 Soils Geography
GEOG 461 Land Dereliction and Rehabilitation 1
GEOG 462 Land Dereliction and Rehabilitation 2
ARCH 224 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 Geomorphology
EARTH 370 Economic Geology
EARTH 438 Engineering Geology
EARTH 440 Quaternary Geology
EARTH 441 Introductory Quaternary Paleocoeology
EARTH 456 Physical Hydrogeology
EARTH 456 Chemical Hydrogeology
SCI 220 Chemistry of Pollution
SCI 250 Environmental Geology
SCI 453 The Seas and Man’s Effect Upon Them
SCI 454 The Inland Waters and Man’s Effect Upon Them

Canadian Geography

GEOG 261 Cities in Canada
GEOG 300 Geomorphology, Southern Ontario Environment
GEOG 309 Physical Climatology
GEOG 311 Regional Industrial Development
GEOG 315 Agricultural Geography
GEOG 322 Geographical Study of Canada
GEOG 352 The Rural-Urban Fringe
GEOG 359 Geography of Energy
GEOG 422 Canada

plus other Canadian Content Courses (page 15:4).

Environmental and Resources Management

GEOG 303 Geographical Hydrology
GEOG 315 Agricultural Geography
GEOG 333 Recreation Geography
GEOG 352 The Rural-Urban Fringe
GEOG 356 Resources Management
GEOG 357 Conservation and Resource Management
GEOG 358 Water Planning and Management
GEOG 359 Geography of Energy
GEOG 408 Atmospheric Resource Management
GEOG 414 Energy Resources Management
GEOG 452 Problems of Rural Land Use
GEOG 461 Land Dereliction and Rehabilitation 1
GEOG 462 Land Dereliction and Rehabilitation 2
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 Economic Geology
ECON 355 Economics of Energy and Natural Resources
ECON 361 Cost Benefit Analysis and Project Evaluation
ECON 451 Advanced Topics in Resource Economics
ENV S 201 Introduction to Environmental and Planning Law
ENV S 401 Environmental Law
ENV S 402 Planning Law
ENV S 417 History of Landscape Change
ENV S 433 People in Natural Areas
ENV S 444 Land Evaluation and Resources Management
ENV S 500 Professional Development in Environmental Management
GEN E 351 Information Technology and Society
Environmental Studies
Geography

ERS 218 Introduction to Canadian Energy Issues
ERS 220 Introduction to Environmental Economics
ERS 241 Introduction to Environmental and Social Impact Assessment
ERS 318 Soft Energy Paths in Canada
ERS 320 Environmental Economics (ECON 357)
ERS 351 Organizations and Environmental Management
ERS 418 Energy Research Seminar
PLAN 255 Planning Surveys and Analysis
REC 210 Organization and Administration of Recreation Services
REC 230 Introduction to Outdoor Recreation
REC 301 Sociology of Leisure
REC 302 Travel and Tourism
REC 331 Outdoor Education
REC 334 Park Management
REC 432 Interpretation
REC 434 Advanced Park Planning and Management
REC 435 Recreation Resource Policy
SCI 250 Environmental Geology
SCI 453 The Seas and Man's Effects Upon Them
SCI 454 The Inland Waters and Man's Effects Upon Them
SOC 286 Sociology of Ecology
SOC 347 Sociology of Leisure

Regional Development
GEOG 311 Regional Industrial Development
GEOG 315 Agricultural Geography
GEOG 350 Regional Urban Systems
GEOG 319 Economic and Social Techniques for Regional Planning
ECON 333 Interregional Economics
ECON 335 Economic Development
ECON 361 Cost Benefit Analysis and Project Analysis
ECON 365 Economic Development of Modern Europe
M SCI 261 Managerial and Engineering Economics 1
M SCI 461 Managerial and Engineering Economics 2
PLAN 232 Rural Planning and Development
PLAN 259 Regional Planning and Development
PLAN 333 The Sociology of Regional Planning
PLAN 360 Technology in Urban and Regional Planning
PLAN 370 Land Development Planning
P SCI 343 Canadian Municipal Government
P SCI 344 The Politics of Local Government
REC 302 Travel and Tourism
SOC 256 Ethnic and Racial Relations

Regional Geography
GEOG 225R Urbanization in the Third World
GEOG 226R Food, Agriculture, and Integrated Rural Development in the Third World
GEOG 204 Soviet Union
GEOG 205 Africa
GEOG 220A/B World Regions
GEOG 221 The United States
GEOG 322 Geographical Study of Canada
GEOG 323 Comparative Regional Problems
GEOG 325R Topics in Development of the Third World
GEOG 332 Topics in Population Geography: Health and Disease
GEOG 421A/B Europe and the Mediterranean
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
SOC 252 Migration and Society

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 10:19).

Methods and Techniques
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 360 Preparation of Maps and Illustrations
GEOG 375 Air Photo Interpretation
GEOG 376 Environmental Remote Sensing
GEOG 403 Computer Cartography
GEOG 404 Cartographic Production and Design
GEOG 407 Field and Lab Techniques in Geomorphology
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
PLAN 255 Planning Surveys and Analysis
Environmental Studies
Urban and Regional Planning

Urban-Economic Geography
GEOG 251 Cities in Canada
GEOG 311 Regional Industrial Development
GEOG 315 Agricultural Geography
GEOG 345 The City as a System
GEOG 356 Regional Urban Systems
GEOG 352 The Rural-Urban Fringe
GEOG 356 Geography of Energy
GEOG 411 Geography of Manufacturing Firms and Industries
GEOG 448 Urban Historical Geography
GEOG 450 Urban Regional Systems
GEOG 452 Problems of Rural Land Use
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 345 Urban Economics
ECON 345 Industrial Organization
ENV S 201 Introduction to Environmental and Planning Law
ENV S 402 Planning Law
PLAN 330 Urban Social Planning
PLAN 370 Land Development Planning

GEOGRAPHY MINOR FOR HONOURS STUDENTS IN OTHER DEPARTMENTS
Any ten term courses in Geography among which can be included ENV S 195 and ENV S 290.

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, includes urban-centred or core regions and rural components in which the policy emphasis is on environmental issues and other contexts typical of the Canadian scene, in which resource potentials are not yet realized, and where development issues and problems of human adjustment are in the forefront.

To implement this approach, the School of Urban and Regional Planning has gathered a team of faculty with diverse academic and practical planning experience.

The broad aim of the School is to prepare the student for active participation in the planning process. This approach gives equal emphasis to the ‘why’ and ‘how’ of planning and requires that a style be adopted that strives for a continuum between classroom and field experience, between planning studies and related disciplines, and between academic studies and future professional practice. Realizing this concept requires integration within the program of selected elements from Geography, social sciences and pure and applied sciences. For this purpose, the School of Urban and Regional Planning has been located in a Faculty with an interdisciplinary approach to a wide range of environmental issues.

The program gives a well-rounded preparation for a wide variety of professional or graduate work in urban planning, regional planning and resource development. Courses on the theory, methods and philosophy of planning provide an integrating framework. The student is also given an opportunity to pursue a special interest in economic, social, and ecological issues in planning, or in planning methodology. This is done through the selection of elective courses. Students are also encouraged to select Senior Honours Essay Topics from these special fields of interest.

The integration of practical work experience into the program is considered an important part of the educational process. Students will be brought into direct contact with the profession and will be exposed to problems typical of those encountered in practice, as well as being introduced to projects and operations far beyond the scope of any university laboratory.

The Honours Co-operative program provides for alternative terms of practical work experience and academic study. Students are admitted to this stream of study at the beginning of their second term of Year Two on the basis of academic standing and interviews. 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 10:23. 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 Advisor, or the Department of Co-operative Education and Career Services.

The Regular program encourages students to actively seek work experience (internship) during the summer months of their second and third years.

Because of the importance of effective communication, incoming students are expected to demonstrate proficiency in written English through the English Language Proficiency Examination offered by the English Department at the start of the fall term. 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, it is highly recommended that students take at least one Grade 13 or 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.
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 or probationary standing at the discretion of the School, which would permit a student to proceed to a subsequent year on a probationary or 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 Planning School 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 2
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 gain 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. Planning students interested in completing an Economics Minor must complete ten term courses in Economics as follows: ECON 101, 102, 201, 202, 231 and one of ECON 211 or 221 (or equivalent approved by the Department of Economics); and at least four of: ECON 241, 333, 335, 341, 343, 345, 353, 355.

6. The School reserves the right to make changes to the curriculum as necessary. Please consult the School prior to registration.

A number of important program guidelines and regulations are covered in the Undergraduate Studies Policy Manual available from the Undergraduate Officer. Policy areas covered include: Admission, Courses, Examinations, English Language Proficiency Requirement, Records and Transfers, Registration, 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

**Year One**
- ARTS 000, PLAN 100 A and B, PLAN 159, PLAN 130
- Electives

**Year Two**
- **Fall Term 2A**
  - ENV S 200, PLAN 256A, ENV S 278
  - Electives

- **Winter Term 2B**
  - PLAN 255, PLAN 256B, ENV S 201
  - Electives

- **Spring Work Term 1**

**Year Three**
- **Fall Term 3A**
  - PLAN 300A, PLAN 307
  - Electives

- **Winter Work Term 2**

- **Spring Term 3B**
  - PLAN 300B, PLAN 330, PLAN 390
  - Electives

**Year Four**
- **Fall Work Term 3**

- **Winter Term 4A**
  - PLAN 456A, PLAN 480A, PLAN 490A
  - Electives

- **Spring Work Term 4**

- **Fall Term 4B**
  - PLAN 456B, PLAN 480B, PLAN 490B
  - Electives

*For complete listing of electives, see Department Undergraduate Manual.*
**Honours Urban and Regional Planning Recommended Program (Regular and Co-op)**

<table>
<thead>
<tr>
<th>YEAR</th>
<th>Required Core Planning Courses</th>
<th>Required Theme Elective Courses</th>
</tr>
</thead>
<tbody>
<tr>
<td>ONE</td>
<td>Plan 100A Introduction to Urban Planning Concepts and Techniques 1</td>
<td>One term course from each of the six categories in the list of Year One Theme Elective Courses (see below). Before making a final selection in these courses, students should check that prerequisites have been covered for courses which they might take in Years Two, Three and Four.</td>
</tr>
<tr>
<td></td>
<td>PLAN 100B Introduction to Urban Planning Concepts and Techniques 2</td>
<td></td>
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<tr>
<td></td>
<td>PLAN 130 Participatory Planning</td>
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<tr>
<td></td>
<td>PLAN 159 Graphics for Planning</td>
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<tr>
<td></td>
<td>ARTS 000 Y English Language Proficiency Exam (no credit)</td>
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</tr>
</tbody>
</table>

**Year One Required Theme Elective Courses**

**Theme Areas**

1. BIOPHYSICAL
2. ECONOMIC THEME
3. POLITICS THEME
4. PHILOSOPHY & ARTS THEME
5. METHODS THEME
6. GENERAL THEME

For a listing of the courses included under each Theme Area, see the current School Undergraduate Manual.

**Note:** Required core and elective courses together will total ten term courses – all courses to be at First-Year level.

<table>
<thead>
<tr>
<th>YEAR</th>
<th>Required Core Planning Courses</th>
<th>Required Theme Elective Courses</th>
<th>Other</th>
</tr>
</thead>
<tbody>
<tr>
<td>TWO</td>
<td>ENV S 200 Field Ecology</td>
<td>Two term courses from list of Second Year Required Theme Areas (see below). Recommended Introductory Theme courses are: PLAN 232, 259, 270.</td>
<td>Two term courses from University offerings (as free electives).</td>
</tr>
<tr>
<td></td>
<td>ENV S 201 Introduction to Environmental and Planning Law</td>
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<tr>
<td></td>
<td>ENV S 278 Advanced Environmental Research Methods</td>
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<tr>
<td></td>
<td>PLAN 255 Planning Surveys and Analyses</td>
<td></td>
<td></td>
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<tr>
<td></td>
<td>PLAN 256A Principles of Environmental Design 1, PLAN 256B Principles of Environmental Design 2,</td>
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<td></td>
</tr>
</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 Manual.

**Note:** Required core and elective courses together will total ten term courses.
### Year Three Required Core Planning Courses

| PLAN 300A Seminar/Workshop Project in Urban and Regional Planning 1, PLAN 300B Seminar/Workshop Project in Urban and Regional Planning 2, PLAN 307 Social Survey Techniques in Planning, PLAN 390 Senior Honours Essay Proposal (no credit weighting). |

### Required Theme Elective Courses

- Three term courses from list of Third Year Required Theme Areas (see below).
- Recommended Major Theme courses are: PLAN 301, 330, 357, 359
- Three term courses from University offerings (as free electives).

### 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 Manual.

**Note:** Required core and elective courses together will total ten term courses.

### Year Four Required Core Planning Courses

| PLAN 456A Political and Administrative Processes in Urban and Regional Planning 1, PLAN 456B Political and Administrative Processes in Urban and Regional Planning 2, PLAN 480A The Philosophy and Methodology of Urban and Regional Planning 1, PLAN 480B The Philosophy and Methodology of Urban and Regional Planning 2, PLAN 490A/PLAN 490B Senior Honours Essay. |

### Required Theme Elective Courses

- Two term courses from list of Fourth Year Required Theme Areas (see below).
- One term course from University offerings (as free elective).

### 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 Manual.

**Note:** Required core and elective courses together will total ten term courses.
Faculty of Human Kinetics and Leisure Studies
Faculty of Human Kinetics and Leisure Studies

The Faculty of Human Kinetics and Leisure Studies was officially formed in the Fall of 1972. This Faculty has gradually evolved from the School of Physical and Health Education (1966-67) and the School of Physical Education and Recreation (1968-72). Within this Faculty, the Department of Health Studies, the Department of Kinesiology, the Department of Recreation and Leisure Studies, and the Dance Group offer academic programs and conduct research.

The programs of the Faculty have developed rapidly in response to student needs and interests and to the changing needs and demands of society. Ten years ago a Regular stream was added to the Co-operative program to enable students who wanted the programs, but not the Co-operative aspects, to attend the University of Waterloo. At the same time elective courses were introduced into each department making it possible for students to pursue, in some depth, a specific area of Kinesiology, Dance, Health Studies or Recreation and Leisure Studies in which they had a special interest. The future promises even greater opportunities for students to specialize in their studies.

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. The three Areas of Concentration, the History-Culture, the Developmental Foundations for Teaching and the Academic Professional area, comprise a balance between studio and classroom work. 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 History, Psychology and Recreation and Leisure Studies offer further career options. A Dance degree may also lead to graduate work at other institutions in choreography, criticism, history, notation, education or therapy.

Health Studies

Students in the Health Studies program examine important health problems and their causes. Of primary interest are diseases such as lung cancer and heart disease in which behaviour is an important contributing cause. Also of interest are health problems which occur because people do not use preventative health-care services, such as periodic health examinations, vaccinations, and screening procedures, or because they do not comply with prescribed medical treatment.

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 graduate studies in medicine, public health, health administration, environmental health, health 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 courses including practia in sports medicine and cardiac rehabilitation, project-oriented courses in biomechanics and sport psychology, and clinical studies such as the role of cognitive dysfunction in motor skills. Students with this preparation in Kinesiology find careers in areas such as ergonomics, special education, fitness management, and exercise therapy for the elderly. Further specialization in graduate schools or in professional programs (e.g. medicine or chiropractic) is also pursued by our top graduates.

The program may be further tailored to individual interests and careers by selecting elective courses in renowned departments on campus, many of which offer Joint Honours degrees with Kinesiology (see Academic Programs section) or a minor (e.g. Chemistry, Biology, Computer Science). Several Option Programs (e.g. 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 degree program encourages students to focus their studies in one or a combination of the following seven areas of concentration:

1. Business Management
2. Cultural Recreation
3. Human Development and Therapeutic Recreation
4. Leisure and the Humanities
5. Parks and Outdoor Recreation
6. Tourism and Commercial Recreation  
7. Urban and Municipal Recreation

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, 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 13 full-time professors, the variety of courses from which students may choose, and the option to select the Co-operative or Regular mode of education, make Recreation and Leisure Studies at the University of Waterloo one of the leading programs of its kind in North America.

Degrees
Health Studies graduates receive an Honours Bachelor of Science degree. Kinesiology graduates receive either an Honours Bachelor of Science degree or a General Bachelor of Science degree. Recreation and Leisure Studies program graduates are granted an Honours Bachelor of Arts degree. Those students who graduate from a Dance program receive an Honours Bachelor of Arts degree or a General Bachelor of Arts degree.

Graduates who have pursued their studies in a Co-operative program and who have successfully completed four work terms, four work reports, and who indeed do finish 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 first 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.

Human Kinetics and Leisure Studies  
Systems of Study  
Admission

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 Human Kinetics and Leisure Studies.

Application from Ontario Secondary Schools
Applicants to the Health Studies program are required to select a university-entrance level program which includes Grade 13 or Ontario Academic Course credits for both Chemistry and Biology. Chemistry and Calculus are being phased in as admission requirements for Kinesiology. Applicants disadvantaged by this change should write directly to the Undergraduate Associate Chairman, Department of Kinesiology. See Chapter 2 for specific admission requirements.

Advanced Standing
Normaly, students transferring to HKLS 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 two years of study at Waterloo (i.e. at least 22 term courses) 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 HKLS. Details are available from the Department of Co-operative Education and Career Services.

Students transferring to the Faculty of Human Kinetics and Leisure Studies 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 of C- (60%) or better has been achieved will be transferred. These courses will not be used in the calculation of cumulative and overall averages.

English Language Proficiency Requirement
The Faculty of Human Kinetics and Leisure Studies feels that a student in any of its programs should be able to demonstrate competency in writing before qualifying for a degree. Therefore, all students entering an HKLS program must write the English Language Proficiency Examination (scheduled during
registration week). A grade of 50% or better on the examination will satisfy the requirement. If a student fails the examination, the requirement can be satisfied by one of the following:

1. Sitting for the examination again and achieving a mark of 50%.
2. Successfully completing the assignments of the UW Writing Clinic.

This requirement normally must be met by the end of Year Two.

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. At the discretion of the chairman of the department 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. 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 re-read.

d) Examination results are issued to individual students by the Registrar. Appeals against faculty decisions made under these regulations should be made in writing to the Associate Chairman, Undergraduate Affairs, of the student’s major department, within one month of publication of the official mark reports.

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) Overall standing will be determined at the end of each academic year for Regular programs and upon completion of the B term for Co-operative programs by 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 22 will be considered Year Two; those who have successfully completed at least 22 term courses but fewer than 32, Year Three; and those with 32 or more, Year Four.

d) It should be noted that all programs use the term-course system (see page 1:7 of this calendar for a description of this system). This means that courses with credit weight of .75 offered by other departments will only count as one term course. Similarly, courses with a credit weight of .25 will be considered as one-half of a term course.

e) Students who are readmitted after being required to withdraw may choose to have their average cleared. See page 11:3 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>
</tr>
<tr>
<td>Health Studies Honours</td>
<td>63</td>
<td>67</td>
</tr>
<tr>
<td>Kinesiology General</td>
<td>53</td>
<td>60</td>
</tr>
<tr>
<td>Recreation Honours</td>
<td>65</td>
<td>70</td>
</tr>
<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>

Kinesiology, Health Studies and Dance students 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. Students enrolled in these programs 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 are designated as “May not proceed in the program.” Recreation and Leisure Studies students who receive two grades of F in one year are required to withdraw. Students in this program who receive a final grade of INC or NMR in any courses are placed in Conditional Standing. (The designation F takes into account all failing grades, i.e. F-, F, and F+.)

If a student clears his/her F, INC, NMR, and DNW grades prior to the next term or session, the decision on his/her grade report may be changed. After eight months grades of INC, NMR, and DNW become grades of F-.
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. Honour Roll
To recognize outstanding academic achievement the Faculty has established the Faculty of Human Kinetics and Leisure Studies Honour Roll.

To be included on the Honour Roll, the student must achieve an 80.0% overall average and an 80.0% major average in the academic year in which the designation is given. A student with an INC, DNW, NMR or F on his/her record will not be included on the list.

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 his/her 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 his/her 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.

Students may complete a segment of their program on a part-time basis but, normally, must successfully complete a minimum of 22 term courses while enrolled in full-time study (i.e. minimum of five courses per term) in the Faculty of Human Kinetics and Leisure Studies. In the case of students who have been granted the equivalent of one year of advanced standing, the HKLS program must be completed in seven years and in the case of students who have been granted the equivalent of two years of advanced standing, the HKLS program must be completed in six years. The Faculty of Human Kinetics and Leisure Studies does not encourage part-time studies but will allow a General degree to be pursued on a part-time or reduced-program basis subject to approval by the Associate Dean of Undergraduate Affairs and the department concerned. Normally, no first-year program for a full-time student may be reduced below the ten courses minimum except in very exceptional circumstances.

Auditing a Course
It is the responsibility of the student to inform the course instructor at the beginning of the course that he or 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. The Associate Chairman may approve up to five term courses (or equivalent). Requests for approval for additional courses must go to the HKLS 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 Human Kinetics and Leisure Studies, Needles Hall, University of Waterloo, Waterloo, Ontario within two months of the completion of the course(s).

Program Selection
Full-time students: All first-year students normally take five term courses in both Fall and Winter terms. In subsequent terms, a student will normally take at least five term courses.

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

All undergraduate honours degree programs in the Faculty of Human Kinetics and Leisure Studies must be successfully completed within eight calendar years from the time the student first enters the program.

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 Chairman for Undergraduate Affairs is the only individual who can grant permission to enrol in a correspondence course. Permission must be granted before the student enrolls in the course and/or the course commences.

Course and Program Changes
a) Up to the end of the first two weeks of lectures, the student may drop or add any elective course without approval, provided he or she does not predetermine a section.
b) After the first two weeks of classes any course may be dropped provided the course instructor initials the drop, and either the Associate Chairman 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 Winter term and July 1 in 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.
c) 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 Chairman, Undergraduate Affairs.
d) Students should note the financial implications of dropping courses or withdrawing from programs (see page 3-3).

Appeals
Students who wish to appeal a grade received for a course should:
i) Contact the instructor associated with the course and attempt to resolve it within one month of the release of grades.
ii) If the student is not satisfied with the discussion, then a written appeal (HKLS Appeal forms can be picked up at each Associate Chairman’s Office) to the Associate Chairman, Undergraduate Affairs of the student’s home department can then be made. This appeal will be reviewed and a decision given by the Associate Chairman.
iii) An unfavourable ruling at the departmental level can be appealed in writing through the Associate Dean of the Faculty, to the HKLS Undergraduate Affairs Committee.
iv) An unfavourable ruling from the HKLS Undergraduate Affairs Committee can be appealed in writing to the Dean of the Faculty of HKLS.

Human Kinetics and Leisure Studies
Program Selection
Academic Programs
Dance

v) An unfavourable ruling from the Dean of HKLS can be appealed in writing to the Academic Vice President of the University.

Academic Programs
Dance

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

To provide the necessary knowledge for varying career interests, two different degree programs are offered: the Honours Bachelor of Arts and the General Bachelor of Arts. The General degree program comprises three years of study and is designed for students who are interested in acquiring an overall knowledge of the subject of dance. The Honours degree program comprises four years of study with the opportunity to specialize in the History-Culture or the Developmental Foundations for Teaching area of concentration. The third area of concentration, the Academic-Professional area, combines an Honours Bachelor of Arts five-year degree program with the Teacher Training Program at The National Ballet School; the student graduates with both an Honours Bachelor of Arts (Dance) and a Diploma from The National Ballet School.

Areas of Concentration (AOC)
The History-Culture area focuses on the art of dance in the Western world, with a view to fostering an understanding of the nature of the art past and present, as well as the factors which influence its development.

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

The Academic-Professional area merges a broad theoretical study of the art of dance with training specific to the teaching of classical ballet. Those interested must consult a faculty advisor for details concerning eligibility and course sequencing.

Joint Honours Degrees
Joint Honours degrees are available with History, Psychology, and Recreation and Leisure Studies. Requirements in the Joint Honours Programs vary and students should consult with the Undergraduate Officer in both departments regarding course sequencing, course or credit requirements, minimum averages and required courses.

Minors
A Minor is a group of approved courses taken by an Honours student in a subject area outside the home department. Minors are available in most departments. Students interested in pursuing a Minor should consult with the Department offering the Minor.
Course Requirements*
To be eligible for the Honours BA degree in Dance, students must successfully complete 44 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
A) Required Dance Courses
   DANCE 110, 111, 220, 230, 231, 233, 336, 410, 411
   Two of DANCE 241, 341 or DANCE 242, 342
   One of DANCE 351, 353
   Either DANCE 234 333, 343, 412 or DANCE 264, 366, 367, 484
B) Required Outside Courses
   MUSIC 100, 111
   PSYCH 101; ANTH 102A; two of ENGL 109, 110, 140R, 141R, 150, 151, 210C; plus
   Six courses in AOC
C) Dance Electives
   Six term courses in Dance
D) Other Electives
   At least five of the ten term course electives must be taken within the Faculty of Arts.

Suggested Course Sequence

<table>
<thead>
<tr>
<th>Year One</th>
<th>Year Two</th>
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</thead>
<tbody>
<tr>
<td>DANCE 110</td>
<td>DANCE 241 or 242</td>
</tr>
<tr>
<td>DANCE 230</td>
<td>DANCE 220</td>
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<tr>
<td>MUSIC 100</td>
<td>Required DANCE</td>
</tr>
<tr>
<td>PSYCH 101</td>
<td>Required AOC</td>
</tr>
<tr>
<td>Elective</td>
<td>Required ENGL</td>
</tr>
<tr>
<td>Elective</td>
<td>Elective</td>
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<tr>
<td>DANCE Elective</td>
<td>DANCE Elective</td>
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<td></td>
<td>DANCE Elective</td>
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<td></td>
<td>Elective</td>
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<td></td>
<td>Elective</td>
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<table>
<thead>
<tr>
<th>Year Three</th>
<th>Year Four</th>
</tr>
</thead>
<tbody>
<tr>
<td>DANCE 336</td>
<td>DANCE 410</td>
</tr>
<tr>
<td>Required DANCE</td>
<td>Required AOC</td>
</tr>
<tr>
<td>Required AOC</td>
<td>Required DANCE</td>
</tr>
<tr>
<td>Elective</td>
<td>Elective</td>
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<tr>
<td>Elective</td>
<td>Elective</td>
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</tbody>
</table>

General Bachelor of Arts Degree Program
A) Required Dance Courses
   DANCE 110, 111, 220, 230, 231, 233, 336
   Two of DANCE 241, 341 or DANCE 242, 342
   One of DANCE 351, 353
B) Required Outside Courses
   MUSIC 100, 111
   PSYCH 101; ANTH 102A
   Two of ENGL 109, 110, 140R, 141R, 150, 151, 210C
C) DANCE Electives
   Five term courses in DANCE
D) Other Electives
   At least four of the nine term course electives must be taken within the Faculty of Arts.

Suggested Course Sequence

<table>
<thead>
<tr>
<th>Year One</th>
<th>Year Two</th>
</tr>
</thead>
<tbody>
<tr>
<td>DANCE 110</td>
<td>DANCE 230</td>
</tr>
<tr>
<td>DANCE 230</td>
<td>DANCE 241 or 242</td>
</tr>
<tr>
<td>MUSIC 100</td>
<td>MUSIC 101</td>
</tr>
<tr>
<td>PSYCH 101</td>
<td>ANTH 102A</td>
</tr>
<tr>
<td>Elective</td>
<td>DANCE Elective</td>
</tr>
<tr>
<td>Elective</td>
<td>DANCE Elective</td>
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<tr>
<td>Elective</td>
<td>Elective</td>
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<td>Elective</td>
<td>Elective</td>
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</tbody>
</table>

Technique Courses
Technique is a highly valuable tool for students in all areas of dance. Ballet and Modern Dance Techniques are offered from beginning to advanced levels. Students may pursue these classes to the technical level of their interest and need. All technique courses have a credit weight of .25. Dance students may apply technique credits to the “Other Electives” section of their degree.

Note
Students enrolled in the BA (Hons) should select area of concentration (AOC) courses appropriate to History-Culture, Developmental Foundations for Teaching, or the Academic-Professional area, in consultation with a faculty advisor.

* Students wishing to pursue the Academic-Professional area of concentration must consult the Undergraduate Officer regarding course selection and sequencing.
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) behavioural factors that contribute to disease, and (d) ways in which health behaviour can be changed.

The curriculum has four core areas:

1. Health Sciences - the scientific facts and principles pertinent to personal and community health. Specific subject areas include: (a) introduction to health sciences, (b) determinants of disease (epidemiology), (c) environmental health, (d) nutrition, and others.

2. Behavioural Sciences - introductions to psychology and sociology, determinants of health behaviour, and health behaviour modification.

3. Biological Sciences - the basic principles of biology, physiology and biochemistry.

4. Evaluation and Research - the principles of statistics and research design aimed at developing sufficient competencies to enable students to evaluate and interpret the findings of health-related research.

Students may apply for admission directly into the Honours Health Studies program, Co-op or Regular. In order to receive the honours BSc degree the student must successfully complete 44 term courses including the following requirements:

Degree Requirements
a) Required Health Studies Courses: (16)
b) Required Kinesiology Courses: (three)
KIN 222, 317, 330
c) Required Courses from other departments: (nine)
BIOL 230, 233, 239
CHEM 123, 123L, 124, 124L
CS 316
PSYCH 101; SOC 101
d) Restricted electives: (four)
One of: ENGL 109 or 210C (recommended for Year One or Two)
One of: PHIL 226, 258 (recommended for Year Four)
Two of: BIOL 211, 240, 241, 330, 350, 441, 455
HLTH 350, 407

Human Kinetics and Leisure Studies
Health Studies

e) Free electives:
12 term courses selected in consultation with the student’s advisor.
*If 433 option taken, an additional elective, presumably at the fourth-year level and approved by the student’s advisor, is required.

Course Sequence

Year One (Co-op and Regular)

<table>
<thead>
<tr>
<th>Fall</th>
<th>Winter</th>
</tr>
</thead>
<tbody>
<tr>
<td>HLTH 101</td>
<td>HLTH 102</td>
</tr>
<tr>
<td>BIOL 230</td>
<td>BIOL 233</td>
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<tr>
<td>CHEM 123</td>
<td>CHEM 124</td>
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<tr>
<td>CHEM 123L</td>
<td>CHEM 124L</td>
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<tr>
<td>SOC 101</td>
<td>PSYCH 101</td>
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<tr>
<td>One Elective</td>
<td>One Elective</td>
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Regular Program

Year Two

<table>
<thead>
<tr>
<th>Fall</th>
<th>Winter</th>
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</thead>
<tbody>
<tr>
<td>HLTH 220</td>
<td>HLTH 210</td>
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<tr>
<td>HLTH 245</td>
<td>HLTH 346</td>
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<tr>
<td>KIN 222</td>
<td>BIO 239</td>
</tr>
<tr>
<td>KIN 317</td>
<td>KIN 330</td>
</tr>
<tr>
<td>One Elective</td>
<td>Two Electives</td>
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Year Three

<table>
<thead>
<tr>
<th>Fall</th>
<th>Winter</th>
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</thead>
<tbody>
<tr>
<td>HLTH 341</td>
<td>HLTH 340</td>
</tr>
<tr>
<td>HLTH 349</td>
<td>HLTH 344</td>
</tr>
<tr>
<td>Four Electives</td>
<td>HLTH 348</td>
</tr>
<tr>
<td>CS 316</td>
<td>Two Electives</td>
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Year Four

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<td>HLTH 431 or 433</td>
<td>HLTH 432 or elective*</td>
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<tr>
<td>HLTH 442</td>
<td>HLTH 443</td>
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<tr>
<td>Three Electives</td>
<td>HLTH 445</td>
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Co-operative Program

Year Two

<table>
<thead>
<tr>
<th>2A (Fall)</th>
<th>2B (Spring)</th>
</tr>
</thead>
<tbody>
<tr>
<td>HLTH 220</td>
<td>HLTH 346</td>
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<tr>
<td>HLTH 245</td>
<td>HLTH 348</td>
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<tr>
<td>KIN 222</td>
<td>HLTH 349</td>
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<tr>
<td>KIN 317</td>
<td>BIO 239</td>
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<tr>
<td>One Elective</td>
<td>KIN 330</td>
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Year Three

<table>
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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>
<td>Three Electives</td>
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<tr>
<td>Two Electives</td>
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</tbody>
</table>
Year Four
4A (Spring)
HLTH 431 or elective
Four Electives

4B (Winter)
HLTH 432 or elective
HLTH 443
HLTH 445
Two Electives

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

Degree Requirements for Joint Honours include:
A) 44 term courses including:
   Health Studies required courses (ten):
   HLTH 101, 102, 245, 341, 348, 349, 431/432 or 443/elective*, 442, 445
   Kinesiology required courses (13):
   KIN 102, 103, 200, 222, 252, 255, 300, 317, 321, 330, 335, 354, 470
   Outside Required (12):
   BIOL 230, 233, CHEM 123, 123L, 124, 124L, CS 102, 316, MATH 106, PHYS 103, PHYS 105, PSYCH 101, SOC 101
   Electives (nine):
   a) Kinesiology - four term courses chosen from those electives available in Kinesiology.
   b) Health Studies - three of HLTH 210, 340, 344, 346, 443, one of PHIL 226, 258.
   c) Free - one term course chosen from any department within the University.
*If 433 option taken, an additional elective presumably at the 4th-year level and approved by the student's advisor, is required.
B) An overall average and major average of 70% is required in the Joint Honours program.

Degree Requirements
Honours Program
Successful completion of 44 term courses is necessary in order to obtain the Honours BSc degree in Kinesiology. The program must be completed in eight years.

a) Required Kinesiology courses:
   KIN 102, 103, 200, 222, 252, 255, 300, 317, 321, 330, 335, 354, 431 or 433, 470.

b) Required courses from other departments:
   *Scientific or Data Analysis Division

Course Substitution
In the case of PHYS 103 and MATH 106 students may elect to take full-year courses in either subject in the appropriate department.

c) 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.

d) Electives: Of the remaining 12 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:

a) Required Kinesiology Courses:
   KIN 102, 103, 200, 222, 252, 255, 300, 317, 321, 335, 354.

b) Required Courses from other departments:
   *Scientific or Data Analysis Division

c) Kinesiology Electives:
   Nine elective courses in Kinesiology.

d) Electives: Of the remaining 12 term courses five must be chosen from outside the Department of Kinesiology.

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.
Course Sequence
Honours and General Program

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

Fall       Winter
KIN 102    KIN 255
KIN 103    BIOL 233
B/OL 230   PHYS 103
MATH 106 or 113A  CHEM 124
PSYCH 101  One Elective

*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

Fall       Winter
KIN 200    KIN 252
KIN 222    KIN 321
SOC 101    KIN 335
PHYS 105   KIN 354
Elective   Elective

Year Three

Fall       Winter
KIN 300    KIN 330†
KIN 317    Five Electives
Four Electives

Year Four

Fall       Winter
KIN 431† or 433†  KIN 470†
Five Electives  Five Electives

Co-operative Program

2A Fall  2B Spring
KIN 200    KIN 252
KIN 222    KIN 300
SOC 101    KIN 321
PHYS 105   KIN 335
Elective   KIN 330†
            KIN 354

3A Winter  3B Fall
Six Electives
            KIN 300
            KIN 317
Four Electives

4A Spring  4B Winter
KIN 431† or KIN 433†  KIN 470†
Five Electives  Five Electives

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

Human Kinetics and Leisure Studies
Kinesiology
Recreation and Leisure Studies

Joint Honours Degrees
Joint Honours degrees with Recreation and Leisure Studies, Psychology, and Economics are available in addition to that with Health Studies (p. 118). Students should consult with the Undergraduate Officer in both departments regarding specific course sequences, course or credit requirements, and minimum averages.

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 the student with the opportunity to specialize in an Area of Concentration which reflects a desired academic and career path.

Degree Requirements
A) Recreation courses (22):

1. Required (12):
   REC 100, 210, 220, 230, 250, 270A, 300 or 301 or 305, 320, 371A, 429, 470, and 471.

2. Recreation Electives (ten):
   Each student must complete additional Recreation electives to meet the required total of 22 Recreation courses.

B) Courses outside the Department of Recreation and Leisure Studies:

1. Required: (nine)
- PSYCH 101 and SOC 101
- Any two sequential English courses: 109 & 110; or 140 & 141; or 150 & 151; or 209 & 210.
- CS 100. Students with a background in CS, with the approval from the Undergraduate Associate Chairman, may take CS 102 in its place.
- Select one course from four of the following seven categories (Restricted Electives):
  a) BUS 121W
  b) ECON 101
  c) A Fine Arts or Performing Arts course
  d) GEOG 101 or ENV S 195
  e) A Science Faculty course
  f) A Health Studies or Kinesiology course
  g) A Political Science or History course

2. Non Recreation Electives: (13)
## Course Sequence

**Year One (Co-op and Regular)**

<table>
<thead>
<tr>
<th>Fall</th>
<th>Winter</th>
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<tbody>
<tr>
<td>REC 100, 210</td>
<td>REC 230, 250</td>
</tr>
<tr>
<td>One of ENGL 109, 140, 150 or 209</td>
<td>One of ENGL 110, 141, 151 or 210</td>
</tr>
<tr>
<td>SOC 101</td>
<td>PSYCH 101</td>
</tr>
<tr>
<td>CS 100</td>
<td>Two Restricted Electives</td>
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<tr>
<td>One Restricted Elective</td>
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**Regular Program**

<table>
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<tr>
<th>Year Two</th>
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</thead>
<tbody>
<tr>
<td>Fall</td>
<td>Winter</td>
</tr>
<tr>
<td>REC 220, 300*, 301*</td>
<td>REC 270A</td>
</tr>
<tr>
<td>One Restricted Elective</td>
<td>Two Recreation Electives</td>
</tr>
<tr>
<td>One or Two Recreation Electives</td>
<td>Three Non-Recreation Electives</td>
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<tr>
<td>Two Non-Recreation Electives</td>
<td>Two Non-Recreation Electives</td>
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<table>
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<tr>
<th>Year Three</th>
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</thead>
<tbody>
<tr>
<td>REC 320, 371A</td>
<td>REC 305*</td>
</tr>
<tr>
<td>One Recreation Elective</td>
<td>Two or three Recreation Electives</td>
</tr>
<tr>
<td>Two Non-Recreation Electives</td>
<td>Two Non-Recreation Electives</td>
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<tr>
<th>Year Four</th>
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<tbody>
<tr>
<td>REC 429, 470</td>
<td>REC 471</td>
</tr>
<tr>
<td>One Recreation Elective</td>
<td>Two Recreation Electives</td>
</tr>
<tr>
<td>Two Non-Recreation Electives</td>
<td>Two Non-Recreation Electives</td>
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## Co-operative Program

<table>
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<tr>
<th>Year Two</th>
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<tbody>
<tr>
<td>2A (Fall)</td>
<td>2B (Spring)</td>
</tr>
<tr>
<td>REC 220, 300*, 301*</td>
<td>Three Recreation Electives</td>
</tr>
<tr>
<td>One Restricted Elective</td>
<td>One Recreation Elective</td>
</tr>
<tr>
<td>One or Two Recreation Electives</td>
<td>Two Non-Recreation Electives</td>
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<tr>
<td>Two Non-Recreation Electives</td>
<td>Two Non-Recreation Electives</td>
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<table>
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<tr>
<th>Year Three</th>
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<tbody>
<tr>
<td>3A (Winter)</td>
<td>3B (Fall)</td>
</tr>
<tr>
<td>REC 270A, 305*</td>
<td>REC 320, 371A</td>
</tr>
<tr>
<td>One or Two Recreation Electives</td>
<td>One Recreation Elective</td>
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<tr>
<td>Two Non-Recreation Electives</td>
<td>Two Non-Recreation Electives</td>
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<th>Year Four</th>
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<tbody>
<tr>
<td>4A (Spring)</td>
<td>4B (Winter)</td>
</tr>
<tr>
<td>REC 429, 470</td>
<td>REC 471</td>
</tr>
<tr>
<td>One Recreation Elective</td>
<td>Two Recreation Electives</td>
</tr>
<tr>
<td>Two Non-Recreation Electives</td>
<td>Two Non-Recreation Electives</td>
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</table>

*Students must take one of REC 300 or 301 or 305.

## Joint Honours Degrees

Joint Honours degrees are available with Geography, Man-Environment Studies, Kinesiology, Psychology, Social Development Studies, Sociology, Music, and Dance. Requirements in the Joint Honours programs vary and students should consult with the Undergraduate Officer in both Departments regarding course sequences, course or credit requirements, minimum averages and required courses.

All students must complete the Recreation core requirements. Further information concerning Joint Honours programs may be obtained from the Undergraduate Officer and the student undergraduate handbook.

## Options

An Option is a specified combination or grouping of courses which provides the student with another emphasis in a particular program.

Options are available with Business, Canadian Studies, Legal Studies, Public Administration, and Women's Studies. For specific course requirements, consult with the Undergraduate Officer and the 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.
Independent Studies Program
Independent Studies: An Opportunity for the Individual to Develop an Independent Program of Study

Independent Studies is a small undergraduate program formerly known as Integrated Studies. The program serves students who wish to create their own, self-directed, plan of study. In many cases these plans of study include a perspective that goes beyond that of a single discipline. Students enrolling in Independent Studies from high school must spend at least four terms in “pre-degree phase.” During this time they study by working individually with I.S. Faculty or Professors, setting up and/or attending seminars, attending conferences and workshops, and perhaps taking courses. At the end of their pre-degree phase, they put together a degree project that they can complete in their final two terms in I.S., when they will be in “degree phase.” Each student must find two non-I.S. University of Waterloo faculty supervisors to oversee this project, which must also be approved by the Academic Board of the program. If a student is transferring from another university program or coming back to university as a mature student, academic credits they have obtained before coming to I.S. may reduce their time of enrollment in I.S. to a minimum of four terms.

In addition to the emphasis on self-directed learning, Independent Studies has a tradition of student involvement in program administration and management. Besides creating a strong sense of community, this involvement ensures student input in decisions which maintain an environment conducive to independent study. Thus, there is some expectation that students will become involved in the various decision-making bodies of the program. These include Council, Executive Committee, Joint Committees (Review and Evaluation Personnel, and Admissions), and In-House Committees such as Compucom (Computers) and Space Committees.

Academic Director
Dr. Anne Innis Dagg
The Academic Director of Independent Studies is a University faculty member who is responsible for administration of the program. She serves as a link between the program and the rest of the university community including the Academic Board. The Academic Director provides students with administrative assistance and academic counselling for their programs of study.

Independent Studies
Independent Program of Study
Faculty

M. Constant, BSc (Toronto)
A.I. Dagg, BA, MA (Toronto), PhD (Waterloo)
H. Huertas-Jourda, BA (Florida), MSc (Waterloo)
M. Lippincott, BA, MA (Delaware), PhD (Toronto)
J. Pauwels, Licenciate (Ghent), MA (Toronto), PhD (York)
H. Woodhouse, BA (Exeter), MA (McMaster), PhD (Toronto)

Maurice Constant
Maurice is an Adjunct Professor in the Department of Systems Design Engineering. In addition to engineering, his academic background includes the life sciences (physiology and biochemistry). Professionally, he is also a maker of documentary films and is engaged in projects with the CBC, TV Ontario, the National Film Board and the IMAX Corporation. He founded a Film Production Program at Conestoga College in 1968. As a consultant and designer, his work includes: pavilions at Expo '67, an air traffic control system and a teleconferencing system for the Federal Government and a CAD (Computer Aided Design) system for the Ontario Government. Areas of interest include: human communications (interpersonal, cross-cultural, mass media, human-machine systems); computer-mediated human communication systems (Telidon, teleconferencing, automated office) and their impact on society; technology and society; computer graphics, computer animation and computer-generated sound; design methodology; the analytic and creative processes; aesthetics and design; history and philosophy of science; systems theory (the behaviour of complex systems, biological, social, industrial, political, ecological); environmental perception; major exhibition design; film and TV production.

Anne Innis Dagg
Although she is now Academic Director, Anne continues to work academically with students in I.S. as she has for the past eight years. Since she has a PhD in biology, she has met with students interested in areas such as field ecology, the brain, human physiology, reproduction, evolution, and sociobiology. As a writer, she is involved with the Writers’ Workshop in which I.S. members bring their poems or stories to be discussed. As a feminist, she helps organize women’s groups and encourages discussion on such things as sexist language and women’s place in society. Because she has been involved in campus activities since 1959, she is able to direct students to many resources that should prove helpful to them.
Heidi Huertas-Jourda
Heidi is primarily interested in the interface between mind, body, behaviour, and what we label as external to these. She explores this interest through her work as a marriage and family therapist, in work in dreams and imagery, and in explorations of the political and personal needs of women. Her focus is on the interdependence of the system and how a particular event can change the system. Heidi’s background also includes working with gestalt, psychodrama, neuro-linguistics, and women’s groups. Other interests are alternative world views as expressed by Gary Zukov, Fritjof Capra, and Bruce Holbrook. Her current research is in the area of the science question in feminism, feminist theology, and psychology and politics. She enjoys working with students interested in these or related fields.

Mark Lippincott
Mark has a doctorate in political theory, with minor areas in comparative politics, American politics and constitutional law. He takes an interdisciplinary approach to his primary interest in modern political movements, combining elements from ancient philosophy and myth, existentialism, Marxism, aesthetics, psychology and sociology. As well as academic teaching experience, Mark has worked as an editor/researcher for studies in school integration, a community health program and the Bertrand Russell Editorial Project. He has recently completed an essay on the ideology of power in 1984 for an anthology on George Orwell and he is currently working on a book entitled Albert Camus’ Theory of Rebellion.

Jacques Pauwels
Jacques has a Licenciate Degree (MA) and a PhD in History as well as an MA in Political Science, and he is currently working on a Doctorate in the same field, specializing in Public Administration and Policy Analysis. In History his main interests concern social-economic and intellectual developments in Europe in the 19th and 20th centuries, and Nazi Germany in particular. He has published a book, Women, Nazis and Universities: Female University Students in the Third Reich (1984), as well as a number of articles, including one on certain aspects of the Canadian Role in World War II. As for Political Science, he is interested primarily in bureaucratic theory and practice (especially Max Weber’s ideas on bureaucracy), neo-Marxist views of the state, and Canadian foreign investment policy; an essay of his on the Foreign Investment Review Agency (FIRA) was recently published in The Osgoode Hall Law Journal. Jacques would be pleased to work with students in these disciplines, and he is also prepared to help students with foreign language interests and needs, as he is fluent in French, German and Dutch, and has a solid background in Latin.

Howard Woodhouse
Howard has done graduate work in both philosophy and history and philosophy of education, holding a doctorate in the latter. He therefore welcomes students wishing to work in these and other areas. Howard is particularly interested in alternative education (such as I.S. itself), the history of educational thought, the impact of science on university and secondary education, and knowledge and its relation to social institutions in general. Before coming to I.S. Howard taught in an African university and has published numerous articles on African education, culture and dependency, which are ongoing interests of his. He considers one of his tasks as an Academic Advisor is to enable students to acquire the research tools and writing abilities desirable in their chosen disciplines. Vitally concerned about teaching, Howard also operates an educational consultancy service, one of whose aims is instructional development. Howard is bilingual.

Approach to Resources
In designing their own studies, the students have access, not only to the Program’s resources, but also to those of the community and the University, including its full array of courses. They decide which resources they require and what approach they wish to pursue. The students often work on an individual basis with faculty or graduate students from the many university departments or with people within the Program. They may audit several courses and take some for credit, or perhaps take no courses at all. Students enrolled in courses offered by other faculties are subject to the rules and regulations of the host university governing such matters as course add and drop procedures and deadlines and grading. The latter may include the reversion of marks of “INC” (Incomplete) and “NMR” (No Mark Reported) to F- after a specified period of time. Students should consult the appropriate section of this Calendar pertaining to the specific faculty and its requirements.

An interest in community affairs leads some students to involvement in such areas as the court system, mental retardation and development centres, public and alternative schools, and environmental groups, to name but a few. In addition, they are also free to pursue studies privately utilizing the library and other facilities.

The diverse interests and perspectives in the Program’s composition continually foster an enthusiastic exchange of information among the students and the Faculty. This activity has promoted a variety of seminars (for example, alternative education; political and legal issues; gender roles; French Conversation), ongoing meetings such as the Writers’ Workshop and Women’s Groups, and special film series.
Term-End Reviews

Students document the structure and pursuit of their studies as their programs develop. At the beginning of each term in their "pre-degree phase" they hand in a Term Plan which outlines what they plan to achieve during that term and how they plan to achieve it. At the end of each term they complete and hand in a Term Performance Report which describes what they actually accomplished. The Term Plans and Term Performance Reports are reviewed by the Review and Evaluation Committee which determines if the student is allowed to proceed in the program. Each student's Term Plans and Term Performance Reports, together with letters describing what other academic work he or she has completed while at I.S., provide an invaluable resource for the preparation of the degree project and the Description of Studies which is included in the B.I.S. Transcript package.

Length of Registration

Students in good standing may register in the Program for up to eight terms. Registration beyond these terms will be at the discretion of the Executive Committee.

Degree Process

While students may take and receive grades for regular university courses, the degree awarded is not based on an accumulation of course credits, but on an evaluation made by the Academic Board and the appointed supervisors during a formal candidacy period. The Bachelor of Independent Studies (B.I.S.) degree is a three-year general bachelor degree. However, each degree program is evaluated on its own merits.

When students are ready to enter the degree phase, they present a written application to the Academic Board for Independent Studies documenting their level of achievement and their plans for their final degree period. The Board, consisting of faculty members of the University appointed by Senate, interviews the applicants to determine their preparedness for degree candidacy.

Accepted degree candidates then work under appointed supervisors (two of whom must be members of this University's faculty) for a minimum of two academic terms. During this time the candidates are required to present tangible evidence of their educational development to assist the supervisors with the evaluation of their total baccalaureate programs. At the end of this process the supervisors present letters of recommendation which serve as the basis for the Board's degree recommendation and form part of the student's academic transcript.

Independent Studies

Term-End Reviews
Degree Process
Examples of Individual Studies

Current members of the Academic Board are:
R.H. Holmes, PhD (Philosophy) Chairman
P.E. Bowers, PhD (Psychology)
S. Lerner, PhD (Environment & Resource Studies)
D. Taylor, PhD (Computer Science)
N. Theberge, PhD (Kinesiology)
J. Vanderkooy, PhD (Physics)
S. Yagar, PhD (Civil Eng.)

Examples of Individual Studies

Diane became so interested in drama while attending St. Lawrence College in Quebec, that she enrolled in Theatre/Production at Ryerson Polytechnic Institute. She continued to work in theatre after graduating from Ryerson until 1983, when she enrolled in I.S. During her first years here she worked with professors of history, anthropology and fine arts on costume history, decorations, and culture of native peoples. She also attended seminars on I.S. on film production and became familiar with the use of computers. Her B.I.S. project will address the specific question "How has Micmac clothing changed through recorded history?" and will discuss not only changes that occurred because of interactions with other tribes and with Europeans, but also what raw materials were used for clothing and decoration, and how clothing related to gender, age, and lifestyle. The information she collects for her thesis will be invaluable as a resource for costume designers involved with theatre about native people.

Jill spent three terms in the School of Architecture at the University of Waterloo before switching to I.S. She enjoyed the architecture courses, but found that they did not allow enough time to explore her areas of interest in depth. Since she has been at I.S., she has specialized in medieval and renaissance architectural history, taking courses in medieval history, in Italian renaissance art, and in Latin. In 1985, she attended a conference at the Centre for Medieval Studies at the University of Toronto dealing with all aspects of medieval towns. Most of her time, however, has been spent in reading books dealing with her specialized area. She has been guided by a few of the I.S. Academic Advisors and by a professor of planning who will be one of the supervisors for her degree project. She has also discussed her work with professors at York University, Western, and the Pontifical Institute for Medieval Studies. Recently, she spent five weeks in England visiting medieval towns and archives.

Doug's academic career began when he retired two years ago. He joined the Air Force when he was young, and then had to earn a living, so he had never been able to attend university. Doug is interested in the effects, mental and physical, of aging in people.
He believes that the quality of a person’s life is important, no matter what his or her age. This ideal led him at age sixty to attempt and succeed at the triathlon athletic event. He now attends fitness classes at the Athletics Building for an hour three times a week. While at I.S., Doug has usually taken three courses, related to gerontology, a term, with extra work on topics that interest him. One such topic is the correlation of quality of sleep with depression. When he completes his academic work this year, he will have both a Bachelor of Independent Studies degree and the Diploma in Gerontology.

Pat learned about Independent Studies while browsing among university calendars in Ottawa. She liked the idea of being able to design her own academic program, something she had not been able to do at high school. Because her long range interests centered on world food problems, especially those in the developing world, in her first year she has taken selected courses in economics, geography, environmental studies, history philosophy, and English. In addition, she has attended five seminars or groups offered in the I.S. program itself. Their subject areas were politics, pre-industrial Europe, systems design, film and video production, and women. She has found the small group discussions in I.S. to be an especially fruitful way of learning.

Before he came to I.S., Shane produced and directed a series of educational and documentary films in countries as far-ranging as Papua New Guinea, Panama, and the Solomon Islands. His interests had also encompassed the field of mental health and psychology, in which he had attended courses at universities in Canada, Brazil, and France. At I.S., he has combined these two areas in studying the use of motion pictures as an educational tool in the field of mental health. He has taken some courses at the university, written an undergraduate thesis, produced a half-hour video on psychotherapy, and worked for a term as a psychology intern in a mental health program in the United States.

I.S. has a new feature, that of students transferring into the program from another area of the campus for a term or two and then transferring out again. This enables them to study some area of interest in depth using our resources without working toward a B.I.S. degree. Teresa is the first person to take advantage of this option. Her studies at the University of Waterloo have lead her through two terms in the Co-op Accountancy program and five terms in a Philosophy and Russian program. She enjoyed her courses but found that several topics of special interest to her were not discussed in much depth. In preparation for her last year of studies, she felt that within her structured program of studies she had not been able to explore her interests as much as she desired. She therefore decided to transfer for several terms to the Independent Studies Program, where she is pursuing work in mysticism and spiritual healing. Eventually she plans to integrate what she has learned into her philosophy thesis.

Independent Studies
Examples of Individual Studies
Computing Facilities

Computing Facilities

The Independent Studies Program has access to all the facilities offered by the Department of Computing Services through five terminals situated within the program. Students may also use any of the many public terminals on campus. These facilities include the CMS or UNIX time-sharing networks supported by IBM and VAX equipment respectively. A small sample of these facilities includes word-processing, programming with all the languages supported by Waterloo, and data-base searches using SPIRES. The latter allows you to search the university’s film library containing in excess of 44,000 entries. A similar service, WATMARS (Waterloo machine-assisted reference service), can be very useful when pursuing independent studies.

WATMARS is an online interactive retrieval system used to perform literature searches. The process takes about 30 minutes and costs about 45 dollars. It not only saves a good deal of time, but it is in many cases more comprehensive than any manual search. By carefully designing search strategies, you can search almost any topic imaginable.

In addition to these computer mainframe systems, the program also provides the students with three microcomputers. One is an IBM Personal Computer XT supplemented with graphics card, 10 megabyte hard disk and graphics printer. This unit is equipped with the coherent operating system supporting the "C" programming language as well as standard MS DOS. The other is a Macintosh Plus with 1 megabyte of RAM, 10 megabyte hard disk and an Apple image writer. The system is supported with a variety of software such as MacPaint, MacDraw, Microsoft Word and other useful utilities.

As a student in the program you can help decide what additional software is purchased for any of our computing equipment as well as what additional hardware is required.

Video Equipment

The program offers students an opportunity to use VHS video equipment to make a video production. The facilities are centred around a Hitachi VK-C870 camera and a five-head portable Hitachi video cassette recorder (VCR) with three lights, stands, and filters. Using the Zenith VCR and the Hitachi VCR together allows students to edit their work into a rough-cut video. The collection also includes high quality omni-directional and directional microphones.
and four lapel microphones. These can be mixed onto a single track or into stereo using our six-channel mixer. The program also offers students training in the use of this equipment and access to film courses or seminars on film production techniques.

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, upon graduation.

Independent Studies

Graduate Opportunities
General Admissions Information

General Admissions Information

Students who wish to enter Independent Studies must have academic potential as well as motivation, and must plan to benefit from the resources of the program and the university.

I. 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 Ontario Grade 13 or 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.

II. Motivation

Students must be so motivated that they can pursue their academic work independently. The committee would like evidence that a student has worked on his or her own on projects outside of regular work or studies (i.e. started own business, built own computer, worked on social or political issues, prepared original reports). Letters attesting to this motivation are important and should be specific, giving examples of projects undertaken.

III. Plans

Students should be prepared to structure their studies in accordance with Independent Studies' philosophy and make appropriate use of the resources available on the UW campus. Plans should include:

a) An independent study component which may be supplemented with courses;

b) A major academic component that is not only technical, only creative, or only artistic.
Admissions Process

I. Letter of Application
The most important part of an application to Independent Studies is an autobiographical letter which must be submitted before an admission interview will be scheduled. This letter should deal with the following areas:

a) Previous educational experience (particularly at the senior high school or post-secondary school level), indicating degree of satisfaction with the regular system or a need for an alternative. Applicants with limited formal education are favourably received if they can demonstrate an ability to handle university-level work.

b) Reasons for wishing to enter Independent Studies should include a statement indicating an understanding of the nature of the Program and a need for an alternative in university education.

c) An outline of the type of exploration the applicant proposes to undertake. The Committee does not expect that the proposed studies will be completely formulated; however, applicants should consider carefully what their academic goals are and how they plan to achieve them.

II. Reference Letters
Letters of reference should be submitted from two or more people who can attest to the applicant’s ability to work on his/her own.

III. Academic Transcripts
Transcripts from previous educational institutions should be included with the letter of application. If an applicant is currently enrolled at the University of Waterloo, these transcripts need not be submitted but will be obtained from the Registrar.

IV. Independent Work
On the day of the interview the Committee will be pleased to examine examples of academic or artistic work if the applicant so desires.

V. Interview
Once the application has been received, an interview will be scheduled with the Admissions Committee which normally includes several students, several faculty members, a person from the Registrar’s Office, and the Academic Director.

Interview questions focus on the autobiographical letter exploring the applicant’s need for an alternative within the university and the feasibility of the proposed studies.

The Committee has two primary functions: first, to decide who should be admitted, and second, to advise applicants, whether they are accepted or not, on a course of action suited to their stated goals.

The Committee will inform applicants of its decision on the same day as the interview.

Please send information to:
Dr. Anne Innis Dagg
Academic Director
Independent Studies Program
University of Waterloo
Waterloo, Ontario N2L 3G1
Faculty of Mathematics

Introduction
Prior to 1967, Honours and General Mathematics programs were offered through the Faculties of Arts and Science. The continued growth and development of these programs led to the formation of the Faculty of Mathematics as a separate faculty in January, 1967. The Faculty consists of the Departments of Applied Mathematics, Combinatorics and Optimization, Computer Science, Pure Mathematics, Statistics and Actuarial Science, and a Division of Mathematics for Industry and Commerce. The degree Bachelor of Mathematics (BMath) is awarded upon successful completion of three-year Pass, four-year General and four-year Honours programs.

Honours programs are available in both the Regular (i.e. conventional September to April academic year) and Co-operative (i.e. alternating four-month academic and work terms) systems of study. The Co-operative system is described in detail in Chapter 5. The Pass and General programs are not available in the Co-operative system. Students interested in registering in the Faculty of Mathematics through St. Jerome's College have the opportunity to indicate their intention when they receive the package of materials sent by the University to acknowledge their application for admission.

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.

Faculty Brochure
The Faculty of Mathematics publishes a brochure specifically designed for Ontario high school students. Copies are available in school guidance offices, or on request from either the Mathematics Undergraduate Office or the Assistant Registrar, Faculty of Mathematics.

Obviously, when the Admissions Committee is making its decisions, high grades are important. Academic performance, in particular, represents the single most influential factor in the decision process, and generally speaking, if a student's Grade 13 or Ontario Academic Course marks are significantly higher relative to those of other applicants, the Admissions Committee will normally issue an Offer of Admission with only limited reference to other factors. For most applicants, however, the factors influencing the selection process include much more than simply grades from the senior year(s) of high school, and these other factors can represent a very important part of the final decision process. The Faculty recognizes, for example, that many excellent candidates for admission have chosen to develop their talents simultaneously in both academic and extra-curricular pursuits, and we feel that it is essential that such students receive every possible consideration for admission. In addition to superior academic performance, the Faculty is looking for students whose activities indicate significant development as well-rounded individuals with potential for leadership. These factors are particularly important for students in Co-op programs, since they are required to present themselves in the most favourable light to potential employers for their Co-op work terms.

All applicants to the Faculty of Mathematics are provided with a Supplementary Information Form as part of the package of materials sent by the University to acknowledge their application for admission. It is most important that applicants return this completed form to ensure that the Admissions Committee can make an informed decision. The information provided on the form, in many instances, allows the Committee to differentiate between applicants whose marks are relatively comparable. As reflected by the nature of the questions on the Supplementary Information Form, the Admissions Committee takes a wide variety of factors into account during the selection process. (The major factors, considered in conjunction with the applicant's Grade 13 or Ontario Academic Course marks, are described in detail in the Faculty of Mathematics brochure.)

Admission as a Mature Student
Any student who has been away from formal education for more than two years and who does not possess the minimum requirements for admission may apply as a mature student. However, as a minimum, applicants should have covered the material in the required Ontario Grade 13 or Ontario Academic Courses in mathematics (see page 2.8), preferably through regular day school classes at a local high school, or alternatively through night school or summer school classes, or possibly by correspondence through the Correspondence Branch of the Ontario Ministry of Education. Applicants are also strongly encouraged to write the Descartes Mathematics Contest, administered by the Faculty of
Mathematics

Admission

Mathematics for students in their senior year(s) of high school, to enhance their chances of admission. (Further details about the Descartes Contest, and how you can arrange to write it, can be obtained by writing to: The Canadian Math Competition, c/o Faculty of Mathematics.) Each application will be considered on its own merits by the Admissions Committee. (See also Part-Time Studies on page 13:4.)

Advanced Standing

1. Applicants From Other University of Waterloo Facilities

Students in other University of Waterloo faculties who wish to apply for transfer to the Faculty of Mathematics may not preregister for a Mathematics program during the normal University preregistration periods. Instead, students in this position are encouraged to preregister for their first-choice program within their own faculty and apply for a transfer to Mathematics following the guidelines below.

Transfer applications for on-campus studies in Mathematics are considered only for Honours programs, and normally only for September admission. (Exceptions are usually made for students on a Co-op work term in the fall, and such students will be considered for January admission.) Applicants should have high-quality academic records and have demonstrated that they can be successful in an Honours Mathematics program. Because of the traditional discrepancy between the number of applicants and the limited number of positions available for advanced-standing transfers, the selection process for admission is a very competitive one. In recent years, the majority of students admitted have had consistent B+ grades or better in their previous post-secondary course work.

Information supplied on an applicant’s Supplementary Information Form is also an important factor in the admission decision process.

Application packages for applicants from other post-secondary institutions can be obtained from the Registrar’s Office at the University of Waterloo, usually starting in November each year. Applicants must apply through the Ontario Universities’ Application Centre and provide supporting documentation directly to the Registrar’s Office at the University of Waterloo. This documentation must include official transcripts from all previous academic institutions. To be guaranteed consideration for September admission, all supporting documentation must be received by the University no later than July 1.

3. Transfer Credits

Once students have been admitted to the Faculty of Mathematics, having transferred from outside or from within the University of Waterloo, they will normally be given transfer credit for relevant courses previously taken 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 non-mathematics University of Waterloo course or in a University of Waterloo mathematics course specifically designed for mathematics students. A transfer failure will normally be assigned if a mark is less than 50%. Credit might not be granted for a course covering only part of the material contained in a corresponding UW course which is required of students registered in the Faculty of Mathematics. A maximum of 12 transfer half-credits per academic year previously taken will normally be given.

Note

Students transferring from other post-secondary institutions or other University of Waterloo faculties must successfully complete at least 12 University of Waterloo mathematics half-credits chosen from those courses which may be taken for credit by a student in the Faculty of Mathematics.

4. Double Counting Of Courses For BMath Degree Credit

The Faculty of Mathematics is prepared to count for BMath degree credit only a limited number of courses that have been used, or are being used simultaneously, to obtain a degree in another UW faculty or at another university. Of courses in this category, students will normally be permitted to count
a maximum of 12 non-math half-credits toward their
BMath degree, with a possibility of exemptions (but
not degree credit) in selected math courses.

5. Cumulative Averages
Grades in courses taken at the University of Waterloo
prior to a student's admission to the Faculty of
Mathematics will normally be included in overall and
mathematics cumulative averages if the courses are
ones that a student registered in the Math Faculty
might take for credit toward a BMath degree.
Otherwise, the grades are considered only for transfer
credit purposes and not included in averages.

Grades in courses taken at other institutions prior to
a student's admission to the Math Faculty will not be
included in cumulative averages.

6. Co-operative Programs
Applicants are not normally considered for admission
to a Co-operative program beyond the second-year
level. Students applying for admission at the second-
year level should normally have credit in courses
equivalent to the first-year Calculus, Algebra, and
Computer Science courses required of University of
Waterloo mathematics students. Applicants who
cannot be admitted to a Co-operative program will be
automatically considered for the Regular program.

Part-time Studies
Students wishing to work toward a BMath degree on a
part-time basis must meet the Faculty's regular
admission requirements.

Although mathematics (i.e. ACTSC, AM, C&O, CS,
MATH, PMATH, STAT) courses are not normally
offered in the evenings or on Saturdays, many part-
time students take courses offered by the Faculty of
Mathematics via the University of Waterloo
Correspondence Program. (See Chapter 1 for more
details of this program. A separate brochure is also
available.) As well, a reasonable cross-section of non-
math courses is available in the evenings, particularly
during the Fall/Winter sessions.

The BMath Pass degree may be obtained entirely by
part-time studies; the BMath General degree requires
at least two complete terms on campus; the BMath
Honours degree requires at least four complete terms
on campus and an additional four full-time terms of
registration. (Please consult Footnotes 7 and 8 on page
13:7 for definitions of "complete term" and "full-time
term".)

Applicants who do not meet the Faculty's regular
admission requirements may be admitted as non-
degree/post-degree part-time students at the discretion
of the Admissions Committee. Admission as a non-
degree/post-degree student does not carry any
commitment from the University beyond permitting
entry to the course(s) and term(s) specified at the time
admission is granted. There is no guarantee of
admission for subsequent terms, although repeat
applications on a non-degree/post-degree basis are
always considered and have rarely been refused in the
past (especially applications to take UW
correspondence courses where limited on-campus
space is not a factor).

After completing some courses on a non-degree/
post-degree basis, usually first-year Calculus and
Algebra in the UW Correspondence Program, a
student may re-apply for admission as a BMath degree
candidate. No special application form is required;
simply write to the Assistant Registrar, Faculty of
Mathematics, in Needles Hall. The Admissions
Committee will then review the applicant's past
academic history, including performance in UW
courses taken on a non-degree/post-degree basis, to
make its decision. If the admission decision is
favourable, any relevant courses taken on a non-
degree/post-degree basis will be counted toward the
BMath degree. Furthermore, any previous academic
work completed prior to commencing UW studies will
be assessed for possible transfer credit.

Admission to Specialized Programs in Mathematics
Listed below are the three admission categories for
the Faculty of Mathematics, accompanied by the
respective Ontario Universities' Application Centre
codes:

Co-op (C.A. Option) – WN
Co-op (including Computer Science) – WT
Regular (including Computer Science) – WM

The WN category is exclusively for students wishing to
pursue the Co-op Mathematics/Chartered Accountancy
Option or Joint Honours Co-op Computer
Science/Chartered Accountancy Option. All other
students should apply to category WT (Co-op) or WM
(Regular).

Once admitted, students identify with a specific
program within the Faculty at different year levels,
depending upon admission category and particular
program of interest. The only students to be admitted
to specialized Honours programs in first year are Co-
op students who wish to register in one of the
following programs:

Co-op Actuarial Science
Co-op Applied Math With Engineering Electives
Co-op Math/Chartered Accountancy
Co-op Math/Management Accounting

Students in the above Co-op programs need to be
explicitly identified in Year One because of the
specialized nature of their work-term employment. All
other students register in the Non-Specialist Faculty
Honours program in Year One. In subsequent years,
beginning with Year Two, students may wish to enter
a specialized program or choose to remain registered
in the Non-Specialist Honours program.
For many specialized Honours programs, admission at the Year Two level is normally automatic for students who have successfully completed Year One. However, in the case of restricted enrolment programs, there is a formal admission process. Academic performance in first year and/or the results of personal interviews are normally the main criteria for admission to restricted enrolment programs.

**Restricted Enrolment Mathematics Programs**

At present, the restricted enrolment programs in the Faculty of Mathematics consist of the following:

- Co-op Math/Chartered Accountancy
- Co-op Teaching Option
- All Computer Science Major Programs (Co-op and Regular)

*At present the number of Co-op placement opportunities exceeds enrolment in the Teaching Option program. Students with an interest in teaching Mathematics and Computer Science are encouraged to pursue this goal by applying for this program.

**Students who take a standard course load in first year (i.e. six courses per term) and successfully complete all twelve courses with math and overall averages in the high-60 range can be reasonably confident of admission to CS Major status for their 2A term. Approximately 300 students are admitted to CS Major programs each year.

In the foreseeable future, the Faculty does not expect that any of its programs not included in the above list will require a formal admission process beyond that involved with admission to the Faculty of Mathematics. However, because of limited resources and varying demands, it is always possible that occasions may arise when other specific programs within the Faculty are not able to accommodate all academically qualified applicants. Every effort will be made to avoid such situations and to provide acceptable alternatives, but the Faculty cannot guarantee in advance that any specific program will be free of enrolment restrictions.

Programs which have had to restrict enrolment, or appear likely to, will be identified, as far as possible, on an on-going basis, and every reasonable effort will be made to publicize such changes to students who may be affected. Related information will be made available through the Mathematics Faculty Undergraduate Office during (pre)registration periods. Students will be expected to take such information into account when planning their courses of study.

**Applicants Holding Student Authorizations**

A maximum of 5% of the available freshman seats in the Faculty of Mathematics is open to qualified applicants who hold Student Authorizations (visas). [Please note that this quota on foreign student enrolment does not apply to Permanent Residents in Canada (landed immigrants).] This same 5% quota applies to all restricted enrolment Mathematics undergraduate Honours programs for which formal admission occurs beyond Year One (e.g., Computer Science Major Programs). By this approach the Faculty hopes to preserve an appropriate international mix in its undergraduate student population while responding to the demand for places from highly qualified Canadian students.

For complete information regarding the admission categories, requirements and procedures, consult Chapter 2 of this Calendar.

**Fees, Financial Assistance**

See Chapters 3 and 4.

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**Mathematics**

**Admission**

**Academic Programs/Degree Requirements**

**General Remarks**

The Faculty of Mathematics offers undergraduate programs leading to the following Bachelor of Mathematics degrees: BMath Honours, BMath General, BMath Pass. The Honours program is designed primarily for full-time on-campus students who wish to pursue in-depth studies in the Mathematical Sciences. The General program, on the other hand, is more suitable for students with a definite interest in mathematics but who prefer more latitude in the depth and breadth of their course selection. The General program is also intended primarily for full-time on-campus students. The Pass program, by comparison, is a relatively non-specialized course of study intended primarily for part-time students, usually studying in the correspondence format, who want to pursue a more general education and include a larger proportion of non-math courses in their program. The Pass and General programs are available only to students in the regular system of study.

The Honours Program is more demanding than either the General or Pass program. In addition to requiring that the Honours (or Advanced Honours) versions of Faculty core courses be taken, the required number of credits for an Honours degree is greater than the number for either a General or Pass degree. Further, the BMath Honours program requires higher graduating averages than the BMath General and Pass programs.

All full-time on-campus Mathematics freshmen take a common core Honours program in Year One, consisting of Algebra, Calculus, and Computer Science, plus three non-mathematics courses. This commonality of curriculum (which continues to a large extent into Year Two) permits considerable flexibility
for students to change from one academic program to another within the Faculty of Mathematics. In fact, if non-math courses are judiciously chosen, this flexibility for change can be extended to many programs in other faculties as well.

Tables I and II, on pages 13:7 and 13:8 respectively, and the accompanying footnotes outline in detail the common degree requirements and typical course load for each academic year (i.e. two four-month academic terms) of all undergraduate programs in the Faculty of Mathematics. Except where noted, Honours programs may be taken in either the Regular or Co-operative system of study. The Pass and General programs, however, are available only in the Regular system. The academic requirements of corresponding Co-operative and Regular programs are identical.

Additional requirements for Co-op students are summarized in a booklet, Regulations and Procedures for Co-operative Programs, available from the Department of Co-operative Education and Career Services in Needles Hall.

Under the Math Faculty’s credit system, it is the student’s responsibility to be aware of all regulations pertaining to his or her program of study. When all requirements for the particular BMath degree being sought have been met, it is the student’s responsibility to submit an ‘Intention to Graduate’ form to the Registrar’s Office.
### Table I - Degree Requirements Common To All BMath Programs

<table>
<thead>
<tr>
<th></th>
<th>Honours Programs</th>
<th>General Programs</th>
<th>Pass Program</th>
</tr>
</thead>
<tbody>
<tr>
<td>Minimum total</td>
<td>44</td>
<td>42</td>
<td>32</td>
</tr>
<tr>
<td>half-credits</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Minimum math</td>
<td>22 - 28</td>
<td>24</td>
<td>12</td>
</tr>
<tr>
<td>half-credits¹,²</td>
<td>See Footnote 2 below.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Minimum non-math</td>
<td>12</td>
<td>12</td>
<td>12</td>
</tr>
<tr>
<td>half-credits³</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Minimum Graduating</td>
<td>65%</td>
<td>60%</td>
<td>60%</td>
</tr>
<tr>
<td>Math Average⁴</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Minimum Graduating</td>
<td>65%</td>
<td>60%</td>
<td>60%</td>
</tr>
<tr>
<td>Overall Average⁴</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Maximum course attempts⁵</td>
<td>58 half-credits</td>
<td>54 half-credits</td>
<td>44 half-credits</td>
</tr>
<tr>
<td>Maximum failures⁶</td>
<td>six half-credits</td>
<td>eight half-credits</td>
<td>eight half-credits</td>
</tr>
<tr>
<td>Minimum complete</td>
<td>four</td>
<td>two</td>
<td>none</td>
</tr>
<tr>
<td>terms required⁷</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Minimum full-time terms of registration⁸</td>
<td>eight, including the four complete terms required above</td>
<td>two, including the two complete terms required above</td>
<td>none</td>
</tr>
<tr>
<td>Standard course load⁹</td>
<td>six half-credits per term in Years One and Two; five half-credits per term in Years Three and Four</td>
<td>six half-credits per term in Year One; five half-credits per term thereafter</td>
<td>six half-credits per term in Year One; five half-credits per term thereafter</td>
</tr>
</tbody>
</table>

**English Writing Skills Requirement**

All BMath degree candidates must satisfy an English Writing Skills Requirement. Please see section (6) on page 13:27 for details.

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**Footnotes to Table I**

1. The term 'math half-credit' includes courses with prefixes ACTSC (Actuarial Science), AM (Applied Mathematics), C&O (Combinatorics and Optimization), CS (Computer Science), MATH (non-departmental Faculty courses), PMATH (Pure Mathematics), and STAT (Statistics).

2. The actual minimum number of math half-credits required for a BMath Honours degree varies from one program to another within the ranges specified in Table I above. Individual program requirements are included with the detailed program descriptions on pages 13:9 - 13:21. Note that students transferring from other post-secondary institutions or other U of W faculties must successfully complete at least 12 University of Waterloo math half-credits chosen from those courses which may be taken for credit by a student in the Faculty of Mathematics.

3. The term 'non-math half-credit' refers to courses offered by other faculties, as well as those with the course prefix MTHEL.

4. i) The ‘Graduating Math Average’ is based on the specified minimum number of successfully completed math half-credits. (See Footnote 2 above.) All Faculty and Departmental courses required for a particular program are included in this average.

   ii) The ‘Graduating Overall Average’ is based on the specified minimum total number of successfully completed half-credits (44 for Honours; 42 for General; 32 for Pass) submitted for the particular degree. It includes all the math courses on which the Graduating Math Average is based and all required non-math courses.

5. For the Honours Math/Accounting and Computer Science/Accounting Options, students must also achieve an average of at least 70% in all the courses with prefix ACC which are explicitly required for their program.

6. The averages in i), ii) and iii) above all exclude failures. If a passed course is repeated, only the better mark is considered. For averages i) and ii), if a student successfully completes more than the minimum number of credits, the 'excess' ones with the lowest grades are excluded.

7. A 'course attempt' refers to a course registration not formally cancelled with the Registrar's Office before the drop deadline in the term in which the course is taken. (See section 4.8 on page 13:25 re: dropping/adding courses and deadline dates.)

8. A course attempt not successfully completed constitutes a course 'failure'.

9. A 'complete term' is normally one in which a student successfully completes at least five half-credits on campus, at least two of which must be math half-credits.

10. A 'full-time term of registration' is one in which a student's course load consists of at least three half-credits.

11. For an alternative way to qualify for a BMath General degree, see page 13:8.
### Table II – Required Year One & Two Faculty Core Courses/Typical Course Loads

<table>
<thead>
<tr>
<th>Year One</th>
<th>Honours Program</th>
<th>General Program</th>
<th>Pass Program³</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>MATH 130A/B; MATH 134A/B; CS 131, 132; six non-math half-credits.</td>
<td>MATH 130A/B; MATH 134A/B; CS 131, 132; six non-math half-credits.</td>
<td>MATH 130A/B; MATH 134A/B; CS 131, 132; six non-math half-credits.</td>
</tr>
<tr>
<td>Year Two</td>
<td>MATH 230A/B; MATH 234A/B; STAT 230/231; two math half-credits; two non-math half-credits; two additional half-credits.</td>
<td>MATH 220A/B; MATH 224A/B; STAT 220/221; two non-math half-credits; two additional half-credits.</td>
<td>four math half-credits; three non-math half-credits; three additional half-credits.</td>
</tr>
<tr>
<td>Year Three</td>
<td>six math half-credits; two non-math half-credits; two additional half-credits.</td>
<td>six math half-credits; two non-math half-credits; two additional half-credits.</td>
<td>four math half-credits; three non-math half-credits; three additional half-credits.</td>
</tr>
<tr>
<td>Year Four</td>
<td>six math half-credits; two non-math half-credits; two additional half-credits.</td>
<td>six math half-credits; two non-math half-credits; two additional half-credits.</td>
<td>not applicable.</td>
</tr>
</tbody>
</table>

### Footnotes to Table II

1. Table II describes the general framework and required Year One and Two Faculty core courses applicable to all programs in the Faculty of Mathematics. Further degree requirements and recommendations, which depend on a particular program, are described on pages 13:9 - 13:21.

2. The term 'math half-credit' includes courses with prefixes ACTSC (Actuarial Science), AM (Applied Mathematics), C&O (Combinatorics and Optimization), CS (Computer Science), MATH (non-departmental faculty courses), PMATH (Pure Mathematics), and STAT (Statistics). The term 'non-math half-credit' refers to courses offered by other faculties, as well as those with the course prefix MTHHEL.

3. On-campus students normally take MATH 130A/B, 134A/B and CS 131, 132. However, in exceptional circumstances (for example, in the Correspondence program), Pass students may take MATH 113A/B (or 115A/B) and MATH 111A/B in place of MATH 130A/B and MATH 134A/B respectively. Course substitutions for CS 131, 132 may also be permitted for BMath Pass students at the discretion of the School of Mathematics. The Honours degree requires a minimum of 18 hours of mathematics at the 300 or 400 level per year.

4. Some flexibility exists to permit the scheduling of courses in a different manner than that shown in Table II, provided that course prerequisites have been met. In certain cases, substitutions among corresponding Advanced Honours, Honours, and General level courses may be made in the Faculty core. (See section 4.1 on page 13:23.)

### An Alternative Way to Qualify For a BMath General Degree

Students who satisfy all of the course-credit requirements for any BMath Honours degree program (Co-op or Regular), but fail to satisfy one or more of the other Honours degree requirements, may elect to graduate with a BMath General (Regular) degree, provided their mathematics and overall Honours graduation averages are both at least 60%, they satisfy the complete-term and writing skills requirements for a General degree, and they do not exceed the course-attempt maximum for an Honours degree or the maximum number of failures for a General degree.
Departmental Honours Programs: Requirements and Recommendations

Except where noted Honours programs may be taken on either the Regular or Co-operative system of study. Academic requirements for corresponding Co-operative and Regular programs are identical.

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 specified in Table I on page 13:7, this program requires a total of 44 half-credits, including at least 28 math half-credits. These overall requirements must include the Faculty core courses outlined in Table II on page 13:8 and the following specific courses:

ACTSC 231, 232, 331, 332, 431, 432;
MTHEL 305A;
STAT 333;
four of ACTSC 335 (or C&O 370), AM 381, CS 337, MATH 332B (or PMATH 352), PMATH 331 (or 351A), 334 (or 344), STAT 330, 331;
Two additional 400-level ACTSC half-credits;
Two additional 400-level math half-credits.

MTHEL 305A/B are recommended to be taken in Year One.

Honours students in another department in the Faculty of Mathematics wishing a “Double Major” or a “Minor” in Actuarial Science should consult the section “Combination Honours Programs within the Faculty of Mathematics” which begins on page 13:16.

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 leading mathematical physicists of their time.

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 between Mathematics and Theoretical Physics, 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. As scientists find out more and more about the mechanisms that make the world ‘tick’, we also find that more mathematics is necessary to systematize, digest, and take advantage of this wealth of knowledge in all scientific areas.

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.


For those students who wish a strong emphasis on Physics, the Department offers the program “Honours Applied Mathematics with Physics Electives.”

Honours Applied Mathematics

In conjunction with the common degree requirements specified in Table I on page 13:7, this program requires a total of 44 half-credits, including at least 26 math half-credits. These overall requirements must include the Faculty core courses outlined in Table II on page 13:8 and the following specific courses:
AM 270, 371, 381;
MATH 332B (or PMATH 352);
One of CS 337, PMATH 331 (or 351A);
Two additional 400-level AM half-credits;
Four additional 300 or 400-level AM half-credits;
PHYS 121, 122.
AM 260 (or 280) and PMATH 334 (or 344) are
strongly recommended.

Recommended elective courses for Honours Applied
Mathematics with Physics Electives are:
PHYS 254/255, 263, 354, 358/359, 363, 441 and
CHEM 123/124.

Joint Honours Applied Mathematics with Computer
Science
In conjunction with the common degree requirements
specified in Table I on page 13:7, this program
requires a total of 44 half-credits, including at least 28
math half-credits. These overall requirements must
include the Faculty core courses outlined in Table II
on page 13:8 and the following specific courses:
AM 270, 371, 381, 391;
CS 241, 242, 340;
One of CS 372, 374;
C&O 230;
MATH 332B (or PMATH 352);
Two additional 400-level AM half-credits;
Two additional 400-level CS half-credits;
One additional 300 or 400-level AM half-credit;
One additional 300 or 400-level CS half-credit;
PHYS 121, 122.
AM 260 (or 280) and PMATH 334 (or 344) are
strongly recommended.

Honours Applied Mathematics with Electives in
Engineering (Co-operative only)
In conjunction with the common degree requirements
specified in Table I on page 13:7, this program
requires a total of 44 half-credits, including at least 26
math half-credits. The math half-credits submitted for
the degree must include a minimum of two 400-level
AM half-credits and at least six further 300 or 400-level
AM half-credits. These overall requirements must
include the Faculty core courses outlined in Table II
on page 13:8 and the following specific courses:
AM 270, 371, 381, 391;
CS 230;
MATH 332B (or PMATH 352);
One of AM 260, 280;
Four of AM 340, 362, 365, 380A, 380B,
CS 334, 337, C&O 350, 370, PMATH 331
(or 351A), 334 (or 344), STAT 333, 371, 433.

Mathematics
Applied Mathematics
Combinatorics and Optimization

Non-math courses required in Year One:
Groups A, B, C require PHYS 121/122.
Groups D, E require PHYS 121, EL E 123 and 126.
Group F requires PHYS 121/122 and CH E 100/101.

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

<table>
<thead>
<tr>
<th>Group</th>
<th>Requirements</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>M E 219, 220; Four of M E 351, 354, CIV E 303, 403, 404, 405, 413, 414, 415.</td>
</tr>
<tr>
<td>B</td>
<td>SY DE 252, 381; SY DE 281 and/or 543; Three of SY DE 372, 442, 468, 535, 544, 565, 567.</td>
</tr>
<tr>
<td>E</td>
<td>EL E 123, 126, 261, 262, 371, 380; One of EL E 342, 463, 464, 465, 481, 482.</td>
</tr>
<tr>
<td>F</td>
<td>CH E 100, 101, 021, 023, 025, 026, 030, 035, 036, 041; Optional Courses: CH E 033, 034, 038, CHEM 26, 36.</td>
</tr>
</tbody>
</table>

Honours students in another department in the Faculty of
Mathematics wishing a “Double Major” or a
“Minor” in Applied Mathematics should consult the
section “Combination Honours Programs within the
Faculty of Mathematics” which begins on page 13:16.

Combinatorics and Optimization

Combinatorics is the mathematics of discretely
structured problems. Although its boundaries are not
easily defined, Combinatorics includes the theories of
graphs, enumeration, designs, and polyhedra. It is a
very old subject which in the past was studied
principally for its aesthetic appeal. Today’s modern
technology, with its vital concern for the discrete, has
given Combinatorics new challenges and a new
seriousness of purpose. In particular, since computers
require discrete formulations of problems,
Combinatorics has become indispensable to modern
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 the computer age, Optimization experienced a dramatic growth as a mathematical theory, enhancing both Combinatorics and classical analysis. In its applications to the management and engineering sciences, Optimization forms an important part of the discipline 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 specified in Table I on page 13:7, this program requires a total of 44 half-credits, including at least 28 math half-credits. These overall requirements must include the Faculty core courses outlined in Table II on page 13:8 and the following specific courses:

- MATH 332B (or PMATH 352);
- PMATH 334 (or 344);
- C&O 230, 350;
- One of CS 337, PMATH 331 (or 351A);
- One of C&O 330, 342;
- One of C&O 351, 367;
- Three additional half-credits chosen from C&O 330, 331, 342, 343, 351, 367, 430 through 466;
- 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 with Computer Science
In conjunction with the common degree requirements specified in Table I on page 13:7, this program requires a total of 44 half-credits, including at least 28 math half-credits. A maximum of ten CS half-credits at the 300 or 400 level may be included in the 44 half-credits presented for a degree. These overall requirements must include the Faculty core courses outlined in Table II on page 13:8 and the following specific courses:

- PMATH 334 (or 344);
- C&O 230, 342, 350;
- CS 241, 242, 340;
- One of MATH 332B (or PMATH 352), PMATH 331 (or 351A);
- Three of C&O 330, 331, 343, 351, 367, 430 through 466;

Mathematics

Computer Science

One of CS 372, 374, 466;
One of CS 350, 354, 358, 360;
Two additional CS half-credits numbered 440 or higher.

Honours students in another department in the Faculty of Mathematics wishing a "Double Major" or a "Minor" in Combinatorics and Optimization should consult the section "Combination Honours Programs within the Faculty of Mathematics" which begins on page 13:16.

Computer Science

Computer Science is centred around the study of information. It is concerned with the nature and properties of information, its structure and classification, its storage and retrieval, and the various types of processing to which it can be subjected. It is also concerned with the physical machines that perform these operations, with the elemental units of which these machines are composed, with the organization of these units into efficient information processing systems, and with the exploration of the limits of the abilities of these machines.

Computer Science is recognized as an independent discipline with an inherently mathematical nature. Its activity ranges from theoretical areas such as the theory of automata, system organization and logic design, formal languages and computability theory to applied areas such as scientific computing, programming languages, software management and computer systems.

The advent of the computer has facilitated a systems approach to solving many problems in science, business and industry. There is currently a great demand for information analysts to define how systems will perform these functions and for programmers to implement production systems on computers.

The Computer Science program 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.
Admission to Computer Science Major Programs

Students interested in Computer Science Major programs will normally be admitted to these programs at the beginning of their second year, based upon their academic performance in 12 half-courses from Year One, with particular emphasis on their performance in MATH 130AB, 134AB, and CS 131, 132. In this context, Computer Science Major programs include Honours Computer Science, Honours Co-op Computer Science with Electrical Engineering Electives, Honours Co-op Computer Science-Information Systems Option, and all Joint and Double Honours BMath programs involving Computer Science as one of the majors. Once admitted to a specific Computer Science Major program, students will normally have the flexibility to change from one Computer Science program to another in the same stream (provided there are no resource limitations in the selected Computer Science Major program), or they may apply to transfer to another program in the Faculty of Mathematics.

Notes

1. Application Procedure

Students will apply for the Computer Science Major program of their choice when they preregister for their 2A term. Normally, only students whose all-inclusive math and overall averages from Year One are both at least 65% will be given serious consideration for admission. Because of resource limitations, however, fulfillment of the minimum 65% entrance average requirements will not guarantee students admission to the program of their choice, or indeed to any Computer Science Major program. If there are more applicants who meet the minimum 65% average requirements than there are positions available for Computer Science Major students, selection will be made on a competitive basis, according to criteria described above.

2. Late Admission

The possibility of admission to Computer Science Major programs at a level beyond 2A will not be completely eliminated. However, it is anticipated that such admissions, normally only at the 3A level, will be relatively rare, and usually only when unexpectedly high attrition allows for new students in the programs.

3. Required Withdrawal

A student in a Computer Science Major program whose all-inclusive cumulative Overall or Math average at the end of any term is below 65% must ensure that both averages are at least 65% at the end of each subsequent academic term. Failure to re-establish and maintain these averages at a level of 65% or above will normally result in the student's being required to withdraw from Computer Science. (Required withdrawal from Computer Science does not necessarily imply required withdrawal from Honours Mathematics, nor does it disqualify a student from taking Computer Science courses in the non-specialist stream."

Honours Computer Science

In conjunction with the common degree requirements specified in Table I on page 13:7, this program requires a total of 44 half-credits, including at least 27 math half-credits. A maximum of ten CS half-credits at the 300 or 400-level may be included in the 44 half-credits presented for a degree. These overall requirements must include the Faculty core courses outlined in Table II on page 13:8 and the following specific courses:

- CS 241, 242, 340, 354, 358, 360;
- One of CS 372, 374;
- Three additional 400-level CS half-credits numbered 440 or above;
- C&O 230;
- Four of AM 381, 391, C&O 330, 342, 350, MATH 332B (or PMATH 352), PMATH 331 (or 351A), 334 (or 344), 430A (or 432), STAT 333, 433.

Honours Computer Science with Electrical Engineering Electives (Co-operative only)

This program has the same course requirements as Honours Computer Science, with the following modifications:

- exclude CS 356;
- include at least two of CS 450, 452, 454, 456, 457;
- include EL E 123, 222, 234, 323, 333, 427.

EL E 438 is recommended.

Honours Computer Science - Information Systems Option (Co-operative only)

This program is offered jointly with the Division of Mathematics for Industry and Commerce. In conjunction with the common degree requirements specified in Table I on page 13:7, this program requires a total of 44 half-credits, including at least 26 math half-credits. A maximum of ten CS half-credits at the 300 or 400-level may be included in the 44 half-credits presented for a degree. These overall requirements must include the Faculty core courses outlined in Table II on page 13:8 and the following specific courses:

- CS 241, 242, 340, 354, 358, 360, 448, 482;
- Two additional 400-level CS half-credits numbered 440 or above;
- C&O 230;
- Two math half-credits chosen from:
  - C&O 342, 350, 370, STAT 331, 332, 333, 371;
  - ACC 121, 122, BUS 111W, 121W, 352W, 481W, 491W, ECON 101, 102, M SCI 211, 311, 432, MTHEL 100.
- DRAMA 223 is recommended.
Courses labelled BUS are offered by Wilfrid Laurier’s School of Business and Economics. They are described by title on page 13:18.

Joint Honours Computer Science with Mathematics/Business Administration, Chartered Accounting (Co-operative only) or Management Accounting (Co-operative only) Options
In conjunction with the common degree requirements specified in Table I on page 13:7, this program requires a total of 44 half-credits, including at least 25 math half-credits. These overall requirements must include the Faculty core courses outlined in Table II on page 13:8 and the following specific courses:

- C&O 230;
- CS 241, 242, 340, 354, 360, 448, 482;
- STAT 331;
- Two additional half-credits chosen from:
  - CS 350, 358, 372 or 374 (but not both), 440-498;
  - Two of AM 380A (or PMATH 380A),
  - C&O 342, 350, 367, 370, 454,
  - STAT 332, 333, 335, 443;
- All specified non-math courses in the Honours Mathematics/Business Administration, Chartered Accountancy and Management Accounting Options (see page 13:19).

Note that, in addition to the 65% Math and Overall Graduation Average requirements for an Honours BMath degree, students in the Honours Computer Science/Accounting Options must also achieve an average of at least 70% in all of the courses with the prefix ACC that are explicitly required for their program. (See also Footnote 4(iv) on page 13:7.)

Joint Honours Applied Math with Computer Science
This program is described with Applied Mathematics programs on page 13:10.

Joint Honours Combinatorics and Optimization with Computer Science
This program is described with Combinatorics and Optimization programs on page 13:11.

Joint Honours Pure Mathematics with Computer Science
This program is described with Pure Mathematics programs on page 13:14.

Joint Honours Statistics with Computer Science
This program is described with Statistics programs on page 13:16.

Mathematics
Computer Science
Operations Research

Notes
1. Honours students in another department in the Faculty of Mathematics wishing a “Double Major” or a “Minor” in Computer Science should consult the section “Combination Honours Programs within the Faculty of Mathematics” which begins on page 13:16.

2. 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.

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, which is administered by the Division of Mathematics for Industry and Commerce in conjunction with the Department of Combinatorics and Optimization, 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, game theory, 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) will 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 specified in Table I on page 13:7, this program requires a total of 44 half-credits, including at least 28 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 13:8 and the following specific courses:
One of AM 381, MATH 332B (or PMATH 352), PMATH 331 (or 351A), PMATH 334 (or 344); C&O 350, 351, 370; CS 230, 337, 437; STAT 331, 333, 371, 443; Four math half-credits chosen from: C&O 342, 367, 450 through 466, CS 334, 432, STAT 332, 335, 450, 433; M SCI 211/311, or PSYCH 101/333, or SOC 101/242; Two of ACC 121, 122, ECON 101, 102, M SCI 461; Two of ACC 371, BUS 352W, M SCI 432; DRAMA 223 is recommended. (BUS 352W is offered by Wilfrid Laurier’s School of Business and Economics. It is described by title on page 13:18.) 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.

Mathematics

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 applications to the basic sciences or technology in mind. 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), 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 three programs: Honours Pure Mathematics, Joint Honours Pure Mathematics with Computer Science and Joint Honours Pure Mathematics with Statistics. For all three programs, MATH 244B is strongly recommended.

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 specified in Table I on page 13:7, this program requires a total of 44 half-credits, including at least 26 math half-credits. These overall requirements must include the Faculty core courses outlined in Table II on page 13:8 and the following specific courses:

C&O 230;
PMATH 344, 351A/B, 352, 367;
One of PMATH 451, 452, 453;
One of PMATH 441, 445, 446, 447;
Three additional 400-level PMATH half-credits other than PMATH 430A;
Two additional 400-level math half-credits.

Joint Honours Pure Mathematics with Computer Science

In conjunction with the common degree requirements specified in Table I on page 13:7, this program requires a total of 44 half-credits, including at least 27 math half-credits. These overall requirements must include the Faculty core courses outlined in Table II on page 13:8 and the following specific courses:

C&O 230;
CS 241, 242, 340, 360;
One of CS 372, 374;
PMATH 344, 351A, 352;
Two additional 400-level CS half-credits;
Three additional 400-level PMATH half-credits other than PMATH 430A;
One additional 300 or 400-level PMATH or CS half-credit.

Joint Honours Pure Mathematics with Statistics

In conjunction with the common degree requirements specified in Table I on page 13:7, this program requires a total of 44 half-credits, including at least 26 math half-credits. These overall requirements must include the Faculty core courses outlined in Table II on page 13:8 and the following specific courses:
Honours students in another department in the Faculty of Mathematics wishing a "Double Major" or a "Minor" in Pure Mathematics should consult the section "Combination Honours Programs within the Faculty of Mathematics" on page 13:16.

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 specified in Table I on page 13:7, this program requires a total of 44 half-credits, including at least 26 math half-credits. A maximum of ten STAT courses at the 300 or 400-level may be included in the 44 half-credits presented for a degree. These overall requirements must include the Faculty core courses outlined in Table II on page 13:8 and the following specific courses:

**Mathematics**

| STAT 330, 331, 332, 333, 430, 450; |
| Four of ACTSC 431, 432, AM 371, 381, 391, C&O 330, 350, CS 337, MATH 332B (or PMATH 352), PMATH 331 (or 351A), 334 (or 344), 351B, 452; |
| One additional 400-level STAT half-credit; Three additional 300 or 400-level math half-credits. |

**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 123/124 should normally be taken in Year One. The Engineering courses are taken in Years Two to Four.

**Group**

- **Chemical**
  - CH E 201, 202, 206, 301, 307, 401;
  - CHEM 123/124, PHYS 121/122.

- **Civil (transportation)**
  - CIV E 126, 292, 340, 342, 343, 344;
  - PHYS 121/122.

- **Groups of courses in Fluid Mechanics and Hydrology, and Water Quality Control are also available**.

- **Management Sciences**
  - M SCI 211, 261, 311, 432, 452, 461.

- **Mechanical**
  - M E 215, 219, 250, 321, 351 and one of 340, 348;
  - PHYS 121/122.

- **Groups of courses in Automation, Production, Materials, Solid Body Mechanics and Thermofluids are also available**.

- **Systems Design**
  - SY DE 281, 364, 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 9:9.
Joint Honours Statistics with Computer Science
In conjunction with the common degree requirements specified in Table 1 on page 13:7, this program requires a total of 44 half-credits, including at least 28 math half-credits. These overall requirements must include the Faculty core courses outlined in Table II on page 13:8 and the following specific courses:

- STAT 330, 331, 332, 333, 430;
- C&O 230;
- CS 241, 242, 340;
- One of CS 372, 374;
- Two of CS 350, 354, 358, 360;
- One of AM 371, 381, 391, C&O 330, 350, MATH 332B (or PMATH 352), PMATH 331 (or 351A), 334 (or 344);
- Two additional 400-level CS half-credits numbered 440 or above;
- One additional 400-level STAT half-credit.

Joint Honours Pure Mathematics with Statistics
This program is described with Pure Mathematics programs on page 13:14.

Honours students in another department in the Faculty of Mathematics wishing a "Double Major" or a "Minor" in Statistics should consult the section "Combination Honours Programs within the Faculty of Mathematics" which begins below.

Combination Honours Programs within the Faculty of Mathematics

Double Honours 'X' and 'Y' Programs
All Honours requirements for both areas 'X' and 'Y' must be satisfied. 'X' and 'Y' refer to any two of Actuarial Science, Applied Mathematics, Combinatorics and Optimization, Computer Science, Operations Research, Pure Mathematics, and Statistics (with the exception that the combination Combinatorics and Optimization and Operations Research is not an officially recognized Double Honours Program). Note that, with some 'X' and 'Y' combinations, it may be necessary to complete more than 44 half-credits and/or more than eight full-time terms to satisfy all of the relevant course requirements.

Honours 'X' with 'Y' Minor Programs
All Honours requirements for area 'X' and the specific requirements designated below for area 'Y' must be satisfied. 'X' refers to any one of Actuarial Science, Applied Mathematics, Combinatorics and Optimization, Computer Science, Math/Teaching Option, Operations Research, Pure Mathematics, and Statistics.

Mathematics
Combination Honours Programs

'Y' Minor Requirements
Actuarial Science:
ACTSC 231, 232, 331, 332, MTHEL 305A;
One of ACTSC 431, 432;
One additional ACTSC half-credit.

Applied Mathematics:
AM 270, 340, 371, 381, 391;
Two additional 300 or 400-level AM half-credits.

Combinatorics & Optimization:
C&O 230, 350;
One of C&O 330, 342;
Two additional half-credits chosen from C&O 330, 331, 342, 343, 351, 367, 436 through 486.

Computer Science:
CS 131, 132;
CS 230 or 242;
Five additional CS half-credits.

Pure Mathematics:
PMATH 344, 351A, 352;
Three additional 300 or 400-level PMATH half-credits.

Statistics:
STAT 331, 332, 333;
Two additional 300 or 400-level STAT half-credits.

Students do not officially register in an Honours 'X' with 'Y' Minor program. Such 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 Honours Mathematics Non-Specialist, Actuarial Science, Applied Mathematics, Combinatorics and Optimization, Computer Science, Math/Teaching Option, Operations Research, Pure Mathematics, Statistics. 'Z' refers to any discipline, in a faculty other than Mathematics, that chooses to make a 'Joint Honours' or a 'Minor' designation available to Math Faculty students. Students interested in a particular discipline 'Z' should consult with the department concerned for specific course requirements.
Joint Honours 'X' and 'Z' Programs
All Honours requirements for area 'X' and the set of requirements prescribed by discipline 'Z' must be satisfied. In addition to meeting the Graduating Average requirements of the Faculty of Mathematics, students in these programs must also satisfy the Honours average requirements specified by discipline 'Z'. Note that, with some 'X' and 'Z' combinations, it may be necessary to complete more than 44 half-credits and/or more than eight full-time terms to satisfy all of the relevant course requirements.

Honours 'X' with 'Z' Minor Programs
All Honours requirements for area 'X' and a set of ten half-credits prescribed by discipline 'Z' must be satisfied. In addition to meeting the Graduating Average requirements of the Faculty of Mathematics, students in these programs must also satisfy any average requirements in these ten half-credits as specified by discipline 'Z'. Students do not officially register in an Honours 'X' with 'Z' Minor program. Such 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.

BMath Transcripts
BMath transcripts include explicit mention of no more than two areas of study in the academic program section.

Non-Departmental Honours, General and Pass Programs: Requirements and Recommendations
Except where noted, Honours Programs may be taken on either the Regular or Co-operative system of study. Academic requirements for corresponding Co-operative and Regular programs are identical. Pass and General Programs are available only in the Regular system.

Faculty Honours, General and Pass Programs:

Honours Mathematics: Non-Specialist Program
The purpose of this program is to provide students in the Faculty of Mathematics with breadth of studies at the Honours level rather than the specialization offered by departmental and option Honours programs. Further, it permits a student to defer a decision as to specialization or affiliation with a particular department or option within the Faculty.

Students taking this program will be prepared either for careers in the applications of mathematics or for graduate studies. By choosing appropriate courses, a student should be eligible to proceed from this program to graduate work in any area of mathematics.

In conjunction with the common degree requirements specified in Table I on page 13:7, this program requires a total of 44 half-credits, including at least 28 math half-credits. These overall requirements must include the Faculty core courses outlined in Table II on page 13:8 and the following specific courses:

AM 280/270 or AM 270/280;
One of AM 340, 362, 371, 381;
C&O 230, 350;
One of C&O 342, 351, 367, 370;
CS 230;
Two of CS 334, 335, 337, 430, 432, 435, 437, 438;
MATH 332B (or PMATH 352);
PMATH 331 (or 351A);
STAT 331;
One of AM 444, C&O 330, PMATH 334 (or 344), STAT 430;
One additional 300 or 400-level math half-credit;
Two additional 400-level math half-credits with 300-level prerequisites.

Note
Students in the Non-Specialist Faculty 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.

General Mathematics (Regular Only)
Students enrolled in the General Math/Business Administration Option are not covered by the degree requirements described in this section. Requirements and recommendations for this Option follow this section.

In conjunction with the common degree requirements specified in Table I on page 13:7, this program requires a total of 42 half-credits, including at least 24 math half-credits. These overall requirements must include the Faculty core courses outlined in Table II on page 13:8 and the following specific courses:

MATH 322A/B, 324;
One of ACTSC 335, CS 337, 372, 375, C&O 350, AM 444;
Eight additional math half-credits which may not include more than two half-credits with the same course prefix (ACTSC, AM, CS, C&O, MATH, PMATH, STAT). [See Note 1 on page 13:18.]
Notes
1. Students are advised to select these eight additional math half-credits from the recommended lists below. (The courses listed are only recommendations from the Faculty. Other math courses may be chosen to satisfy the “course-breadth” requirement, provided they are at the 200-level or above.)
   - ACTSC 221, 222, 337;
   - AM 260, 270, 340, 380A/B, 444;
   - C&O 220, 270, 350, 370, 380, 382;
   - CS 230, 330, 334, 335, 337, 430, 432, 435, 437, 438;
   - PMATH 340, 360, 380A/B, 430A/B;
   - STAT 321, 322.
2. There are no restrictions as to course prefix for any math courses taken beyond the 24 explicitly required math half-credits.
3. For an alternative way to qualify for a BMath General degree, see page 13:8.

Pass Mathematics (Regular only)
In conjunction with the common degree requirements specified in Table I on page 13:7, this program requires a total of 32 half-credits, including at least 12 math half-credits. These overall requirements must include the Faculty core courses outlined in Table II on page 13:8.

Mathematics/Business Administration, Chartered Accountancy and Management Accounting Options
The constantly increasing complexity of business organizations has created a demand for persons trained in analyzing business and accounting problems from a mathematical point of view. The Faculty of Mathematics, in co-operation with the Division of Mathematics for Industry and Commerce, the School of Business and Economics at Wilfrid Laurier University, the Departments of Economics and Management Sciences, and the School of Accountancy at Waterloo offers three unique programs combining Mathematics with Business Administration, Chartered Accountancy, and Management Accounting. Each of these is designed so that students gain an appreciation for the applications of mathematics to commerce and gain experience in areas such as banking, marketing, production control, accounting, auditing, etc. All three Options are available, at the Honours level only, in the Co-operative system of study. Only the Business Administration Option, however, is available in the Regular system of study, and it is offered at both Honours and General levels for Regular students.

The Chartered Accountancy and Management Accounting Options are offered in co-operation with the Institute of Chartered Accountants of Ontario and the Society of Management Accountants of Ontario, respectively. Graduates of the Chartered Accountancy Option will normally have completed all formal university course work required by the Institute. The other principal requirements for the CA designation include two or three years work experience in public accounting and successful completion of the National Institute’s Uniform Final Examinations. The Management Accounting Option is structured so that successful completion of the program normally qualifies a student for 16 CMA exemptions and also to write four of the Society’s six Uniform National Examinations required for CMA (Certified Management Accountant) certification.

Co-operative work terms are accepted by both the Institute and the Society as part of their respective internship requirements. Thus, Co-op graduates are normally able to complete all Institute or Society requirements in as little as one year after graduation.

Note
In the requirements and recommendations which follow, courses with prefix BUS are offered by Wilfrid Laurier University’s School of Business and Economics. These courses are:
   - BUS 111W - Introduction to Business Organization
   - BUS 121W - Functional Areas of the Organization
   - BUS 352W - Marketing I
   - BUS 362W - Marketing II
   - BUS 454W - Personnel Management
   - BUS 481W - Business Policy I
   - BUS 491W - Business Policy II

Complete course descriptions, and the terms in which these courses are normally offered for 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 3115).

Honours Mathematics/Business Administration, Chartered Accountancy (Co-operative only), Management Accounting (Co-operative only) Options
In conjunction with the common degree requirements specified in Table I on page 13:7, these programs require a total of 44 half-credits, including at least 22 math half-credits. These overall requirements must include the Faculty core courses outlined in Table II on page 13:8 and one of the course packages listed below.
On entering Year Three, students must specify one of the following packages a), b), c):

a) Information Systems Package
CS 230, 330, 438, STAT 331;
CS 432 or 434;
Two of AM 380A (or PMATH 380A),
C&O 350, 367, 370, 454;
One of STAT 332, 333, 335, 443;
One additional 300 or 400-level CS half-credit;
One additional 300 or 400-level math half-credit.

b) Optimization Package
C&O 350, 351, 370, CS 330, 438, STAT 331;
Two of C&O 367, 450, 452, 454, 456, 459, 464, 465;
One of STAT 332, 333, 335, 443;
One additional 300 or 400-level math half-credit.

c) Statistics Package
STAT 331, 332, 335, 443, CS 330, 438;
Two of C&O 360, 367, 370, 454;
One of STAT 333, 430, 440;
One additional 300 or 400-level math half-credit.

ACTSC 221 (or 231), C&O 270, and DRAMA 223 are recommended for all three packages.

The non-math half-credits required (together with the terms in which these courses are normally taken) are given in the table below.

<table>
<thead>
<tr>
<th>Term</th>
<th>Math/Bus. Admin.</th>
<th>Math/Accounting</th>
</tr>
</thead>
<tbody>
<tr>
<td>1A</td>
<td>ACC 121, BUS 111W, ECON 101</td>
<td>ACC 101, BUS 111W, ECON 101</td>
</tr>
<tr>
<td>1B</td>
<td>ACC 122, BUS 121W, ECON 102</td>
<td>BUS 121W, ECON 102</td>
</tr>
<tr>
<td>2A</td>
<td>BUS 352W, MTHEL 100</td>
<td>ACC 281, MTHEL 100</td>
</tr>
<tr>
<td>2B</td>
<td>BUS 362W</td>
<td>ACC 291, M SCI 211 (See Note 3)</td>
</tr>
<tr>
<td>3A</td>
<td>ACC 371, M SCI 211</td>
<td>ACC 351, 371, 392</td>
</tr>
<tr>
<td>3B</td>
<td>ACC 372, M SCI 311</td>
<td>ACC 372, 381</td>
</tr>
<tr>
<td>4A</td>
<td>BUS 454W, 481W</td>
<td>ACC 382, 461, 491</td>
</tr>
<tr>
<td>4B</td>
<td>BUS 491W, M SCI 432</td>
<td>ACC 462 (See Note 1)</td>
</tr>
</tbody>
</table>

Notes

1. ACC 401, 453 are strongly recommended in terms 4A/B of the Accounting Options.

2. In addition to the 65% Math and Overall Graduation Average requirements for an Honours BMath degree, students in the Honours Math/Accounting Options must also achieve an average of at least 70% in all of the courses with the prefix ACC which are explicitly required for their program. (See also Footnote 4(iv) on page 13:7.)

3. The explicitly required non-math half-credits for the Math/Chartered Accountancy and Management Accounting Options are identical except for M SCI 211 which is required only in the Management Accounting Option.

4. The minimum grade required to satisfy a prerequisite for courses with prefix ACC is C−.

Joint Honours Computer Science with Mathematics/Business Administration, Chartered Accountancy (Co-operative only) or Management Accounting (Co-operative only) Options
These programs are described with Computer Science programs on page 13:13.

General Mathematics/Business Administration Option (Regular only)
In conjunction with the common degree requirements specified in Table I on page 13:7, this program requires a total of 42 half-credits, including at least 24 math half-credits. These overall requirements must include the Faculty core courses outlined in Table II on page 13:8 and the following specific courses:

- ACTSC 221;
- Two of CS 230, 330, 438;
- Two of C&O 270, 350, 367, 370;
- One of STAT 321 (See Note 1 below), 322;

The non-math half-credits required are the same as for Honours students, except that ACC 372 is not required for General students. These courses are stated (together with the terms in which they are normally taken) in the corresponding table for Honours students.

Notes

1. STAT 321 is required by the Society of Management Accountants, but not for the BMATH degree.

2. For an alternative way to qualify for a BMATH General degree, see page 13:8.

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 any one of the Mathematics Faculty's non-teaching Co-operative Programs in Year One, and will be considered for admission to the Teaching Option in
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 5:3.) 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 specified in Table I on page 13:7, this program requires a total of 44 half-credits, including at least 26 math half-credits. The math half-credits submitted for the degree must include at least twelve 300 or 400-level math half-credits, and students are encouraged to gain as much mathematical breadth as possible in their selection. These overall requirements must include the Faculty core courses outlined in Table II on page 13:8 and the following specific courses:

- C&O 230;
- MATH 332B (or PMATH 352);
- PMATH 331 (or 351A);
- PMATH 334 (or 344);
- One of AM 270, 280, 340;
- One of C&O 270, 380, 480, 481;
- One of CS 330, 334, 335, 337;
- One of PMATH 340, 360, 430A;
- One of ACTSC 221, STAT 331, 332, 333;
- MTHEL 206A, SOC 207G.

Recommended non-math courses include

PSYCH 212, 213, PHIL 311, 312, and
MTHEL 102.

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 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 in London. This term occurs after all other components of the program have been completed.

3. The selection of courses required to satisfy the BMath Teaching Option must include at least four half-credits in one of the following subject disciplines:

   - Biology, Chemistry, Computer Science,
   - Environmental Studies, General Science, or
   - Physics. These four half-credits will fulfill the

Mathematics

Mathematics/Teaching Option

Combination Honours Program

Ministry of Education’s requirement for a second teaching subject.

Combination Honours Programs Leading to a Degree with Another Faculty

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.

The Faculty of Mathematics course requirements consist of a total of 14 math half-credits with a minimum average of 65%. These overall requirements must include the following specific courses:

- MATH 130A/B, 134A/B, 230A/B, 234A/B;
- STAT 230, 231;
- Two of CS 100, 102, 212, 230;
- Two 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 65%. These overall requirements must include the following specific courses:

- MATH 130A/B, 134A/B;
- STAT 220, 221;
- Two of CS 100, 102, 212, 230;
- Two additional math half-credits which qualify for BMath degree credit.

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 65%, which must consist of:

- a half-credit Calculus course;
- a half-credit Algebra course;
- CS 102 or equivalent;
- CS 212, 230;

* Students do not officially register for a Mathematics or Computer Science Minor. Such students register in
the appropriate Honours program and request an
official Mathematics or Computer Science Minor
designation when they complete an 'Intention to
Graduate' form.

**Options in Mathematics**
Options in Mathematics for students in the Faculty of
Engineering and Honours Chemistry are described on
pages 9:8 and 14:21 respectively.

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**Division of Mathematics for Industry
and Commerce**

The Division is a unit within the Faculty of
Mathematics which deals with those activities that
relate closely to business and industry. The Division
manages five programs related to industry and
commerce within the Faculty of Mathematics:

1) Operations Research
2) Computer Science/Information Systems
3) Mathematics/Management Accounting
4) Mathematics/Chartered Accountancy
5) Mathematics/Business Administration

In addition, the Division serves as a focal point for
contact between faculty members and the industrial
and commercial sector.

Members of the Division are drawn from existing
departments within the Faculty of Mathematics, as well
as other groups on campus which are involved with
these programs, specifically the School of
Accountancy, Department of Co-operative Education
and Career Services, and Department of Management
Sciences (Engineering). There is also external
representation from the accounting profession and
various other areas of business and commerce.

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**Centre for Information Theory**

The Centre for Information Theory was created by the
Senate of the University of Waterloo on September 15,
1980. It consists of members of the Engineering,
Mathematics, and Science Faculties who are teaching
and doing research in Information Theory.

Members of the Centre work on the algebraic,
combinatorial, non-probabilistic, probabilistic and
mixed theories of information and their applications to
coding, cryptography, economics, engineering,
forecasting, optimization, physics, pattern recognition,
picture processing, and system designs. The Centre
organizes a Seminar and Lecture Series on
Information Theory and publishes Research Reports.

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**Recognition of Academic Excellence**

1. **DEAN'S HONOURS LIST**

To recognize outstanding academic achievement each
term, the designation “Dean’s Honours List” is
awarded to undergraduate Mathematics students in an
Honours program whose term averages (both math
and overall) are at least 85%, based on all courses
taken that term. Only students carrying at least a
standard course load in the term will be eligible for the
Dean’s Honours List. (See Table I on page 13:7 for
definition of ‘standard’ course load.) This designation
is reflected on end-of-term grade reports and official
university transcripts.

Those with outstanding academic records
throughout their undergraduate careers who qualify for
a BMath Honours degree “Graduate on the Dean’s
Honours List” if their cumulative averages (both math
and overall) are at least 85%, based on all courses
taken. In addition to an appropriate notation on their
official university transcript, those who “Graduate on
the Dean’s Honours List” have their names displayed
in gold in the Math Faculty Colloquium Room (MC
5158).

2. **ALUMNI GOLD MEDALLIST**

An Alumni Gold Medal is presented annually (usually
at the Spring Convocation) to recognize the academic
excellence of the Faculty’s most outstanding
undergraduate student.

3. **K.D. FRYER GOLD MEDAL**

The K.D. Fryer Gold Medal is presented annually at
Fall Convocation to a graduating student who best
exemplifies academic excellence and good student
citizenship.
Faculty Policies

1. UNDERGRADUATE STANDINGS AND PROMOTIONS COMMITTEE

Membership, Duties, Operating Procedures
The Committee consists of the Dean, Associate Dean for Undergraduate Studies, Assistant Dean (External Programs), the Assistant Registrar, Faculty of Mathematics (who serves as the Committee’s Secretary), the Academic Advisors for each of the Faculty’s undergraduate programs, a representative of St. Jerome’s College, the Director of Undergraduate Affairs, the Mathematics Program Administrator of Cooperative Education and Career Services, and other non-voting persons.

The main purposes of the Committee are to administer the rules and regulations pertaining to undergraduate studies in the Faculty, to make recommendations on student performance before end-of-term grade reports are issued to students by the Registrar, and to consider all requests for special consideration or appeals in matters within its jurisdiction.

Exceptions to normal Faculty policies under the jurisdiction of the Standings and Promotions Committee may be authorized only by that Committee. All such requests must be made in writing to the Assistant Registrar, Faculty of Mathematics, Needles Hall. At its meetings the Committee carefully deliberates all petitions and requests, and when special circumstances justify making an exception to existing rules, the Committee grants the request. It is often useful for students to discuss their circumstances with an Undergraduate Advisor before making a formal request to the Committee. Committee meetings are normally scheduled every other week.

2. PROMOTIONAL POLICIES

2.1 Required Withdrawal from Co-op
Students will be required to withdraw from a Co-operative Mathematics program if they fall into one or more of the following categories:

i) They have been required to withdraw from an Honours Mathematics program.
ii) They have failed to meet minimum requirements on work terms and/or work reports.

2.2 Required Withdrawal from Honours
Students will normally be required to withdraw from an Honours Mathematics program if they fall into one or more of the following categories:

i) They have accumulated more than six half-credit failures in total.
ii) They have accumulated four or more half-credit failures during any two consecutive full-time academic terms (including failures obtained in any part-time terms interspersed between the two full-time terms in question).

iii) At the end of their first two full-time terms of registration in the Faculty of Mathematics (or by the time they have accumulated 12 half-course attempts, whichever comes first), they have failed to complete successfully eight half-credits, with an average on these eight half-credits of at least 60%.

Students who have been required to withdraw as Honours BMath degree candidates will be permitted to register in a BMath Pass or General program, provided their records do not meet any of the criteria for ‘Required Withdrawal from Mathematics’ (see Section 2.3 below). Students allowed to continue their studies in Pass or General will not normally be permitted to take Honours-level mathematics courses when there are corresponding General-level courses available. (See table with Note 2 on page 16:94 for a complete listing of such courses.)

2.3 Required Withdrawal from Mathematics
Students will normally be required to withdraw from the Faculty of Mathematics if they fall into one or more of the following categories:

i) They have accumulated more than eight half-credit failures in total.
ii) They have accumulated six or more half-credit failures during any two consecutive full-time academic terms (including failures obtained in any part-time terms interspersed between the two full-time terms in question).

iii) They have exceeded the maximum number of course attempts allowed for their degree. (See Table I on page 13:7).
iv) They have failed to satisfy all requirements for a BMath Pass degree by the end of the first term in which they have accumulated 44 or more half-course attempts.

v) In the opinion of the Standings and Promotions Committee, they are unlikely to profit from further study in the Faculty of Mathematics.

Students who have been required to withdraw from the Faculty of Mathematics will not normally be re-admitted to a degree program in Mathematics at any point in the future. However, at the time a Required-To-Withdraw decision is given, the Standings and Promotions Committee will review the student’s academic record to date. If, at the end of any term prior to the term when withdrawal is being required, the student would have qualified for a lesser BMath degree, the student will be granted that lesser degree, even though he/she is not being permitted to pursue his/her studies in the Faculty of Mathematics toward a higher degree.

2.4 Exceeding Maximum Course Attempts/Failures
A student who, at the end of a specific term, has
accumulated all the requirements for a particular degree, but has simultaneously exceeded the maximum number of failures or course attempts permitted for the degree in question will not normally be granted the degree. In some cases, depending upon the circumstances, the student might be eligible for a lesser degree. (See the last paragraph in Section 2.3 above.) In other circumstances, however, it is quite possible that the student would be required to withdraw from the Faculty with no degree.

3. GRADING POLICIES

3.1 Grade Designations/Averages
In addition to marks from the numerical scale 0-100, the designations INC (Incomplete course work, no credit granted), AEG (Aegrotat, credit granted due to illness), CR (Credit granted), NMR (No mark reported) and DNW (Did not write examination, no credit granted) may be used from time to time.

Courses recorded as AEG or CR will count as credits but have no numerical grade for average purposes. Those recorded as INC, NCR, NMR and DNW will count as failures for the purpose of course- attempt and failure counts. If a student abandons a course and does not write the final examination, some instructors may elect to submit a numerical grade based upon term work, with a zero mark included for the examination, rather than submitting a DNW grade for the course. Students considering such action are advised to determine their instructor’s intentions prior to making any final decision to abandon the course. INC, NMR, DNW count as zeros in the calculation of averages.

A student who receives an INC grade designation has up to eight months (two terms) to complete the appropriate course work. If, after eight months, the course work is not completed, then the INC is automatically converted to a DNW grade designation.

3.2 Grade Appeals
Any math student wishing to appeal a grade may do so by contacting the Assistant Registrar, Faculty of Mathematics, in Needles Hall, and requesting a grade appeal form. The grade appeal form must be completed and returned to the Registrar’s Office along with $5.00 per grade appeal (which is refunded if the grade is raised). Such an appeal must normally be submitted within one month of the official release of that term’s grades. Please note, however, that a grade may be lowered if a re-examination leads to the discovery of an earlier error not in the student’s favour.

3.3 Posting of Final Grades by Instructors
Final course grades are not official until student examination reports have been issued by the Registrar’s Office. However, once the official final examination period is over each term, instructors in the Faculty of Mathematics are encouraged to post their lists of unofficial final grades, by I.D. number only, on their office doors. Faculty policy precludes such lists from including student names or being posted prior to the end of the official final examination period. Individual students who do not want their grades included on such posted lists must notify their instructors of this fact prior to the end of the official lecture period.

4. POLICIES RE: COURSES

4.1 Advanced/Honours/General Level Courses
A number of mathematics courses are offered at three different levels for BMath degree credit to accommodate the wide variety of students interested in such courses. The most challenging level, Advanced Honours, is intended for exceptionally gifted students in an Honours program. The second level, Honours, is intended for all Honours students not taking the Advanced Honours courses. The third level, General, is intended for students registered in a General or Pass program. In some instances, there are also other versions of such courses designed for students in faculties other than Mathematics.

Advanced Honours courses may always be substituted in lieu of corresponding Honours courses to satisfy Honours BMath degree requirements. Similarly, either level of an Honours course may always be substituted in lieu of the corresponding General course to satisfy General or Pass BMath degree requirements. However, students who have been required by the Standings and Promotions Committee to change from an Honours program to General or Pass may not subsequently (pre) register for any Honours level math course which has a corresponding General-level equivalent without written permission from the Standings and Promotions Committee. (See table with Note 2 on page 16:94 for a complete listing of such courses.)

4.2 Course Upgrading
A student who takes the General version of a course instead of the Honours version (e.g. MATH 220A instead of 230A), but later decides to pursue an Honours degree, may petition the Standings and Promotions Committee for special consideration. When the academic record of the student in question is of very high calibre, the Committee sometimes permits the student to count the General course toward an Honours degree, in lieu of the Honours equivalent. The grade in the General-level course, however, is not normally included in the Graduating Averages which determine the student’s eligibility for an Honours degree. Otherwise, the student must retake the course at the Honours level.

4.3 Failed Courses
The minimum passing mark in all courses is 50%. If a student fails a course, he/she may either retake the same course (and this will be the case if the course is
required for the degree being sought) or replace it by another course. The failed course remains a permanent part of the student’s record at the University, regardless of whether he/she passes the same course on a subsequent attempt, and it is included in course-attempt and failure counts.

However, the failing grade will not be included in the Graduating Averages required for the degree in question (see Footnote 4 with Table I on page 13:7).

Note that supplemental examinations are not available for students in the Faculty of Mathematics.

4.4 Repeated Courses
A student may not normally retake a passed course more than once in an attempt to improve the grade. Both attempts will be included in the student’s quota of course attempts, but the course will be included only once in credit counts and may be counted at most once in the Graduating Averages required for the degree in question (see Footnote 4 with Table I on page 13:7).

4.5 No Credit/Overlap Courses
Some courses offered within the University may not normally be taken for credit toward a BMath degree. The content of such courses has usually been designed with the academic needs and background of students in faculties other than Mathematics in mind.

Other courses offered by various departments throughout the University sometimes deal with similar subject matter. In such instances, at most one entry from a group of ‘overlapping’ courses may count for credit toward a BMath degree.

Lists of such courses are published annually in the “How To Get Around in MATHEMATICAL CIRCLES” booklet, copies of which are available in the Mathematics Undergraduate Office (MC 5115). It is the student’s responsibility to be aware of the contents of these lists.

4.6 Correspondence Courses
The Correspondence Program at the University of Waterloo offers a large variety of courses each term primarily for part-time students who are not able to attend classes on campus. Concurrent registration by full-time BMath degree candidates in on-campus and Correspondence courses is not normally permitted.

For a BMath Honours degree, all explicitly specified course requirements must normally be satisfied by on-campus courses. However, any additional courses (math or non-math) may be taken on a part-time basis by Correspondence for Honours degree credit.

For BMath General and Pass degrees, students may elect to satisfy any course requirement by part-time Correspondence study, provided suitable courses are available in this mode.

A note of caution is in order for those students who will be studying full-time on campus in the Winter term and wish to take Correspondence courses in the preceding Fall term. Fall Correspondence courses do not begin until late October and normally have their final examinations near the end of January. This presents an overlap in course schedules between on-campus and Correspondence courses. Students are urged to consider carefully the potential extra workload involved in studying for, and writing exams in, Fall Correspondence courses while simultaneously carrying a full-time load of on-campus Winter courses.

Subject to the limitations described above, Correspondence courses may be taken on a part-time basis by Regular and Co-op students during terms off campus. Note that while on a work-term, Co-op students are limited to one half-credit course, unless they have written support from their employer to take two half-credit courses. Interested students are encouraged to discuss Correspondence course selections with their Faculty Advisor, but the actual paperwork to preregister for Correspondence courses involves completely separate application forms available in the Correspondence Program Calendar.

4.7 Courses at Other Universities
(Letters of Permission)
Students in good academic standing (i.e. at least 60% cumulative all-inclusive overall average) 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. Such courses may be used as credits toward a Bachelor of Mathematics degree at Waterloo. However, only under very special circumstances will math students be permitted to take mathematics courses (i.e. MATH, CS, STAT, etc.) or required non-math courses, or study on a full-time basis, at other institutions to count toward their Waterloo degree requirements. Students wishing to take courses at other universities must apply to the Standings and Promotions Committee for permission by completing a special "Letter of Permission" form available from the Registrar’s Office. Please note that permission must be obtained before taking each course. The Committee will not normally approve courses taken elsewhere for Waterloo degree credit if prior approval has not been obtained.

All courses taken on a Letter of Permission will be recorded on Math Faculty Student Examination Reports with a grade of ‘CR’ (credit) or ‘NCR’ (no credit) as appropriate. As a result, the grades for such courses will be excluded from the calculation of averages used to determine eligibility for graduation with a BMath degree (see Footnote 4 with Table I on page 13:7). Note that, while on a work-term, Co-op students are limited to one half-credit course, unless they have written support from their employer to take two half-credit courses.

Care should be exercised in the selection of courses to be taken on a Letter of Permission to eliminate unnecessary duplication in course material covered and to ensure adequate preparation for subsequent
courses the student is planning to take in future years at the University of Waterloo.

Once the Faculty has approved a request to take a course or a Letter of Permission, the student will be held responsible for it. It will be his/her 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 submitted. Any changes a student wishes to make to an authorized Letter of Permission must be approved in advance by the Standings and Promotions Committee.

There is a non-refundable fee for processing each request for a Letter of Permission. (Only one host institution may be indicated on each request.) If replacement courses are requested because the host institution has cancelled or closed a course which has already been approved to be taken on a Letter of Permission, there will be no additional charge for this service.

4.8 Dropping/Adding Courses
Normally, the last day to ADD a course is two weeks after the official beginning of lectures. The last day to DROP a course for students not carrying more than a standard course load, is four weeks after the beginning of lectures. (A ‘standard’ course load is defined in Table I on page 13.7.) Students carrying more than a standard course load may not normally DROP any courses later than two weeks after the beginning of lectures. (These deadline dates apply only to Math Faculty students.) All exceptions to these deadlines must be approved by the Standings and Promotions Committee. Complete withdrawal from a Mathematics program without academic penalty is discussed in Section 5.6. on page 13:27.

Since OSAP assistance is partially based upon the course load in which a student is enrolled, course drop/adds during the term can affect a student’s initial entitlement. Students who wish to drop below three half-credit courses per term should first consult with the Student Awards Office staff in Needles Hall. In some cases, such action could have a significant effect on their OSAP entitlement.

A course attempt refers to a course registration not formally cancelled with the Registrar’s Office before the drop deadline in the term in which the course is taken. A course attempt not successfully completed constitutes a course failure.

5. MISCELLANEOUS POLICIES

5.1 Special Co-op Regulations

i) 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. For most students admitted at the 1A level, this sequence will normally involve eight academic terms and six work terms. (For students admitted beyond the 1A level, the normal numbers of academic and work terms will be adjusted accordingly.)

To be eligible for a Co-op degree, a student must normally have successfully completed all academic degree requirements, written at least four satisfactory work reports, followed an approved academic/work-term sequence and successfully completed at least five satisfactory work terms. (For students admitted beyond the Year One level, and for students in the Math/Teaching Option, Math/Chartered Accountancy, and Computer Science/Chartered Accountancy Options, four satisfactory work terms may suffice depending upon individual circumstances.) Any work terms completed following a student’s last academic registration will not be counted toward the minimum satisfactory work-term requirement for graduation.

Co-op mathematics students, who have not completed their Honours degree requirements at the termination of their approved academic/work-term sequence, will be eligible for a Regular BMath General (or Pass) degree if they have satisfied the appropriate degree requirements. Being granted such a degree will not disqualify these students from being able to upgrade to an Honours (or General) degree. However, if they wish to obtain a Co-op degree, they will have to satisfy the appropriate Honours degree requirements within one further calendar year after the termination of their approved academic/ work-term sequence. After one year, they will normally be eligible only for a Regular degree.

ii) 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 Mathematics Undergraduate Office.

Such requests will normally be approved if all of criteria 1-6 listed below are met. Students who alter their academic/work-term sequence, without first obtaining written approval from the Standings and Promotions Committee, may be required to withdraw from the Co-op program.

1. The request does not reduce the number of work terms remaining for the student at the time of the request.
2. The request does not involve more than two consecutive academic terms or two consecutive work terms.
3. There is no obvious indication that the new sequence requested will result in serious course selection difficulties for the student.
4. The student’s academic performance to date is of sufficiently high calibre that he/she should not suffer academically from being off campus for any
eight-month work terms which might be involved in the request.
5. The student's employer supports the request in writing (if appropriate).
6. The request is properly documented.

Before making a formal request to the Standings and Promotions Committee to rearrange an academic/work-term sequence, it is often advantageous for the student to discuss the situation with a Co-ordinator and Faculty Advisor. If the request is approved by the Standings and Promotions Committee, it is the student's responsibility to deal with any timetabling difficulties which may arise and to make any necessary preregistration arrangements for subsequent terms.

iii) Course Load During Academic Terms
While registered for an academic term, Co-op students are normally expected to maintain a full-time course load of three or more half-credits, unless they have already satisfied the eight-full-time-term requirement for an Honours degree and are within one or two half-credits of fulfilling the academic degree requirements for their program. While on a work term, Co-op students are limited to one half-credit course, unless they have written support from their employer to take two half-credit courses.

5.2 Course Load
Students may not normally preregister for more than the standard course load associated with their program. (See Table I on page 13.7.) In exceptional circumstances, Honours students with strong academic records may be permitted to add further courses during the course-change period at the beginning of term, subject to the approval of their Faculty Advisor. Pass and General students may not normally add courses beyond their standard course load.

When seeking approval to take additional courses beyond a standard course load, students should ensure that they have their most recent mark report for consultation with their Faculty Advisor. Any students carrying more than a standard course load at the end of the two-week course-change period may not normally drop any courses subsequent to that date.

The number of half-credits constituting a standard course load varies according to a student's program and year of registration. (See Table I on page 13.7.) In all cases, a student's "year" will be determined by the number of half-credits (N) achieved to date:

<table>
<thead>
<tr>
<th>Year</th>
<th>N</th>
</tr>
</thead>
<tbody>
<tr>
<td>First Year</td>
<td>0 ≤ N &lt; 10</td>
</tr>
<tr>
<td>Second Year</td>
<td>10 ≤ N &lt; 20</td>
</tr>
<tr>
<td>Third Year</td>
<td>20 ≤ N &lt; 32</td>
</tr>
<tr>
<td>Fourth Year</td>
<td>32 ≤ N</td>
</tr>
</tbody>
</table>

5.3 Registration of Regular Students in Spring Terms
Students in the Regular program normally take courses during the Fall and Winter terms. They may also register, on a part-time or full-time basis during the Spring (May-August) or Summer (July-August) term. However, there are no Math Faculty course offerings in the Summer term and those in the Spring term are planned primarily for Co-op students.

Because of resource limitations, it may not always be possible to allow Regular students universal access to Math Faculty course offerings in the Spring term. First priority for access to particular courses in the Spring term will always be given to Co-op students.

Co-op students normally preregister for Spring courses at the beginning of the preceding November. Regular students may preregister in early February. By that time, the extent of the demand by Co-op students for Spring courses will be known and departments will be in a better position to determine which courses will be available to Regular students. (A list of such courses will be available for February preregistration.)

If subsequent preregistration requests from Regular students should exceed the space available in the non-restricted courses, it may not be possible to accommodate all Regular students in the courses in question, and preference will normally be given to students who preregister during the officially scheduled February preregistration period.

5.4 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 successfully completed all the course prerequisites stated in the University Undergraduate Calendar, the student is subject to having his/her preregistration/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.

5.5 Illness or Incapacity
Normally, failure to write a required final examination in any course in which a student is officially registered, or failure to complete such a course for some other reason, will result in a DNW, NMR or INC grade being recorded for the course. All of these grades are considered as failures for the purpose of course-attempt and failure counts and count as zeros in average calculations.

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, assign 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 appeals on the grounds of illness may be considered if accompanied by proper medical documentation and should be submitted as soon as possible after the examination to the course instructor or to the Registrar’s Office. The Standing and Promotions Committee 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 university record.

5.6 Voluntary Withdrawal
The normal deadline date for Math undergraduate students to withdraw from all their courses, without academic penalty, is four weeks after the beginning of lectures in a given term. However, exceptions will normally be made for 1A students who have never previously been registered at a degree-granting post-secondary institution. Such students will normally be permitted to withdraw without academic penalty as late as the last official day of lectures for their 1A term. (A special ‘Withdrawal Form’, available from the Registrar’s Office, must be completed.) A student who withdraws late will normally be held responsible for that term’s courses in the sense that such courses will be permanently recorded with grades of DNW and will subsequently be counted as course attempts and failures. Students in this category may still be eligible for tuition and residence fee rebates, depending on course, upon the date of withdrawal.

A student who has been admitted as a BMath degree candidate and subsequently withdraws without academic penalty prior to completing at least one term of study must request re-admission in order to register for a subsequent term. Such requests will be considered by the Faculty Admissions Committee in competition with other new applicants for admission at that time. (Note: the Faculty of Mathematics does not normally offer admission for the Winter or Spring terms.)

5.7 ‘Inactive’ Status/Re-Admission
A BMath degree candidate who has been ‘inactive’ for more than four consecutive academic terms must apply for re-admission by writing to the Assistant Registrar, Faculty of Mathematics, in Needles Hall. A résumé covering the ‘inactive’ period, including official transcripts from any post-secondary institutions attended, must accompany the letter requesting re-admission. If the student is re-admitted, he/she will normally be subject to Faculty policies in effect at the time of re-admission.

(‘Inactive’ is taken to mean that the student has not been registered at the University of Waterloo, or on an approved Letter of Permission as a BMath degree candidate.)

6. BMATH WRITING SKILLS REQUIREMENT
BMath degree candidates must satisfy the following Writing Skills Requirement:
“A grade of 60% or better on the UW English Language Proficiency Exam or a half-credit with a mark of C- or better in a term-course chosen from a list approved by the Undergraduate Affairs Committee and maintained by the Math Undergraduate Office. (The current list includes the following English courses: ENGL 109, 129R, 150, 210A and 210C.)”

The entry ARTS 000 will appear on both the Student Examination Report and the student’s transcript with a CR grade once the student has successfully completed the Writing Skills Requirement.

7. “AREAS OF STUDY' ON TRANSCRIPTS
BMath transcripts include explicit mention of no more than two areas of study in the academic program section.
Faculty of Science
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 260 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 on the successful completion of a four-year professional program.

Programs
Biochemistry, Biology, Chemistry, Earth Sciences and Physics programs are available on both the Regular and Co-operative system of study. In the co-operative system the 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 and Honours Liberal Science (Science for the Generalist) 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.

Normally, admission to the Faculty of Science is to one of the Co-operative programs in Biology, Biochemistry, Chemistry, Earth Sciences or Physics, or to Regular Honours Science. In Regular Honours Science a major field of study or the non-major program (Honours Science – Program One) must be selected on pre-registration.

Science

Admission

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.

Admission as a Mature Student
Applicants are normally required to obtain standing in Grade 13 (or O.A.C.) Calculus and one Grade 13 (or O.A.C.) Science (Chemistry or Physics preferred) 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 Requirements
All Faculty of Science students entering degree programs in September, 1982 or later must write the English Language Proficiency Examination (scheduled during registration week).

They 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.
Program and Course Selection

1. 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 Grade 13 average was 70% or better may select six lecture-courses if they wish. It is recommended that students intending to take an Honours Physics program enrol in six lecture-courses. Courses should be chosen either with a specific Year Two goal in mind or to cover many 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 14.7.

2. Course and Program Changes
a) 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.

b) 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.

c) Students may not drop a laboratory course without written clearance from the lab supervisor (faculty member or senior demonstrator). Students not checking out of such courses remain liable for the full value of the locker kit issued to them.

d) 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 readmission.

3. Eligibility for Courses
Students must ensure they have the appropriate course prerequisites and where applicable corequisites stated in the course descriptions in the calendar.

4. 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).

5. 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.

6. 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 toward 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.

7. Audit
The Faculty of Science does not record nor recognize audits for students in Science or any other Faculty.

8. Enrolment in a Graduate Course
A student may obtain credit toward a graduate degree in the Faculty of Science for normally not more than a one term graduate course taken during the fourth year of an undergraduate program provided this course is not used for credit toward 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 his/her major subjects in the fourth year.
9. Reduced Program
The General Science degree may be taken on a completely 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 an Honours 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.

10. 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.

Science
Program and Course Selection

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 15, Year Three; and those with 15 or more, Year Four.

1. Final Examinations
   a) 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.
   b) Final examinations are held in December, April, or August. The time normally allowed for each examination is three hours.
   c) 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.
   d) 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.

   e) 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.
   f) No course or its equivalent may be repeated more than once.
   g) All examinations which receive a failing grade are automatically re-read.
   h) 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.

2. 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:
   a) 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.
   b) 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 the Department to do so.
   c) 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.

3. 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.
Grade Appeals
Any student wishing to appeal a course grade should submit a formal written appeal either through the Registrar’s Office or the Science Undergraduate Affairs Office. Appeal forms are available in both locations.
Normally a formal appeal must be submitted within one month of the official release of the term’s grades.

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 readmission 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 or minister of religion.

Readmission is not automatic. All such applicants will be assessed in competition with new applicants and on the probability of their future success.

Readmission 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.

AEG or CR will count as a course passed towards the total necessary but will not count in the cumulative averages.

Unless there are medical or other extenuating circumstances, a DNW will be weighted for averaging purposes as a mark of 32 (equivalent to F on the common grading system) in determining standing.

“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 in Year One or Year Two, Three or Four 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 have 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 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.
## Year One Science Program Selections

### Regular Programs

<table>
<thead>
<tr>
<th>Major Field of Study</th>
<th>Required Courses in Year One</th>
<th>Recommended Electives in Year One</th>
</tr>
</thead>
<tbody>
<tr>
<td>Biology (see Note 3)</td>
<td>Two 200-level term courses in BIOL, CHEM 123/124 and 123L/124L, CS 102.</td>
<td>PHYS 111/112, or MATH 113A/B</td>
</tr>
<tr>
<td>Biochemistry (see Note 3)</td>
<td>Two 200-level term courses in BIOL, MATH 113A/B, CHEM 125/126 and 123L/124L, a first year Physics credit with labs, CS 102.</td>
<td>EARTH 121/122.</td>
</tr>
<tr>
<td>Biology and Environment and Resource Studies (see Note 3)</td>
<td>Two 200-level term courses in BIOL, two term courses in ERS, CHEM 123/124 and 123L/124L, CS 102.</td>
<td>EARTH 121/122.</td>
</tr>
<tr>
<td>Biology and Geography (see Note 3)</td>
<td>Two 200-level courses in BIOL, two term courses in GEOG, CHEM 123/124 and 123L/124L, CS 102.</td>
<td>EARTH 121/122.</td>
</tr>
<tr>
<td>Chemistry (see Note 3)</td>
<td>CHEM 125/126 and 123L/124L, MATH 113A/B, PHYS 121/122 and 121L/122L, CS 102.</td>
<td>EARTH 121/122, CHEM 123/124 and 123L/124L, PHYS 121/122 and 121L/122L, CS 102, MATH 113A/B, GEOG 101/102, or BIOL 111/112.</td>
</tr>
<tr>
<td>Chemistry and Environment and Resource Studies (see Note 3)</td>
<td>CHEM 125/126 and 123L/124L, ERS 100, 101, 150, 151, BIOL 101, 102, MATH 115A/B, CS 102, ENV S 195.</td>
<td>EARTH 121/122.</td>
</tr>
<tr>
<td>Chemistry with Options</td>
<td>CHEM 125/126 and 123L/124L, MATH 113A/B, PHYS 121/122 and 121L/122L, CS 102.</td>
<td>EARTH 121/122, CHEM 123/124 and 123L/124L, PHYS 121/122 and 121L/122L, CS 102, MATH 113A/B, GEOG 101/102, or BIOL 111/112.</td>
</tr>
<tr>
<td>Chemical Option (Environmental Studies Option) (see Note 3)</td>
<td>CHEM 125/126 and 123L/124L, MATH 113A/B, PHYS 121/122 and 121L/122L, CS 102.</td>
<td>EARTH 121/122, CHEM 123/124 and 123L/124L, PHYS 121/122 and 121L/122L, CS 102, MATH 113A/B, GEOG 101/102, or BIOL 111/112.</td>
</tr>
<tr>
<td>b) Chemistry (Mathematics Option) (see Note 3)</td>
<td>CHEM 125/126 and 123L/124L, MATH 115A/B, PHYS 121/122, and 121L/122L, MATH 114, CS 102.</td>
<td>EARTH 121/122, CHEM 123/124 and 123L/124L, PHYS 121/122 and 121L/122L, CS 102, MATH 113A/B, one unrestricted term course.</td>
</tr>
<tr>
<td>c) Chemistry (Physics Option) (see Note 3)</td>
<td>CHEM 125/126 and 123L/124L, MATH 115A/B, PHYS 121/122, and 121L/122L, MATH 111A/113A/B.</td>
<td>EARTH 121/122, CHEM 123/124 and 123L/124L, PHYS 121/122 and 121L/122L, CS 102, MATH 113A/B, one unrestricted term course.</td>
</tr>
<tr>
<td>Earth Sciences (see Note 3)</td>
<td>EARTH 121/122, CHEM 123/124 and 123L/124L, PHYS 121/122 and 121L/122L, CS 102, MATH 113A/B, one unrestricted term course.</td>
<td>EARTH 121/122, CHEM 123/124 and 123L/124L, PHYS 121/122 and 121L/122L, CS 102, MATH 113A/B, one unrestricted term course.</td>
</tr>
<tr>
<td>Earth Sciences with Options</td>
<td>EARTH 121/122, CHEM 123/124 and 123L/124L, GEOG 101/102, CS 102. Either PHYS 111/112 and 111L/112L or BIOL 111/112 or equivalent elective.</td>
<td>EARTH 121/122, CHEM 123/124 and 123L/124L, PHYS 121/122 and 121L/122L, CS 102, MATH 113A/B, one unrestricted term course.</td>
</tr>
<tr>
<td>a) Earth Sciences (Geography Option) (see Note 3)</td>
<td>EARTH 121/122, CHEM 123/124 and 123L/124L, GEOG 101/102, CS 102. Either PHYS 111/112 and 111L/112L or BIOL 111/112 or equivalent elective.</td>
<td>EARTH 121/122, CHEM 123/124 and 123L/124L, PHYS 121/122 and 121L/122L, CS 102, MATH 113A/B, one unrestricted term course.</td>
</tr>
<tr>
<td>b) Earth Sciences (Economics Option) (see Note 3)</td>
<td>EARTH 121/122, CHEM 123/124 and 123L/124L, PHYS 121/122 and 121L/122L, CS 102, MATH 113A/B, ECON 101 or 102.</td>
<td>EARTH 121/122, CHEM 123/124 and 123L/124L, PHYS 121/122 and 121L/122L, CS 102, MATH 113A/B, ECON 101 or 102.</td>
</tr>
</tbody>
</table>
### Year One Science Program Selections

#### Regular Programs

<table>
<thead>
<tr>
<th>Major Field of Study</th>
<th>Required Courses in Year One</th>
<th>Recommended Electives in Year One</th>
</tr>
</thead>
<tbody>
<tr>
<td>Optometry (consult page 14:31 for full list of prerequisites for admission to Optometry).</td>
<td>BIOL 230 and 211, CHEM 123/124 and 123L/124L, PHYS 121/122 and 121L/122L, MATH 113A/B, PSYCH 101.</td>
<td>PSYCH 102(A-G) or SOC 101.</td>
</tr>
<tr>
<td>Physics (see Note 1)</td>
<td>PHYS 121/122; PHYS 121L/122L; PHYS 123, MATH 115A/B or MATH 113A/B; MATH 134A/B or MATH 111A/B;</td>
<td>CHEM 123/124 and 123L/124L.</td>
</tr>
<tr>
<td>Psychology</td>
<td>Two 200-level term courses in BIOL, CHEM 123/124 and 123L/124L, PHYS 111/112, 111L/112L or 121/122 and 121L/122L, MATH 113A/B, PSYCH 101; one PSYCH elective.</td>
<td></td>
</tr>
<tr>
<td>Honours Science and Business (see Notes 3 and 4)</td>
<td>2.0 Science lecture-credits from the Year One offerings in CHEM, EARTH, PHYS and BIOL 230/233; MATH 113A/B; BUS 111W; BUS 121W, CS 102; MATH 111B.</td>
<td></td>
</tr>
<tr>
<td>General Science &amp; Honours Science non-major (see Note 3)</td>
<td>2.0 Science lecture-credits from the courses offered to Year One students in Biology, Chemistry, Earth Sciences &amp; Physics. One Liberal Science Core Course for Liberal Science (Science for the Generalist) program.</td>
<td>MATH 113A/B; CS 102.</td>
</tr>
</tbody>
</table>

#### Co-operative Programs

<table>
<thead>
<tr>
<th>Major Field of Study</th>
<th>Required Courses in Year One</th>
<th>Recommended Electives in Year One</th>
</tr>
</thead>
<tbody>
<tr>
<td>Applied Chemistry (see Notes 2 and 3)</td>
<td>CHEM 125/126 and 123L/124L, MATH 115A/B, PHYS 121/122 and 121L/122L, CS 102.</td>
<td></td>
</tr>
<tr>
<td>Applied Physics (see Notes 1 and 2)</td>
<td>PHYS 121/122, PHYS 121L/122L; MATH 115A/B, MATH 134A/B, PHYS 123.</td>
<td>CHEM 123/124 and 123L/124L.</td>
</tr>
<tr>
<td>Applied Physics (Geophysics Option) (see Notes 1, 2 and 3)</td>
<td>PHYS 121/122 and 121L/122L, MATH 114, 115A/B, CHEM 123/124 and 123L/124L, CS 102, EARTH 121/122.</td>
<td></td>
</tr>
<tr>
<td>Applied Earth Sciences (Geology Option) (see Note 3)</td>
<td>EARTH 121/122, CHEM 123/124 and 123L/124L, PHYS 121/122 and 121L/122L, CS 102, MATH 113A/B.</td>
<td></td>
</tr>
<tr>
<td>Applied Earth Sciences (Geophysics Option) (see Note 3)</td>
<td>EARTH 121/122, MATH 115A/B; PHYS 121/122 or 121L/122L, CHEM 123/124 and 123L/124L, CS 102, MATH 114 or 111B.</td>
<td></td>
</tr>
<tr>
<td>Co-operative Biology (see Notes 2 and 3)</td>
<td>Three or four 200-level term courses in BIOL, CHEM 123/124 and 123L/124L, MATH 115A/B.</td>
<td>PHYS 111/112, EARTH 121/122.</td>
</tr>
<tr>
<td>Co-operative Biochemistry (see Notes 2 and 3)</td>
<td>Three or four 200-level term courses in BIOL, CHEM 125/126 and 123L/124L, MATH 115A/B, PHYS 121/122 and 121L/122L, CS 102.</td>
<td></td>
</tr>
</tbody>
</table>

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**Note 1**
Co-op Physics students and those planning to enrol in Honours Physics in Year Two are advised to select MATH 130A/B instead of MATH 113A/B or 115A/B if they have more than an 80% average, and may select MATH 111 instead of MATH 134 if they have less than an 80% average in Grade 13 Mathematics and Physics.

Students wishing a Biophysics Option with the Honours Physics program are advised to include BIOL 111/112 in their program.

Students wishing a Geophysics Option with the Honours Physics program are advised to include EARTH 121/122 and CHEM 123/124 in Year One.

Students wishing any of the Business Administration Options with the Honours Physics program are advised to select ECON 101/102.

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**Note 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 "B-stream" (September-April) or (b) fall term on campus "A-stream" (September-December), winter term at work (January-April) and spring term on campus (May-August).

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**Note 3**
CS 100 must be taken before CS 102 by students with no computing background from high school.

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**Note 4**
Students needing CS 100 in the Fall must delay CS 102 to the Winter (1B) and reschedule their MATH 111B to Year 2B and MTHETL 100 to 2A.
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 medical school in Ontario. Students who have passed the first year of the program with appropriate choice of courses are qualified to apply for admission to a dental school.

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 2 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 Math.

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 BIOL courses;
   b) EARTH 121/122;
   c) CHEM 123/124 + labs;
   d) PHYS 111/112 or PHYS 121/122 + labs.
It is recommended that the required Math credit be taken in Year One.

Science
Academic Programs and Degree Requirements

Years Two and Three
5.0 credits of which two or three should normally be in Science.

The following list indicates some of the courses from which a choice should be made when selecting courses.

Science courses recommended (other than Year One courses):


1) A student required to withdraw from an Honours Program in Chemistry who enrols 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.


Mathematics courses recommended

MATH 113A, 113B, 111A, 111B, 215 or 216; CS 100, 102; STAT 204, 304 but not MATH 103, 104 or 106.

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.
A. 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 Liberal Science and an Honours Science and Business program. All are conducted through the regular system of study, and they all begin at the Year Two level. They are:

Program 1: Non-specialized (see below).
Program 2: Biology specialization (see page 14:17).
Program 3: Chemistry specialization (see page 14:24).
Program 4: Earth Sciences specialization (see page 14:27).
Program 5: Physics specialization (see page 14:29).
Liberal Science (see below)
Honours Science and Business (see below).

Honours Science (Non-Specialized) — Program One
Admission to, and continuance in, Honours Science Program 1 requires a cumulative overall average of 60% and a cumulative average of 60% in all Faculty of Science courses. In order to graduate in the Honours Science (non-specialized) program, the following requirements must be met:

1) Successful completion of 22.0 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 22.0 credits that are required:
   a) at least 20.0 must be lecture credits;
   b) at least 14.0 credits must be Faculty of Science credits, of which 10.0 must be at or above the 200 level, and at least 5.0 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.

Science
Academic Programs and Degree Requirements

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 appropriate laboratory experience has been gained at the post-secondary level, through employment, or unless such experience will be gained during the degree program.

Year One
5.0 lecture credits, exclusive of laboratory credits. At least two of (a), (b), (c), or (d) must be taken:
   a) BIOL 111/112, or two 200-level BIOL courses;
   b) CHEM 123/124 plus labs;
   c) EARTH 121/122;
   d) PHYS 111/112, or PHYS 121/122 plus labs.

Years Two, Three and Four
Normally, 4.0 Science credits plus 2.0 others are taken in Year Two and Three; in Year Four, 4.0 Science credits plus 1.0 other are taken.

Liberal Science (Science for the Generalist)
Director: Prof. G. Atkinson
This program, which has developed from a restructuring of the General Science Program, is intended to present a broader perspective on science. It is a four-year Honours Program, but students may earn a three-year degree with a Liberal Science label by meeting certain conditions as shown below. A Liberal Science Option is also available for students in other programs. The goal of the program is to produce a generalist with the capability of understanding specialist areas in science, and with some selected experiences in doing so in at least two sciences. This program operates under a Board of Studies representing the units in the Faculty of Science and the other faculties which contribute to the teaching of the Core Courses.

Students must apply to be admitted on completion of Year One. A minimum 60% average, both overall, and in all courses taken in the Faculty of Science will be required.

Admission to, and continuance in, the Liberal Science program requires a cumulative overall average of 60%, and 60% in all Science courses. Students required to withdraw from Honours Degree programs may apply for admission, but admission is not automatic and is granted on consideration of individual cases. No student will receive the degree from this program without spending one academic year leading to that degree enrolled in the program. A normal course load is 2.5 lecture credits per term plus any associated lab credits.

In order to graduate with a Liberal Science degree, the following requirements must be met:

1) Successful completion of 22 credits exclusive of lab credits with a cumulative average of 60%, including:
   a) 2.5 credits in Core Courses
   b) 1.0 credit in SCI 468A and B
c) 0.5 credit in SCI 469  

d) 1.5 credits in mathematics  

e) 2.0 credits in Year One offerings of two Science disciplines  

f) 2.0 credits in sequences of upper year courses, plus  

g) 2.0 credits in other upper year courses in those two Science disciplines  

h) 3.0 credits in languages, humanities or social sciences courses.  

The remaining 7.5 credits may be freely selected in consultation with an advisor.  

2) Apart from the required SCI courses, no more than 1.5 credit in SCI courses may be applied to the degree.  

3) Students will be required to withdraw from the program upon failing 2.0 credits in an academic year, or 3.5 credits overall.  

4) Students must apply for admission to the program, and spend at least one successful academic year in it, obtaining good standing.  

5) Students admitted to this program must choose courses aimed at fulfilling these program requirements, and may not substitute courses aimed at gaining or regaining admission to some other program.  

6) A student must take Year Four at the University of Waterloo, and must be enrolled full-time in Year Four and in either Year Two or Year Three.  

Students enrolled in Liberal Science who decide to take a three-year degree with a Liberal Science label must:  

1) Obtain credit for SCI 369 (and record their intention of doing so early in their penultimate term.)  

2) Successfully complete 15 credits exclusive of lab credits with a cumulative average of 60%.  

3) Fulfill other requirements for the Honours Degree in part as may be approved by the Board of Studies on a case-by-case basis. (A student enrolled in Liberal Science throughout Years Two and Three will be expected to show credits for at least four Core Courses or acceptable equivalents.)  

The following is a list of courses from which students are advised to choose:  

Core Courses  
SCI 260, 261, 263, 265, 267, 369, 469.  

Year One Offerings  
BIOL 230, 233  
CHEM 123, 123L, 124, 124L  
EARTH 121, 122  
PHYS 111, 111L, 112, 112L or 121, 121L, 122, 122L  

Upper Year Sequences (suggested sequences joined by + signs)  
BIOL 201 + 202, 210 + 211, 220 + 221, 240 + 241, 337 + 338  
CHEM 212 or 218 + 312 or 313, 237 + 332 or 333, 266 + 267, 356 + 357 with the appropriate lab course: CHEM 314L, 237L, 266L, 356L respectively  
EAH1H 231 + either 221, 232, or 238, 230 + 238, 236 + 238  
PHYS 226 + 246, 275, 301 + 302, 368 + 369, 380 + 381 with appropriate lab courses  

Students are explicitly excluded from:  
BIOL 301 and 400-level courses not listed below  
CHEM 400-level courses except by permission of instructor  
EARTH 260 and 400-level courses  
PHYS 400-level courses except by permission of instructor  

Suggested additional upper year courses:  
BIOL 239, 250, all other 300-level courses, 420, 424, 441, 443, 444, 448, 449, 450, 456, 457, 460, 461, 473  
CHEM any other 200- or 300-level courses subject to prerequisites and antirequisites  
EARTH 331, 332, 333, 336, 342, 345, 370  
PHYS any other 200- or 300-level courses subject to prerequisites and antirequisites  
SCI 250, 255, 355, 453, 454, 462  

Liberal Science Option  
Students in any 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 consult a Liberal Science advisor, and record their proposed option program for approval by the Board of Studies. Subsequent changes to the program must also be recorded and approved.  

In order to have a Liberal Science Option recorded, the following requirements must be met:  
Successful completion of six approved term courses with an average of 60%, including:  
a) three Liberal Science Core Courses or approved alternatives. The third of these courses may by agreement be SCI 369 or 469.  
b) three other term courses proposed by the student and approved.  

Students will submit written statements showing how the three core courses and three other courses form a coherent option related to the student's 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. Specimen option programs will be available as examples to assist students in planning a proposal.  

Honours Science and Business  
As high technology plays an increasingly greater role in society, there will be a growing need for graduates who have a competence in the combined disciplines of science and business. The knowledge and skills which will be required by managers have never been greater.
Science
Academic Programs and Degree Requirements

Year Three:
M SCI 211, M SCI 331, CS 330
Year Four:
M SCI 431 or M SCI 432

Recommended electives are:
MTH110, MATH 111B, ECON 221, STAT 202 or 204, M SCI 261, M SCI 461, BUS 352W, BUS 454W

B. HONOURS MAJOR PROGRAMS
Honours major programs are offered through the Regular and/or Co-operative system of study. The specific programs that are offered are as follows:
- Honours Biochemistry – Regular and Co-operative
- Honours Biochemistry (Biotechnology Option) – Regular and Co-operative
- Honours Biology – Regular and Co-operative
- Honours Biology and Environment and Resource Studies – Regular
- Honours Biology and Geography – Regular
- Honours Chemistry – Regular and Co-operative
  Applied (also with Options)
- Honours Chemistry and Environment and Resource Studies (Regular)
- Honours Earth Science – Regular (Geology, Economics or Geography), and Co-operative
  Applied (Geology or Geophysics)
- Honours Physics – Regular, and Co-operative
  Applied (also Geophysics Option)
- Honours Psychology – Regular and Co-operative

The Honours Chemistry programs (including Co-op Applied Chemistry and Honours Biochemistry) are normally limited by the available physical facilities to the best qualified students. Those who have failed core courses should not expect to proceed in any Honours Chemistry Program.

Enrolment is limited to approximately 45 students in Year Two of all Earth Sciences programs. Selection is made on the basis of academic standing in Year One, including standing in Earth 121 and 122.

Refer to the specific departmental sections for the degree requirements of the above programs.

The modern manager must have a knowledge of finance, economics, accounting, marketing, organizational behaviour to name a few areas 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.

Admission to, and continuance in, Honours Science & 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 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:
BUS 111W, BUS 121W (or University of Waterloo equivalents), MATH 113A, MATH 113B, CS 100 or elective*, CS 102, two First Year Science courses**

*Students with no computer literacy should take CS 100 before CS 102
**First Year Science courses are:
(i) any two 200 level 0.5 credit BIOL courses
(ii) CHEM 123, CHEM 124, CHEM 123L, CHEM 124L
(iii) EARTH 121, EARTH 122
(iv) PHYS 121, PHYS 122, PHYS 121L, PHYS 122L or
     PHYS 111, PHYS 112, PHYS 111L, PHYS 112L

Year Two:
ECON 101, ECON 102, ACC 121, ACC 122 (or BUS 227 instead of ACC 121, ACC 122), one First Year Science course.
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 & 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 Science Program Two (with specialization in Biology)**

- **Minor in Biology**

**HONOURS MAJOR PROGRAMS - REGULAR**

**Honours Biology**
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 beyond Year One;
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. 1.0 (or 1.5) Biology credits from the following: BIOL 210, 211, 220, 221, 230, 233, 239, 240, 241, 250;
2. CHEM 123/123L, and CHEM 124/124L;
3. Six (or five) electives (2.5 - 3.0 credits).

**Science**

Departmental Programs

Biology

**Year Two**
Students entering Year Two must take:
1. 4.0 (or 3.5) Biology credits from the following: BIOL 210, 211, 220, 221, 230, 233, 239, 240, 241, 250;
2. CHEM 266/266L, and CHEM 237/237L;

**Year Three**
Students entering Year Three must take:
1. At least 3.5 credits from the 300-level BIOL courses (excluding BIOL 301);
2. Three electives (1.5 credits), BIOL 461 is available to students in Year Three or Year Four. (Chemistry courses and PHYS 301 are recommended).

**Year Four**
Students entering Year Four must take:
1. At least 3.0 credits from the 400-level BIOL courses;
2. Four electives (2.0 credits).

**Honours Biochemistry**

**Program Advisors:** Professors L.J. Brubacher, Chemistry and D.G. Dixon, 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 on 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:

1. Successful completion of 23.5 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.

**Note**
Students who plan to take one or more of the Chemical Engineering electives in Year Four of the Biotechnology option, should take the prerequisite MATH 215 or MATH 216 in Year Two or Year Three.
Year One
1) 1.0 Biology credit from: BIOL 210, 211, 220, 221, 230, 233, 239, 240, 241, 250;
2) CHEM 125 and 123L, and 126 and 124L
3) PHYS 121/122 and 121L/122L or 111/112 and 111L/112L;
4) MATH 113A/B;
5) CS 102;
6) Elective (0.5 credit)

Year Two
Fall:
1) 0.5 credit from: BIOL 210, 220, 230, 240, 250;
2) CHEM 212, 220, 220L, 264;
3) STAT 202.

Winter:
1) 1.0 credit from: BIOL 211, 221, 233, 239, 241;
2) CHEM 221, 221L, 237, 237L*, 265, 265L.
   *may be taken in Year Three

Year Three
Fall:
1) 1.0 credit from: BIOL 316, 323, 324, 327, 330, 336, 337, 342, 350;
2) CHEM 332, 356, 368, 368L.

Winter:
1) 1.0 credit from BIOL 311, 315, 331, 333, 335, 338, 344, 356;
2) CHEM 333, 334L, 356L, 357, 357L
3) One elective (0.5)

Note
BIOL 461 is available to students in Year Three or Year Four.

Year Four
Fall:
1) 1.5 credits from: 400-level BIOL courses, CHEM 432, 435, 452 or 492A*
2) CHEM 312, 464.

Winter:
1) 2.0 credits from: 400-level BIOL courses, CHEM 419, 433, 434, 492B*
2) One elective (0.5)
   *Students electing CHEM 492A/B must earn 5.5 credits in Year Four.

Honours Biology and Environment and Resource Studies
Honours Biology and Geography
Program Advisor: D.G. Dixon, Biology

Admission to, and continuation in, either program requires an overall cumulative average of 60% with a cumulative average of 70% in the Faculty of Environmental Studies courses, and a cumulative average of 65% in Biology courses.

In order to graduate in either program, the following requirements must be met:
1) Successful completion of 21.0 credits.
2) Of the 21.0 credits required, 7.0 credits must be approved by the Dept. of Biology, and 6.5 credits beyond Year One must be in the appropriate department of the Faculty of Environmental Studies, or equivalent;
3) STAT 202, and CS 102;
4) CHEM 123/123L, CHEM 124/124L, CHEM 266/266L and CHEM 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.

Since proper course selection in either program is critical, contact Professor D.G. Dixon, Biology, for further details.

HONOURS MAJOR PROGRAMS - CO-OPERATIVE

Honours Co-operative Biology
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 continuation in, Honours Co-operative Biology requires a cumulative average of 60% and a cumulative average of 65% in all Biology courses.

In order to graduate in the Honours Co-operative Biology program, the following requirements must be met:
1) Successful completion of 21.0 credits;
2) By the end of Year 2B, students must have completed the ten introductory Biology courses at the 203 level, and CS 102;
3) Seven 300-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 BIOL 241.

Note to All 1B Students
Students should be aware that BIOL 233 and 239 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.
**Stream 8**

*Students who take Year 1B during Winter Term*

<table>
<thead>
<tr>
<th>Fall</th>
<th>Winter</th>
<th>Spring Work Term</th>
</tr>
</thead>
<tbody>
<tr>
<td>Year 1A</td>
<td>Year 1B</td>
<td></td>
</tr>
<tr>
<td>BIOL 230</td>
<td>BIOL - 1.0 or 1.5 200-level credits.</td>
<td></td>
</tr>
<tr>
<td>BIOL 240</td>
<td>CHEM 123/123L</td>
<td></td>
</tr>
<tr>
<td>Electives -</td>
<td>Electives -</td>
<td></td>
</tr>
<tr>
<td>1.0 credit.</td>
<td>1.0 or 0.5 credit.</td>
<td></td>
</tr>
<tr>
<td>Year 2A</td>
<td></td>
<td>Year 2B</td>
</tr>
<tr>
<td>BIOL - 1.5 200-level credits.</td>
<td>BIOL - 1.0 or 1.5 200-level credits.</td>
<td></td>
</tr>
<tr>
<td>CHEM 266/266L</td>
<td>CHEM 237/237L</td>
<td></td>
</tr>
<tr>
<td>STAT 202</td>
<td>Electives -</td>
<td></td>
</tr>
<tr>
<td></td>
<td>0.5 credit.</td>
<td></td>
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**Work Term**

<table>
<thead>
<tr>
<th>Year 3A</th>
<th>Year 3B</th>
</tr>
</thead>
<tbody>
<tr>
<td>BIOL - 1.5 or 2.0 300-level credits</td>
<td>BIOL - 1.5 or 2 300-level credits.</td>
</tr>
<tr>
<td>CHEM 228</td>
<td>CHEM 267/267L</td>
</tr>
<tr>
<td>Electives -</td>
<td>Electives -</td>
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<td>0.5 credit.</td>
</tr>
<tr>
<td>(CHEM 267 is recommended.)</td>
<td>(CHEM 237 is recommended.)</td>
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<table>
<thead>
<tr>
<th>Year 2B</th>
<th>Year 3A</th>
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</thead>
<tbody>
<tr>
<td>BIOL - 1.5 200-level credits.</td>
<td>BIOL - 1.5 or 2.0 300-level credits.</td>
</tr>
<tr>
<td>CHEM 237/237L</td>
<td>CHEM 267/267L</td>
</tr>
<tr>
<td>STAT 202</td>
<td>Electives -</td>
</tr>
<tr>
<td></td>
<td>0.5 credit.</td>
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<tr>
<td>(CHEM 267 or CHEM 333 are recommended.)</td>
<td>(CHEM 237 or CHEM 333 are recommended.)</td>
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- **Stream 4 and Stream 8**

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<th>Spring Work Term</th>
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<tbody>
<tr>
<td>Year 4A</td>
<td>Year 4B</td>
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<tr>
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<td>BIOL - 1.5 400-level credits.</td>
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<td>Electives -</td>
<td>Electives -</td>
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</tr>
<tr>
<td>1.0 credit.</td>
<td>1.0 credit.</td>
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</tr>
<tr>
<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.

**Note:**

Some 400-level Biology courses may be taken in the third year.

**Honours Co-operative Biochemistry**

Program Advisors: Professors L.J. Brubacher, Chemistry and D.G. Dixon, 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 on 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 65%, 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 23.5 credits (including all required labs in Chemistry and Physics);
2. By the end of Year 2B, students should have completed BIOL 230, 233, 239, 240 and 241;
3. Four satisfactory work-term reports.

**Notes**

1. **Students should be aware that BIOL 233 and 239 must be taken during either the Winter or Spring Terms in even-numbered years and BIOL 241 must be taken during either the Winter or Spring Terms in odd-numbered years. Students entering in the Fall of odd-numbered years will take the same courses as listed below but in a slightly different sequence.**

2. **Students who plan to take one or more of the Chemical Engineering electives in Year Four of the Biotechnology option, should take the prerequisite MATH 215 or MATH 216 in Year Two or Year Three.**
Stream 8
(Students who take Year 1B in Winter Term).

<table>
<thead>
<tr>
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<th>Winter</th>
<th>Spring</th>
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<tr>
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<td>Year 1B</td>
<td>Work Term</td>
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<td>BIOL 233</td>
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<td>BIOL 240</td>
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<tr>
<td>CHEM 125/123L</td>
<td>CHEM 126/124L</td>
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<tr>
<td>MATH 115A</td>
<td>MATH 115B</td>
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<tr>
<td>PHYS 121/121L</td>
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<tr>
<td>CHEM 264</td>
<td>CHEM 237/237L</td>
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<td>STAT 202</td>
<td>Elective (0.5)</td>
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<table>
<thead>
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<th>Year 3A</th>
<th>Work Term</th>
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<tbody>
<tr>
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<tr>
<td></td>
<td>BIOL - 0.5 300-level credit.</td>
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<tr>
<td></td>
<td>CHEM 333</td>
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<td></td>
<td>CHEM 357</td>
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<tr>
<td></td>
<td>CHEM 368/368L</td>
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<table>
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<td>BIOL 350</td>
<td>CHEM 332/334L</td>
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</tr>
<tr>
<td>CHEM 356</td>
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Stream 4 and 8
(Students who take Year 1B in Spring Term).

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<td>BIOL 233</td>
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<td>CHEM 126/124L</td>
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<td>MATH 115A</td>
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<td>PHYS 122/122L</td>
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<th>Work Term</th>
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<tbody>
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<td></td>
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<tr>
<td></td>
<td>CHEM 220/220L</td>
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<td></td>
<td>CHEM 264</td>
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<table>
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<th>Year 3A</th>
<th>Work Term</th>
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</thead>
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<td>CHEM 221/221L</td>
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<td>CHEM 237/237L</td>
<td>BIOL 350</td>
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<tr>
<td>CHEM 265/265L</td>
<td>CHEM 332</td>
<td></td>
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<tr>
<td>STAT 202</td>
<td>CHEM 356</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Elective (0.5)</td>
<td>CHEM 368/368L</td>
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<table>
<thead>
<tr>
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<th>Work Term</th>
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<tr>
<td></td>
<td>BIOL 331</td>
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</tr>
<tr>
<td></td>
<td>BIOL - 0.5 300-level credit.</td>
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<td></td>
<td>CHEM 333/334L</td>
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<tr>
<td></td>
<td>CHEM 357</td>
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<tr>
<td></td>
<td>Elective (0.5)</td>
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</tbody>
</table>

Science
Biology

Honours Co-operative Biochemistry (Biotechnology Option)

Program advisors – Professors L.J. Brubacher, Chemistry and D.G. Dixon, Biology

The first two years of this program coincide with the Honours Co-operative Biochemistry programs for streams 4 and 8. The Biotechnology option comes into effect in Year Three. Although this option is set up in co-operative format, it is also available for regular students.

Note
Students who plan to take one or more of the Chemical Engineering electives in Year Four, should take the prerequisite MATH 215 or MATH 216 in Year Two or Year Three.

Stream 8

<table>
<thead>
<tr>
<th>Fall</th>
<th>Winter</th>
<th>Spring</th>
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</thead>
<tbody>
<tr>
<td>Year 3A</td>
<td>Year 4B</td>
<td>Work Term</td>
</tr>
<tr>
<td>BIOL 330</td>
<td>BIOL 350</td>
<td></td>
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<tr>
<td>BIOL 342</td>
<td>CHEM 332</td>
<td></td>
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<td>BIOL 350</td>
<td>CHEM 333</td>
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<tr>
<td>CHEM 332/334L</td>
<td>CHEM 357</td>
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<tr>
<td>CHEM 356</td>
<td>CHEM 368/368L</td>
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</table>

<table>
<thead>
<tr>
<th>Year 3B</th>
<th>Work Term</th>
<th>Work Term</th>
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<tbody>
<tr>
<td>BIOL 330</td>
<td>BIOL 350</td>
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<tr>
<td>BIOL 342</td>
<td>CHEM 332</td>
<td></td>
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<td>BIOL 350</td>
<td>CHEM 333</td>
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<td>CHEM 332/334L</td>
<td>CHEM 357</td>
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<tr>
<td>CHEM 356</td>
<td>CHEM 368/368L</td>
<td></td>
</tr>
</tbody>
</table>
### Science

#### Biology

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) 1.0 credit from the following: BIOL 210, 211, 220, 221, 230, 233, 239, 240, 241, 250;
2) CHEM 123/123L and CHEM 124/124L;
3) CS 102;
4) Electives (2.5).

#### Year Two
1) 3.0 credits from BIOL 210, 211, 220, 221, 230, 233, 239, 240, 241, 250;
2) CHEM 266/266L and 237/237L;
3) Electives (1.0).

#### Year Three
1) 3.0 credits from BIOL 311, 315, 316, 323, 324, 327, 330, 331, 333, 335, 336, 337, 338, 342, 344, 350, 355;
2) 0.5 credit in Science;
3) Electives (1.5).

#### Note
BIOL 461 is available to students in Year Three or Year Four.

#### Year Four
1) 4.0 Science credits at least 2.0 of which are Biology credits from the 400-level or the list of 300-level courses above;
2) Electives (1.0).

### 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 third or fourth year level. A minimum average of 65% is required in BIOL courses.

#### Stream 4

<table>
<thead>
<tr>
<th>Fall</th>
<th>Winter</th>
<th>Spring</th>
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</thead>
<tbody>
<tr>
<td>Year 2B</td>
<td>Work term</td>
<td>Year 3A</td>
</tr>
<tr>
<td>BIOL 480</td>
<td></td>
<td>BIOL 330</td>
</tr>
<tr>
<td>BIOL 443</td>
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<td>BIOL 342</td>
</tr>
<tr>
<td>CHEM 312</td>
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<td>BIOL 350</td>
</tr>
<tr>
<td>CHEM 356L</td>
<td>Two electives (1.0)</td>
<td>CHEM 332</td>
</tr>
<tr>
<td>CHEM 464</td>
<td>Two recommended electives (1.0)</td>
<td>CHEM 356</td>
</tr>
<tr>
<td>One recommended elective (0.3)</td>
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### Work Term

<table>
<thead>
<tr>
<th>Year 3B</th>
<th>Work Term</th>
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<tbody>
<tr>
<td>BIOL 331</td>
<td></td>
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<tr>
<td>BIOL 439</td>
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<tr>
<td>CHEM 333/334L</td>
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<td>CHEM 357</td>
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<tr>
<td>CHEM 366/368L</td>
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</table>

<table>
<thead>
<tr>
<th>Year 4A</th>
<th>Year 4B</th>
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<tbody>
<tr>
<td>BIOL 443</td>
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<td>BIOL 480</td>
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<td>Two electives (1.0)</td>
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<td>CHEM 356L</td>
<td>Two recommended</td>
</tr>
<tr>
<td>CHEM 464</td>
<td>electives (1.0)</td>
</tr>
<tr>
<td>One recommended elective (0.3)</td>
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</tr>
</tbody>
</table>

### Notes

1) Recommended electives:
   - BIOL 432, 434, 481
   - CH E 582, 584 (one of MATH 215 or 216 must be taken as a prerequisite).
   - CHEM 419, 432, 433, 434, 435

2) Students may prepare in writing some variation in this program for approval by the Biology and Chemistry undergraduate advisors to accommodate their special interest.

### HONOURS SCIENCE PROGRAM TWO (With Specialization in Biology)

Admission to, and continuance in, Honours Science - Program Two requires an overall cumulative average of 60% and a cumulative average of 65% in Biology courses.

In order to graduate in the Honours Science program, with specialization in Biology, the following requirements must be met:

1) Successful completion of 21.0 credits.
   - Of the 21.0 credits that are required:
     a) at least 19.0 must be lecture credits;
     b) at least 13.5 must be Faculty of Science credits;
   - at least 0.75 credit of biochemistry and 0.75 of organic chemistry beyond Year One;
   - 1.0 credit in Math is required, of which 0.5 must be CS 102.
Chemistry

The following programs are offered in the Chemistry department:

- **Honours Major Programs**
  - Regular:
    - Honours Biochemistry - (see page 14:13)
    - Honours Biochemistry, Biotechnology Option – (see page 14:16)
    - Honours Chemistry
    - Honours Chemistry and Environment and Resource Studies
    - Honours Chemistry (with Options)
      a) Environmental Studies Option
      b) Mathematics Option
      c) Physics Option
      d) Thesis Option
  - Co-operative:
    - Honours Co-operative Biochemistry - (see page 14:15)
    - Honours Co-operative Biochemistry, Biotechnology Option – (see page 14:16)
    - Honours Co-operative Applied Chemistry
    - Thesis Option (available for any Co-operative program)

- **Honours Science – Program Three (with specialization in Chemistry)**

- **Minor in Chemistry**

**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.

**Professional Standing**
The Honours Major programs fulfill the academic requirements for professional membership in the Chemical Institute of Canada.

**Note to all Honours Chemistry Students:**
Honours Chemistry students (all programs) may not elect to take these General program courses for degree credit:
CHEM 218, 219, 266, 267, 366

**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>
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(b) Electives Relevant to Industrial Employment

Students contemplating careers in industry should consider some of these subjects and courses:

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<tr>
<th>Statistics</th>
<th>STAT 204, 304</th>
<th>Writing</th>
<th>SCI 209, ENGL 210A or C</th>
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<tr>
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<td>Law</td>
<td>P SCI 291, 292, ENV S 201, ACC 231</td>
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<td>M SCI 211</td>
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<td>BUS 352, 362, 382, 383</td>
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<td>Accounting</td>
<td>ACC 121, 122</td>
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<td>CS 212, 230, GEN E 121</td>
<td>Microprocessors</td>
<td>EL E 222, 323, 427, PHYS 353</td>
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<td></td>
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<td>Critical Thinking</td>
<td>PHIL 145</td>
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Notes:
* Indicates recommendation for Applied Chemistry students.
† Indicates special permission required from the Associate Chairman for Undergraduate Studies in the Chemical Engineering Department.
‡ Indicates strong recommendation for all Chemistry major students.
HONOURS MAJOR PROGRAMS – REGULAR

Honours Biochemistry
(see page 14:13)

Honours Biochemistry (Biotechnology Option)
(see page 14:16)

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 non-elective lecture courses each term.

In order to graduate with an Honours Chemistry degree, the following requirements must be met:

1) Successful completion of 24.75 credits including 5.75 lab credits.
2) In Years Three and Four, students must choose four 400-level term courses (other than CHEM 407) and two term lecture courses at any level from the list of Technical electives with Chemistry content (see page 14:19);
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 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;
6) Students are encouraged to include an ethics course in their program such as STV 100, PHIL 226, PHIL 215, SCI 263, SCI 265.

Year One
Students entering Year One must take:
Fall:
1) CHEM 125/123L
2) PHYS 121/121L
3) MATH 113A
4) CS 102 (Fall or Winter)
5) Electives (1.0 or 0.5)
Winter:
1) CHEM 126/124L
2) PHYS 122/122L
3) MATH 113B
4) Electives (1.0 or 0.5)

Year Two
Students entering Year Two must take:
Fall:
1) CHEM 220, 220L, 254, 264
2) MATH 215
3) PHYS 249, 249L
Winter:
1) CHEM 10, 212, 221/221L, 255, 265/265L
2) Elective (0.5)

Year Three
Students entering Year Three must take:
Fall:
1) CHEM 312, 314L, 355/355L, 368/368L
2) Two electives (1.0)
Winter:
1) CHEM 10, 313, 315L, 358/358L
2) Three electives (1.5)

Year Four
Students entering Year Four must take:
1) CHEM 10, 492A/B (1.5)
2) Eight electives (4.0)

Honours Chemistry and Environment and Resource Studies
Program Advisors: Professors G.E. Toogood (Chemistry) and S.C. Lerner (Environment and Resource Studies)

Admission to, and continuance in, Honours Chemistry and Environment and Resource Studies requires an overall cumulative average of 60% and a cumulative average of 60% in the non-elective lecture courses each term. A 70% average is required in all Faculty of Environmental Studies courses.

In order to graduate with an Honours Chemistry and Environment and Resource Studies degree, the following requirements must be met:

1) Successful completion of 23.75 approved credits including 4.25 lab credits;
2) The student must have been enrolled full-time in Year Four and in either Year Two or Three. Year Four must be taken at the University of Waterloo;
3) Mandatory courses as listed below.

Year One
1) CHEM 125/126, 123L/124L
2) ERS 100, 101, 150, 151
3) BIOL – two 200-level courses
4) MATH 115A/B
5) CS 102
6) ENV S 195 (0.5)

Upper Years
1) CHEM – 7.5 lecture credits including CHEM 212, 220, 221, 237, 264, 265, 356, 357, 368, and 3.0 lecture credits from appropriate 300- and 400-level courses in the Chemistry Department, 2.25 laboratory credits: CHEM 220L, 221L, 237L, 265L, 356L, 357L, 368L
2) ERS 12 courses (to be selected in consultation with the Department of Environment and Resource Studies)
3) MATH 215
4) STAT 202
5) CHEM 492A/B or ERS 490A/B.
Honours Chemistry (with Options)

A) HONOURS CHEMISTRY (ENVIRONMENTAL STUDIES OPTION)

Program Advisor: Professor G.E. Toogood

This program supplements the Honours Chemistry core with courses to familiarize the student with legal, economic and social aspects of environmental control and resource management.

Admission to, and continuance in, Honours Chemistry (Environmental Studies Option) requires an overall cumulative average of 60%. In addition, a 60% average must be obtained in all non-elective lecture courses each term. A 70% average is required in all Environmental Studies courses.

In order to graduate with an Honours Chemistry (Environmental Studies Option) degree, the following requirements must be met:

1) Successful completion of 24.0 credits including 5.0 lab credits;
2) 4.0 credits from the Environmental Studies Option course list or courses approved by the Undergraduate Dean of Environmental Studies;
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 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;
6) Students are encouraged to include an ethics course in their program, such as STV 100, PHIL 226, PHIL 215, SCI 263, SCI 265.

ENVIRONMENTAL STUDIES OPTION COURSE LIST

Students must take ENV S 195.

In addition, 3.5 credits must be selected from both portions of the list below:

Legal, Economic and Social Aspects
ENV S 201, 202, 401, 411
ERS 320
PLAN 156, 222, 319

Resource Management
ENV S 200
GEOG 301, 356, 357, 358, 359, 414
SCI 350

Year One

Students must take the same courses as stated in the Honours Chemistry program.

Year Two

Students must take the same courses as stated in the Honours Chemistry program (page 14:20)

Year Three

Students entering Year Three must take:
Fall:
1) CHEM 312, 314L, 356L, 368/368L
2) STAT 204
3) One Elective (0.5)
Winter:
1) CHEM 10, 313, 357/357L
2) STAT 304
3) Two electives (1.0)

Year Four

Students entering Year Four must take:
1) CHEM 10, 419, 492A/B
2) ENV S 201
3) 2.0 CHEM credits. (CHEM 237/237L, 311, 320, 321L, 420, 452 and 455 are recommended)
4) Four electives (2.0)

B) 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 Cooperative system of study should first speak to Professor McCourt 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 in all non-elective 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 23.75 credits including 4.75 lab credits;
2) 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 to be at the discretion of the Chemistry Undergraduate Committee and in exceptional circumstances only;
3) 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;
4) Mandatory courses as listed below;
5) Students are encouraged to include an ethics course in their program, such as STV 100, PHIL 226, PHIL 215, SCI 263, SCI 265.

Year One

Students entering Year One must take
Fall:
1) CHEM 125/123L
2) PHYS 121/121L
3) MATH 115A, 114
(or 134B, Winter)
4) CS 102
Winter:
1) CHEM 126/124L
2) PHYS 122/122L
3) MATH 115B
4) Electives (1.0)
Year Two
Students entering Year Two must take:
Fall:
1) CHEM 220/220L, 254, 264
2) One Elective (0.5)
3) PHYS 249/249L
Winter:
1) CHEM 10, 212, 221/221L, 255, 265/265L
2) MATH 210

Year Three
Students entering Year Three must take:
Fall:
1) CHEM 312, 314L, 355/355L
2) MATH 216
3) CS 212
4) One Elective (0.5)
Winter:
1) CHEM 10, 358/358L
2) MATH 322B
3) PHYS 359, 365
4) One Elective (0.5)

Year Four
Students entering Year Four must take:
1) CHEM 10, 492A/B (1.5)
2) Three Chemistry Electives (1.5) mainly from 400-level courses
3) Three Mathematics Electives (1.5) from 300- or 400-level courses
4) Two other Electives (1.0)

C) HONOURS CHEMISTRY (PHYSICS OPTION)
Program Advisor: Professor J.W. Hepburn
This program combines the Honours Chemistry core with courses in physics. It is suitable preparation for work in Physical Chemistry or Chemical Physics, or for students whose interests divide between the two disciplines.

Students wishing to follow this program on the Co-operative system of study should first speak to Professor Hepburn and to Mr. R.A. Pullin of the Department of Co-operative Education and Career Services.

Admission to, and continuance in, Honours Chemistry (Physics Option) requires an overall cumulative average of 60%. In addition, a 60% average must be obtained in all non-elective lecture courses each term. A 60% average is required in all Physics courses:

In order to graduate with an Honours Chemistry (Physics Option) degree, the following requirements must be met:
1) Successful completion of 24.0 credits including 5.0 ab credits;
2) 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 to be at the discretion of the Chemistry Undergraduate Committee and in exceptional circumstances only;
3) 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;
4) Mandatory courses as listed below.
5) Students are encouraged to include an ethics course in their program, such as STV 100, PHIL 226, PHIL 215, SCI 263, SCI 265.

Year One
Students entering Year One must take:
Fall:
1) CHEM 125/123L
2) PHYS 121/121L
3) MATH 115A, 111A
4) CS 102
Winter:
1) CHEM 126/124L
2) PHYS 122/122L
3) MATH 115B, 134B
4) Electives (1.0)

Year Two
Students entering Year Two must take:
Fall:
1) CHEM 212, 220/220L, 254
2) PHYS 265/265L
3) MATH 216
Winter:
1) CHEM 10, 221/221L, 255
2) PHYS 253/253L, 263
3) MATH 210

Year Three
Students entering Year Three must take:
Fall:
1) CHEM 264, 312, 355L
2) CHEM 355 or PHYS 354
3) Two Electives (1.0)
Winter:
1) CHEM 10, 265/265L, 350, 358/358L
2) PHYS 365
3) One Elective (0.5), PHYS 352/352L recommended

Year Four
Students entering Year Four must take:
1) CHEM 10, 492A/B (1.5)
2) PHYS 434, 454
3) Three chemistry electives (1.5), and two physics electives (1.0) (courses other than Chemistry and Physics, such as Chemical Engineering, Mathematics, or Applied Mathematics, may be acceptable, but permission must be given by the Undergraduate Officer)
4) One other elective (0.5) (suggested electives include PHYS 353/353L, 363, 432, 441 and 445).
D) HONOURS CHEMISTRY (THEESIS OPTION)
Program Advisor: Professor G.E. Toogood
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 program, regular or co-operative.

Years One and Two: as at present in any Honours Chemistry program

Years Three and Four: CHEM 355, 368, one of 312/313, and three of 496A-E, plus research courses, CHEM 392A/B and 495A/B.

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 MAJOR PROGRAMS – CO-OPERATIVE

Honours Co-operative Biochemistry
(see page 14:15)

Honours Co-operative Biochemistry (Biotechnology Option)
(see page 14:16)

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 five 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 4A term to take Year Four together and graduate together in the spring.

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 the non-elective 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 24.75 credits including 5.75 lab credits.

2) In Years Three and Four, students must choose four 400-level term courses (other than CHEM 407) and two term lecture courses at any level from the list of Technical Electives with Chemistry Content (see page 14:19);

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 to be at the discretion of the Chemistry Undergraduate Committee and in exceptional circumstances only;

4) Successful completion of a minimum of four work terms, and submission of a minimum of four satisfactory work reports;

5) Mandatory courses as listed below;

6) Students are encouraged to include an ethics course in their program, such as STV 100, PHIL 226, PHIL 215, SCI 263, SCI 265.

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HONOURS SCIENCE PROGRAM THREE (WITH SPECIALIZATION IN CHEMISTRY)

Admission to, and continuation 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 3 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 0.5 lab credit and 1.0 lecture credit in each of the following areas of Chemistry: Analytical, Inorganic, Organic, Physical. 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 & 111L/112L or PHYS 121/122 & 121L/122L; CHEM 123/124 or 125/126, 123L/124L;
MATH 113A/B, CS 102; Three Electives (1.5)

Year Two
Students entering Year Two must take:
1) 3.0 Chemistry lecture credits, at least 2.0 of which must be chosen from: CHEM 212, 220, 221, 254, 255, 264, 265;
2) 1.0 lecture credit chosen from Physics, Biology or Earth Sciences courses;
3) Two Electives (1.0)
4) CHEM 10.

Year Three
Students entering Year Three must take:
1) 3.0 Chemistry lecture credits at the 300-level or higher;
2) 1.0 lecture credit chosen from Physics, Biology or Earth Sciences courses;
3) Two Electives (1.0);
4) CHEM 10.

Year Four
1) 2.0 Chemistry credits at 300-level or higher (at least 1.0 at 400-level);
2) 2.0 lecture credits from Biology, Chemistry, Earth Sciences or Physics
3) Two Electives (1.0)
4) CHEM 10

MINOR IN CHEMISTRY

In order to graduate with a Minor in Chemistry the following requirements must be met:
1) The following courses must be taken, with a minimum cumulative average of 60% in these courses:
   a) CHEM 123/124 or 125/126, and CHEM 123L/124L;
   b) a minimum of 3.5 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;
   c) 0.5 lab credits beyond Year One appropriate to the lecture credits chosen.

Students are urged to check their plans with the Undergraduate Officer in Chemistry.

Earth Sciences

The following programs are offered in the Earth Sciences department:

- Honours Major Programs
  
  Regular:
  
  Honours Earth Sciences (Geology Option)
  Honours Earth Sciences (with Options)
  a) Geology Option
  b) Economics Option

  Co-operative:
  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 four 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 continuation 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 four 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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<th>Co-op</th>
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<tr>
<td>Earth</td>
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100-level  
Sci Math Core  
Arts Core  
Earth Sciences  
200-level  
Math, CS, or Physics  
Geography/Environmental Studies  
Science/Mathematics Elective  
Arts Elective  
Unrestricted Elective  
Total Term Courses  
Non-credit field courses

1*Excluding SCI courses; optional Labs must be taken.  
EARTH 358 is considered a Science/Mathematics elective.  
Students who plan to do graduate work in hydrogeology are advised to take MATH 213A/B or CIV E 221 during their fourth year.  

HONOURS MAJOR PROGRAMS - REGULAR  

Honours Earth Sciences (Geology Option)  

Year One  
EARTH 121/122, CHEM 123/124 and 123L/124L, PHYS 121/122 and 121L/122L, CS 102, MATH 113A/B, one elective.  

Year Two  
Students entering Year Two must take:  
1) EARTH 221, 231, 232, 235, 236, 238, 260;  
2) ENGL 210C;  
3) Two electives  

Year Three  
Students entering Year Three must take:  
1) EARTH 331, 332, 333, 336, 342, 345, 355, 370, 390  
2) Four electives  

Year Four  
Students entering Year Four must take:  
1) EARTH 427, 436A/B, 490;  
2) Five* term courses from: EARTH 421, 432, 433, 434, 435, 437, 438, 439, 440, 456, 460, 470;  
3) Two electives, not from Earth Sciences.  

* 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.  

Honours Earth Sciences (Geography Option)  
In addition to the requirements for all Honours Major programs listed on page 14:24, 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, 403, 404  
Air Photo-Remote Sensing Sequence  
GEOG 275, 375, 470, 471  
Resource Management Sequence  
GEOG 303, 356, 357, 358, 359, 414, 461  

Year One  
EARTH 121/122, CHEM 123/124 and 123L/124L, GEOG 101/102, CS 102, either PHYS 111/112 and 111L/112L or BIOL 111/112 or equivalent elective.  

Year Two  
Students entering Year Two must take:  
1) EARTH 221, 231, 232, 235, 236, 238;  
2) ENV S 200;  
3) GEOG 201, 202  
4) One elective  

Year Three  
Students entering Year Three must take:  
1) EARTH 331, 332, 333, 336, 342, 345, 370, 390;  
2) ENGL 210C;  
3) Two GEOG electives;  
4) Two unrestricted electives
Year Four
Students entering Year Four must take:
1) EARTH 427, 436A/B, 440, 490, plus two term courses from 400-level EARTH courses;
2) Three GEOG electives from 300- or 400-level courses
3) One unrestricted elective

Honours Earth Sciences (Economics Option)
This program is intended for Earth Sciences students who wish to take additional courses in Economics and Business. It will be of particular interest for those who intend to pursue an M.B.A. or who anticipate careers in management or entrepreneurial areas. Students must maintain a 65% average in both Earth Sciences and Economics courses.

Economics courses:
Required courses are ECON 101, 102, 201 and 355. Two additional courses are required, with no more than one from each of the following groups:
ECON 241 or 341, BUS 111 or 121 (offered at WLU),
M SCI 211
A course in entrepreneurship.

Year One:
EARTH 121/122, CHEM 123/124 and 123L/124L, PHYS 121/122 and 121L/122L, CS 102, MATH 113A/B, ECON 101.

Year Two:
EARTH 221, 231, 232, 235, 236, 238, 260, ECON 102, 201, elective

Year Three:
EARTH 331, 332, 333, 345, 345, 370, 390, One other 300-level EARTH, ECON 355, ENGL 210C. One ECON elective, three other electives.

Year Four:
EARTH 427, 436A/B, 490. Three other 400-level EARTH. Three electives.

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 5.3 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.

Science
Earth Sciences

Co-operative Applied Earth Sciences (Geology Option)

Year One
EARTH 121/122, CHEM 123/124 and 123L/124L, PHYS 121/122 and 121L/122L, CS 102, MATH 113A/B, one elective.

Year Two
2A students must take:
1) EARTH 231, 235, 236, 260;
2) One elective
2B students must take:
1) EARTH 221, 232, 238;
2) ENGL 210C;
3) One elective

Year Three
3A students must take:
1) EARTH 332, 333, 345, 370, 390;
2) Two electives
3B students must take:
1) EARTH 331, 336, 342, 355;
2) Two electives

Year Four
Identical to the regular program in Honours Earth Sciences (see page 14.25).

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 MATH 111B); MATH 115A/B; MATH 213A/B; PHYS 121/122 and 121L/122L.

Year One
EARTH 121/122, PHYS 121/122 and 121L/122L, CHEM 123/124 and 123L/124L, CS 102, MATH 115A/B, 114 or 111B.

Year Two
2A students must take:
1) EARTH 231, 235, 260;
2) MATH 213A;
3) ENGL 210C;
4) One elective from PHYS, MATH, CS, or Engineering.

2B students must take:
1) EARTH 221, 232, 238;
2) MATH 213B;
3) MATH 216;
Year Three
3A students must take:
1) EARTH 333, 358, 360A or 460 (given alternate years), 370, 390;
2) One unrestricted elective

3B students must take:
1) EARTH 236, 355, 458;
2) Two electives from PHYS, MATH, CS or Engineering;
3) One Arts elective.

Year Four
Students entering Year Four must take:
1) EARTH 360A or 460 (given alternate years), 427, 436A/B, 490;
2) Two electives from PHYS, MATH, CS or Engineering.
3) an additional four EARTH term courses from 300- or 400-level courses.

Recommended Electives:
STAT: 204, 220
PHYS: 246, 252, 253, 256, 259, 352, 353, 364, 365
CS: 212, 230, 316
CIV E: 375, 381, 472, 473, 480, 486
CHEM: 574
CHEM: 212, 219, 254, 255, 264, 311, 312, 313
GEOG: 275, 375, 376

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 p. 14:25.
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:
1) EARTH 121/122;
2) CHEM 123/124 and 123L/124L;
3) PHYS 111/112 and 111L/112L, or two 100- or 200-level BIOL term courses;
4) MATH 113A/B;
5) CS 102

Year Two
Students entering Year Two must take a total of ten term courses, which must include:
1) EARTH 221, 231, 232, 235, 236, 238;
2) ENGL 210C;
3) Two other Science term courses

Year Three
Students entering Year Three must take a total of 12 term courses, which must include:
1) Six or eight term courses from: EARTH 260, 331, 332, 333, 336, 342, 345, 355, 360A or 460, 370;
2) Two other Science term courses;
3) Two or one Arts term courses.

Year Four
Students entering Year Four must take a total of ten term courses, which must include:
1) 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 courses.
2) The required credits must include:
   a) EARTH 121/122 in Year One;
   b) 2.0 credits from: EARTH 221, 231, 232, 235, 236, 238 in Year Two;
   c) 1.5 or 1.0 credits from: EARTH 331, 332, 333, 336, 342, 345, 355, 358, 360A, 368, 369, 370 in Year Three;
   d) 0.5 or 1.0 credits 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 Physics (Geophysics Option)
  Co-operative:
  Honours Co-op Applied Physics
  Honours Co-op Applied Physics (Geophysics Option)
- Honours Science Program Five (with specialization in Physics)
- Minor in Physics
HONOURS MAJOR PROGRAMS - REGULAR

Honours Physics
The Honours program is in the form of a core of required courses, plus appropriate electives. By careful selection of electives, students can deepen their knowledge of experimental or theoretical physics, or obtain a background in another subject (e.g. Astronomy, Geophysics, Chemistry, Mathematics, Computing, Business Administration). Examples of possible elective programs are available in the office of the undergraduate advisors.

Admission to, and continuance in, Honours Physics requires an overall cumulative average of 60% and a 60% Physics average each year.

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.

Students entering Year One must take:

Fall:
1) PHYS 121/121L, 123
2) MATH 115A or 113A, 111A or 134A
3) One elective (0.5)

Winter:
1) PHYS 122/122L
2) MATH 115B or 113B, 111A or 134A
3) Two electives (1.0)

Year Two
Students entering Year Two must take:

Fall:
1) PHYS 10, 252, 256/256L
2) MATH 213A, 216
3) One elective (0.5)

Winter:
1) PHYS 10, 234, 253/253L, 263
2) MATH 213B
3) One elective (1.0)

Year Three
Students entering Year Three must take:

Fall:
1) PHYS 10, 354, 358, 360A, 364
2) One elective (0.5)
3) One elective Physics lab (0.25)

Winter:
1) PHYS 10, 359, 360B, 363, 365
2) One elective (0.5)
3) One elective Physics lab (0.25)

Year Four
Students entering Year Four must take a total of 5.0 credits, which must include the following:

1) PHYS 10, 434, 441, 455, plus an additional 1.0 credit of PHYS electives. PHYS 437A and PHYS 454 are strongly recommended for students intending to do graduate work. PHYS 443 is recommended for students intending to do graduate work or intending to work as industrial physicists.

Honours Physics (Geophysics Option)
In order to graduate with an Honours Physics (Geophysics Option) degree, the academic requirements listed on page 14:29 under Honours Co-op Applied Physics (Geophysics Option) must be met.

Elective Programs
The "Core plus elective" structure of the Honours Physics program allows a great many combinations of courses to be taken. Commonly taken combinations of courses which emphasize various aspects of physics such as experimental physics, theoretical physics, biophysics, astrophysics, as well as physics in combination with such studies as Business Administration, Computing, Electrical Engineering, are kept on file in the office of the undergraduate advisor. Students may obtain a copy on request. All such programs are subject to timetable restrictions.

HONOURS MAJOR PROGRAMS — CO-OPERATIVE

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.

Throughout 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 Co-ordination Department can be found in Chapter 5.

Options
There are two main options in the Co-op Physics program. The first option is Honours Co-op Applied Physics with emphasis on such topics as Solid State, Biophysics, Chemistry and Physics, Physics with Computing, Physics with Business Administration, Physics with Electrical Engineering, etc. All are based on the common core of courses as outlined below. Typical examples of several combinations of courses, which supplement the core, are kept on file in the office of the undergraduate advisor, from whom copies are available. The second option is in Geophysics. It is offered as a combination of Physics and Earth Science courses with work terms following the scheme of the Co-op Earth Science program, and is detailed separately below.
Honours Co-op Applied Physics
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 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
Students entering Year One must take:
1A (Fall):
1) PHYS 121/121L, 123
2) MATH 115A, 111A or 134A
3) One elective (0.5)
1B Winter or Spring:
1) PHYS 122/122L
2) MATH 115B, 111B or 134B
3) Two electives (1.0)

Year Two
Students entering Year Two must take:
2A (Fall):
1) PHYS 10, 252, 256/256L
2) MATH 213A or 230A, 216 or AM 260
3) One elective (0.5)
2B (Spring):
1) PHYS 10, 234, 253/253L, 263
2) MATH 213B or 230B
3) One elective (0.5)

Year Three
Students entering Year Three must take:
3A (Spring):
1) PHYS 10, 354, 358, 360A, 364
2) One elective (0.5), one elective Physics lab (0.25)
3B (Winter):
1) PHYS 359, 360B, 363, 365
2) One elective (0.5), one elective Physics lab (0.25)

Year Four
Students entering Year Four must take a total of 5.0 credits, which must include the following:
4A & B (Fall & Winter):
1) PHYS 10, 434, 441, 455, plus an additional 1.0 credit of PHYS electives. PHYS 437A and PHYS 454 are strongly recommended for students intending to do graduate work. PHYS 443 is recommended for students intending to do graduate work or intending to work as industrial physicists.

Honours Co-op Applied Physics (Geophysics Option)
Admission to, and continuance in, Honours Co-op Applied Physics (Geophysics Option) requires an overall cumulative average of 60% and a 60% Physics average in Year One and in each subsequent term.

In order to graduate with an Honours Co-op Applied Physics (Geophysics Option) degree, the following requirements must be met:
1) Successful completion of 20.5 lecture credits, plus 2.0 physics lab credits.
2) Mandatory courses as listed below.

Year One
Students entering Year One must take:
1A (Fall):
1) PHYS 121/121L
2) CHEM 123/123L
3) EARTH 121
4) MATH 114, 115A
1B (Winter or Spring):
1) PHYS 122/122L
2) CHEM 124/124L
3) EARTH 122
4) CS 102
5) MATH 115B

Year Two
Students entering Year Two must take:
2A (Fall):
1) PHYS 10, 252, 256/256L
2) MATH 213A, 216
3) EARTH 231, 290
2B (Spring):
1) PHYS 10, 253/253L, 263
2) MATH 213B
3) EARTH 232, 238

Year Three
Students entering Year Three must take:
3A (Winter):
1) PHYS 10, 259/259L, 363, 365, 360B
2) EARTH 369, 370
3B (Fall):
1) PHYS 10, 354, 358, 364
2) EARTH 235, 368

Year Four
Students entering Year Four must take:
4A & B (Fall & Winter):
1) PHYS 10, 352/352L*, 353/353L*, 437A, 441, 443, 455
2) EARTH 460, 461
*PHYS 352/352L, 353/353L may be replaced by PHYS 464, 465

Honours Science Program Five (With Specialization in Physics)
Admission to, and continuance in, Honours Science Program Five requires an overall cumulative average of 60%, and a Physics average of 60%.

In order to graduate in the Honours Science program, with a specialization in Physics, the following requirements must be met:
1) Successful completion of 22.0 credits. Of the 22.0 credits that are required, 14.0 must be Faculty of Science credits;
2) No more than 5.0 failed credits will be allowed;
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:

**Fall:**
1) PHYS 121/121L
2) MATH 115A or 113A, 111A or 134A
3) Two electives (1.0)

**Winter:**
1) PHYS 122/122L
2) MATH 115B or 113B, 111B or 134B
3) Two electives (1.0)

Year Two
Students entering Year Two must take:
1) PHYS 234, 252, 253/253L, 256/256L, 263
2) MATH 213A/B, 216, or equivalent

Years Three and Four
Students in Years Three and Four must take:
1) At least 2.5 lecture credits of Honours Physics core courses at the 300- or 400-level and an additional 3.5 lecture credits of Physics courses at the 300- or 400-level, of which PHYS 354 and 455 must be included.

**MINOR IN PHYSICS**

In order to obtain 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 average of 60% in all Physics courses attempted;
2) Lecture credits must include: PHYS 121/122, 253, 226/246 or 256, 324/325 or 263/354;
3) Lab credits must include: PHYS 121L/122L, and 0.5 credits of Year Two labs.

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**Science**

**Psychology**

**Honours Psychology**

The Honours B.Sc 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.

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.

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 a-i on p. 8:33
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.
Recommended Program

Year One
Two 200-level term courses in BIOL; CHEM 123/124, 123L/124L; PHYS 111/112, 111L/112L or PHYS 121/122, 121L/122L; MATH 113A/B; PSYCH 101, one PSYCH elective

Year Two
1) PSYCH 291/292 (see overlapping courses p. 8:7)
2) One Natural Science Course from PSYCH 203, 206, 207, 261, 271
3) One Social Science Course from PSYCH 211, 253, 355, 357
4) Two PSYCH Electives (1.0)
5) Four Science Electives (2.0)
6) Two Unspecified Electives (1.0)

Year Three
1) PSYCH 391 (see overlapping courses, p. 8:7)
2) One Natural Science Research Course from PSYCH 392*, 394, 396, 398
3) One Social Science Research Course from PSYCH 392*, 393, 395, 397
4) One Natural Science Course from PSYCH 203, 206, 207, 261, 271
5) One Social Science Course from PSYCH 211, 253, 355, 357
6) One Honours Seminar in PSYCH
7) Four Science Electives (2.0)
8) Two Unspecified Electives (1.0)
*Students may not use PSYCH 392 to satisfy both 2 and 3.

Year Four
1) PSYCH 499A/B
2) One Honours Seminar in PSYCH
3) One PSYCH Elective
4) Two Science Electives (1.0)
5) Four Unspecified Electives (2.0)

Optometry Program

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 men and women 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 O.D. 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

Science
Optometry

Philosophy degree are also available.

TAs 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 should be represented. At the University of Waterloo the following program or equivalent is recommended to students planning to apply to the first professional year: BIOL 230/230L, Cell Biology; BIOL 211, Vertebrate Zoology; CHEM 123/123L, Chemical Reactions, Equilibria and Kinetics; CHEM 124/124L, Introductory Organic Chemistry; PHYS 121/122, 121L/122L, General Physics; (students without Grade 13 Physics must take PHYS 111/112 and PHYS 111L/112L); MATH 113A/B, Calculus; PSYCH 101, Introductory Psychology. The above mentioned courses represent the minimum requirements for admission to the School of Optometry. The following courses represent a second year program of 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; PSYCH 200 or 292, or 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 preprofessional program, additional courses in the behavioural sciences, social sciences and the humanities are recommended.

Admission Test
It is recommended but not required, that applicants take the Optometry Admission Test (OAT). Details of this test can be obtained from the Psychological Corporation, 211 East Chicago Avenue, Chicago, Illinois. 60611, USA.
The Admissions Committee will also consider applications from superior students who have completed other academic programs. In the event that applications from such students are successful, they may be expected to remedy specific deficiencies either during the summer preceding admission or during the regular professional program.

Selection Factors
All applicants should note that enrolment in the first professional year is limited to 60 and that in 1987 there were approximately 400 applications for those places. Consequently, neither acceptance to nor successful completion of the pre-professional program can guarantee admission to the first professional year. Applicants are selected on a competitive basis considering scholarship, interest, motivation, general qualifications for the profession and recommendations.

While admissions of well qualified applicants are made from all the provinces, prospective students are advised that some preferential consideration must be given to Ontario residents. Preferential consideration is also given to applicants completing their pre-professional program at the University of Waterloo, but applicants to Year One Regular Science 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 Year One Regular Science as given at the University of Waterloo.

The provinces of British Columbia, Alberta, Manitoba, New Brunswick, Prince Edward Island and Saskatchewan have entered into an agreement 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 School of Optometry will accept in the first professional year, five applicants who are residents of British Columbia, seven applicants who are residents of Alberta, three applicants who are residents of Manitoba, three applicants who are residents of Saskatchewan, one resident of New Brunswick and one resident every three years from P.E.I. 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 provinces must meet the same admission criteria as other applicants. The location of the university where studies have been undertaken is not a criterion in the selection of these applicants.

Additional information may be obtained from the Admissions Office of the School of Optometry.

Application Procedures
Students enrolled at the University of Waterloo make application to the Optometry program by completing an application for internal transfer form obtained from the Admissions Office at the School of Optometry. Graduates of the University of Waterloo or persons who were at one time registered at the University of Waterloo in any type of program also apply by completing this form. In the winter term an interview with the admissions committee will be arranged for the student. Students who have completed the pre-professional program at another university must apply through the Ontario Universities Application Centre (OUAC). Such applicants should obtain the appropriate OUAC application form from the Registrar of the University of Waterloo. These forms will not ordinarily be available from the Registrar prior to October 1, 1988. The completed OUAC form should reach the Registrar at Waterloo by the deadline of February 28. After the OUAC form has been processed the applicant will receive a supplementary application package from the Registrar of the University of Waterloo, due in March. This will contain details on required transcripts, letters of reference and the curriculum vitae. The exact due date will be stated in this package. 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, polio, 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.

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 O.D. degree. For more information write: The Admissions Office, School of Optometry.

Note
Interviews with the Admissions Officer of the School are required in the case of applicants in certain categories before any application can be processed. These categories include:

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 had been made.

Appointments for interviews can be made by phone or letter to the Admissions Officer 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 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.

Year One
Students entering Year One must take the following:

Fall term:
1) OPTOM 100, 104, 105, 106, 109;
2) BIOL 301A.

Winter term:
1) OPTOM 111, 114, 115, 116;
2) BIOL 301B.

Year Two
Students entering Year Two must take the following:

Fall term:
1) OPTOM 241, 242, 244, 245, 246, 261.

Winter term:
1) OPTOM 251, 252, 254, 255, 274.

Year Three
Students entering Year Three must take the following:

Fall term:

Winter term:

Year Four
Students entering Year Four must take the following:

Spring term:
1) Optom 418

Fall term:
1) OPTOM 440, 442, 448A, 449, 468, 480;
2) OPTOM 441 or PSYCH 357*.

Winter term:
1) OPTOM 448B, 452, 459, 490, 499 (A-E);
2) OPTOM 451 or one elective (0.5)*.

*Students with a particular interest in and an 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 Options

Students in many General or Honours programs may select a specified group of courses from a number of disciplines to form an Interdisciplinary Option or Minor which will be designated on the diploma. Interdisciplinary Options or Minors are composed of courses selected from different disciplines which have a common focus on a particular theme or area of study.

For example, a student enrolled in Honours French might select courses in the Canadian Studies Option, or a student in Honours Biology might wish to take the Gerontology Minor.

Students should note that, in most cases, courses for an Option would be selected after Year One. The 12 Interdisciplinary Options now available are described below:

Canadian Studies, S.E. McMullin, Director, St. Paul's College
Gerontology, W.F. Forbes, Director, PAS 3010
Iberoamerican Studies, A. Fama, Director of Latin American Studies, ML 207
Legal Studies, M. McDonald, Director, ML 119
Management Studies, E.S. Lucy, Director, NH 3042B
Middle East Studies, D. Sahas, Director, HH 289G
Peace and Conflict Studies, R.J.R. Mathies, Director, Conrad Grebel College
Personnel and Administrative Studies, E.S. Lucy, Director, NH 3042B
Society, Technology and Values, R.D. Legge, Director, St. Paul's College
Studies in Personality and Religion, R.D. Legge, Director, St. Paul's College
Studies in Sexuality, Marriage and the Family, P.J. Naus, Director, St. Jerome's College
Women's Studies, L. Dorney, Director, PAS 3022
Canadian Studies

Participating faculty members are listed in Chapter 16.

The Canadian Studies Option

The Canadian Studies Option provides an opportunity to gain insight into Canada in three ways: through courses about Canada in the student’s home discipline, courses about Canada in departments outside that discipline, and core interdisciplinary courses offered by the Canadian Studies Program Centre. The Centre is located 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 Genera or Honours Option in Canadian Studies.

Year One

Because 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, and they should otherwise proceed with their Faculty’s usual 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 Canadian Studies Option. Those in a three-year General degree program choose the General Option, while those in a four-year Honours program select the Honours Option. The difference in the two Options is that Honours students complete the fourth year (see below).

Year Two

- CDN ST 201, 202 Core courses
- two term courses in the home discipline dealing specifically with Canada
- two term courses from outside the home discipline, dealing with Canada and chosen from the approved course list (see p. 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, 313, 365 Core courses
- 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 p. 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 Core Courses
- two term courses from outside the home discipline, dealing specifically with Canada and selected from the approved course list on p. 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 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. This requires assembling a package equivalent to ten term courses. The package includes four of CDN ST 101, 201, 202, 301, 302, 313 and 365 plus six term courses from the approved course list on p. 15:4.
Principal Canadian Content Courses Offered by Participating Departments

The list below indicates courses tentatively scheduled for 1988-89. Refer to previous and forthcoming Undergraduate Calendars for other Canadian content courses.

**Anthropology (ANTH)**
102A Introduction to Social and Cultural Anthropology
203 Prehistoric Man in North America
230 Indians of Canada
233 Inuit & Eskimo Cultures
241 The Contemporary Canadian Indian Scene
322 Prehistoric Cultures in the Great Lakes Area
351 Comparative Policies on Native Minorities
377 Early Cultures in the New World
459 Honours Essay

**Economics (ECON)**
101 Introduction to Micro-economics
102 Introduction to Macro-economics
150 An Introduction to Macro and Micro Economics
310 History of Canadian Economic Development
333 Interregional Economics
341 Public Finance
343 Urban Economics
345 Industrial Organization
351 Labour Economics
353 Population Economics
355 Economics of Energy and Natural Resources
361 Cost-Benefit Analysis and Project Evaluation
363 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
498A/B Senior Honours Essay Canadian Literature Option

**Environment and Resource Studies (ERS)**
241 Introduction to Environmental and Social Impact Studies
338 Social Impact Assessment
352 Current Issues in the Canadian North
385 Technology/Lifestyles for a Conserver Society

**Environmental Studies (ENV S)**
195 Introduction to Environmental Studies
201 Introduction to Environmental and Planning Law

**Interdisciplinary Options**

**Canadian Studies**
401 Environmental Law
402 Planning Law
433 People in Natural Areas

**French (FR)**
151 Basic French (For students who have no background in French)
152 Basic French (For students who have no background in French)
155 Intensive Review of French (For students with Grade 12 French)
192 French Language (For students with Grade 13 French)
193 French for Bilingual Students I
195 French Literature 1
196 French Literature 2
205 Spoken French
206 Spoken French
207 Spoken French
208 Spoken French
251 Intensive Language Training
252 Français Pratique
273 Aspects du Québec
275 Contemporary French-Canadian Novel
293 French for Bilingual Students II
301 Advanced Instruction in Written French
302
371 French-Canadian Poetry
372 Contemporary French-Canadian Theatre
401 Advanced Language Study
402 Advanced Language Study
471 French-Canadian Poetry

**Geography (GEOG)**
251 Cities in Canada
300 Geomorphology and the Southern Ontario Environment
309 Physical Climatology
322 Geographical Study of Canada
341 Historical Geography of Canada 1
342 Historical Geography of Canada 2
352 The Rural-Urban Fringe
422 Canada
461 Land Dereliction and Rehabilitation I

**History (HIST)**
102C Origins of War in the 20th Century
102E Canadian History
204 Life on the Ontario Frontier
206 History of Canadian Minorities
207 Canadian Labour History
215 The Proper Sphere: Canadian Women in Historical Perspective
234 The Catholic Church in Canada since Confederation
248 History of Canadian-American Relations to 1914
253 Canadian History: 1760-1900
254 Canadian History: 1900-1979
Interdisciplinary Options
Canadian Studies

273 Canadian Social History I
274 Canadian Social History II
320 Modern Quebec History
325 History of Canadian Indians to 1870's
326 History of Canadian Indians since 1870's
385 Canada From MacDonald to Laurier
389 Canada in World Affairs: From Laurier to Trudeau
403 Senior Seminar: Canadian History

Political Science (P SCI)
101M Introduction to Public Policy
102M Contemporary Issues in Canadian Public Policy
231 Government and Business in Canada
260A/260B Canadian Government and Politics 1/2
291 The Canadian Legal Process
292 Issues in Canadian Criminal Law
331 Public Administration 1
332 Public Administration 2
333 Administrative Law
342 Politics in Quebec
343 Canadian Municipal Government
344 The Politics of Local Government
351 Comparative Federal Systems
352 Comparative Legislative Systems
363 Canadian Constitutional Law
372 Political Parties and Interest Groups
422 Conflict of Political Ideas in Canada
428 The State and Economic Life
431 Canadian Public Policy
435 The Politics of Canadian Resource Development
442 Politics in Ontario
443 Politics in Western Canada
461 Problems in Canadian Politics 1
462 Problems in Canadian Politics 2

Sociology (SOC)
101 Introduction to Sociology
102 Social Problems
200 Marriage and the Family
204 Sociology of Adolescence
206 Gender Roles
209 Family Origin and Personal Identity
214 Class, Status and Power
221 Canadian Society
222 Juvenile Delinquency
223 Deviance: Perspectives and Processes
224 Law and Order
226 Juvenile Justice
227 Criminology
228 Sociology of Corrections
232 Technology and Social Change
242 Industrial Sociology
247 Death and Social Structure
248 Health, Illness and Society
252 Migration and Society
253 Population in Canadian Society
256 Ethnic and Racial Relations
275 The Mennonites as a Sociological Community
286 Environment and Behaviour
307 Problems in Contemporary Education
333 Canadian Multiculturalism
342 Sociology of Industrial Relations
343 Sociology of Health Care
360 Social Psychology and Political Participation
366 Urban Sociology
377 Studies in the Society of the Mennonites
378 Sociology of Women

Urban and Regional Planning
PLAN 156 Introduction to Urban and Regional Planning Concepts
PLAN 231 Citizen Involvement, Planning and Social Change
PLAN 255 Planning Surveys and Analysis
PLAN 259 Regional Planning and Economic Development
PLAN 330 Urban Social Planning
PLAN 344 Principles of Recreation Planning
PLAN 370 Land Development Planning
PLAN 402 Planning Law
PLAN 430 Social Policy Planning
ENV S 201 Introduction to Environmental and Planning Law
ENV S 401 Environmental Law
ENV S 417 Land Use History and Landscape Change 1
ENV S 418 Land Use History and Landscape Change 2
Principal Canadian Content Courses Offered by Other Arts Departments

Fine Arts (FINE)
21E Canadian Art
31E Canadian Native Art
31E Canadian Ethnic and Traditional Arts

Music (MUSIC)
272 Traditional Folk Music of Canada
28C Canadian Music

Philosophy (PHIL)
22C Moral Issues
327A Philosophy of Law: Part I

Psychology (PSYCH)
212 Educational Psychology
213 Exceptional Children (Consult Department)

Religious Studies (R S)
264 Religion in the Canadian Experience
265 Unity and Diversity in Canadian Religion
266B Religious Perspectives in Contemporary Canadian Literature
31E Canadian Native Religions
31E Canadian Native Religious Traditions

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 or 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 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 402 and Gerontology 255 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
Interdisciplinary Options

Gerontology
Iberoamerican Studies

KIN 352/ SOC 344 Sociology of Aging
PSYCH 217 Aging and Basic Psychological Processes
PSYCH 218 Aging, Dying and Death
SOC 247 Death and Social Structure

Optional Courses
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 I
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 353 Population Economics
HLTH 245 Community Health
HLTH 210 Growth, Development and Aging
HLTH 472 Special Topics: Aging, Immunity and Health
ISS 350D Adult Life Crises and Events
OPTOM 449 Community Health Optometry
OPTOM 452 Special Populations
PHIL 226 Ethics and the Life Sciences
PHYS 480 Radiation Biophysics
PLAN 414/416 Issues in Housing
PLAN 420 Health, Environment and Planning
REC 361 Aging and Leisure
R S 271 Personality and Religion
R S 400A Aging as Spiritual Journey
SOC 248 Health, Illness and Society
SOC 343 Sociology of Health Care
SOC WK 367R 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
Science: J.C. Carlson, Biology B2-252A (ext. 2664)
Arts: N.H. Charness, Psychology PAS 4055 (ext. 3313)
Env. Studies: H.S. Coblentz ES1-331 (ext. 3909)

HKLS: B.D. McPherson, Adjunct Professor
Faculty of Social Work, W.L.U.

Church Colleges: P. Naus
St. Jerome's College
STJ 114 (ext. 6593)

Optometry: M.E. Woodruff
School of Optometry
OPT 339 (ext. 3175)

Iberoamerican Studies

Associate Professor, Director of Latin American Studies
A. Fama, BA (Brock), MA (Western Ontario), PhD (Suny at Buffalo)

Members of the Iberoamerican Studies Advisory Committee

Assistant Professors
J.E. Cuenca, LIC (Madrid), MA (Western Michigan), PhD (Toronto)
B. Thalmann, BA (DePauw), MA, PhD (Ohio State)

The Iberoamerican Studies Option is an interdisciplinary program designed for students in any faculty of the University who have an interest in the Spanish- and Portuguese-speaking world, both in Latin America and in the mother countries, Spain and Portugal. 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 Iberoamerican 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 Iberoamerican Studies Option indicated on the diploma, students must have an overall average of 65% in the Iberoamerican Studies Option courses.

Courses
P SCI 102F Politics in the Third World
P SCI 350A Politics of the Developing Areas 1
P SCI 350B Politics of the Developing Areas 2
P SCI 453 /651 Comparative Politics of Latin America
P SCI 454 /652 Comparative Politics II
SPAN 217 Spanish American Civilization 1
SPAN 218 Spanish American Civilization 2
Legal Studies

The Legal Studies Committee

Associate Professor, Director
M.F. McDonald, BA (Toronto), MA, PhD (Pittsburgh)

Associate Professors
C.G. Brunk, BA (Wheaton), MA, PhD (Northwestern) G
D. Estring, BA, LLB (Alberta)
F.G. Reynolds, BSc, MSc, (Manitoba), FSA, FCIA, MAAA
J.A. Wahl, CR, BA (Western Ontario), MA, PhD (St. Louis) J

Assistant Professors
P.J. Carrington, AB (Harvard), MA, PhD (Toronto)
S.P. Gunz, BA, LLB (Sydney), MBA (Manchester)
R.P. Woolstencroft, BA, PhD (Alberta)

Legal Studies is an Interdisciplinary Option that focuses 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 Sciences, Economics, Environmental Studies, History, Philosophy, Political Science, and Sociology. Students are invited to join in on 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.

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 those in the second 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.

The Legal Studies Option is open to students in General or Honours programs. Students must complete five year-course equivalents of designated Legal Studies courses from the appropriate sections. An overall average of 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, 0.5
- PHIL 327A Philosophy of Law - Part 1, 0.5
- P SCI 292 Aspects of Canadian Law, 0.5
- SOC 370 Sociology of Law, 0.5

Total credits in Section 1: 2.0.

Section 2

Students are required to complete successfully two year-course equivalents from the following courses. Students in the Faculty of Environmental Studies must take ENV S 201, 401, and PLAN 402 plus one other course in Section 2.

- ACC 231 Business Law, 0.5
- ACTSC 458 Insurance Law, 0.5
- ENV S 201 Introduction to Environmental & Planning Law, 0.5
- ENV S 401 Environmental Law, 0.5
- HIST 102M Law and Society in the Middle Ages: 500-1400, 0.5
- HIST 329 The History of Anglo-American Law, 0.5
- ISS 350E Family Law and Social Work, 0.5
- PHIL 327B Philosophy of Law - Part 2, 0.5
- PLAN 402 Planning Law, 0.5
- P SCI 292 The Canadian Legal Process, 0.5
- P SCI 333 Administrative Law (in 1980/81 offered as P SCI 392), 0.5
Section 3
Students are required to complete successfully one year-course equivalent from the following courses:

- ACC 461 Taxation 1, 0.5
- ACC 462 Taxation 2, 0.5
- HIST 211 British History to 1603, 0.5
- HIST 212 British History Since 1603, 0.5
- PACS 202 Conflict Resolution, 0.5
- PHIL 215 Professional and Business Ethics, 0.5
- PHIL 226 Ethics & the Life Sciences, 0.5
- PHIL 329 War, Peace and Justice, 0.5
- P SCI 225 History of Political Theory I, 0.5
- P SCI 260A Canadian Government & Politics, 0.5
- SOC 222 Juvenile Delinquency, 0.5
- SOC 223 Deviance: Perspectives & Processes, 0.5
- SOC 329 Crime as Business, 0.5

Total credits in Section 3: 1.0.

Interdisciplinary Options
Management Studies
Middle East Studies

Required Courses
1. All of the courses listed below:
   - ECON 101
   - M SCI 211 or PSYCH 333
   - ACC 121 and 131
   - CS course compatible with Major program
   - BUS 352 (WLU)
   - ENGL 210 or SCI 209
   - Statistics course compatible with Major program

2. Three of the courses listed below, but only one in each category:

- Categories: Accounting, Economics, Management, Computers, Organizational Behaviour, Decision Making, Personnel, Psychology, Sociology
- Courses: ACC 122, ECON 102, ACC 132, An additional CS course, M SCI 311 or PSYCH 339, PHIL 216 or M SCI 452, PAS 200, PSYCH 253, 254, SOC 242, 243, 310, 336, 340, 342

Only two courses in the Major field may be counted for the Minor. This does not include Statistics.

An overall average of 70% in these courses is necessary to graduate with the Management Studies Minor.

More information on this program is available from the Course Director, E.S. Lucy, ext. 4551.

Middle East Studies

Director of Middle East Studies
Daniel J. Sahas, BA (Athens), STM (Indianapolis), PhD (Hartford)

(Participating Faculty members are listed in Chapter 16).

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.

This Middle East Studies Option provides, in an organized way, a listing of all 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 each Spring, 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 honors program.

2. Eight term courses are required for this option. They are to be distributed as follows:
   a) At least six term course equivalents from the approved list described below taken from at least three different disciplines.
   b) MES 200 Introduction to the Middle East
   c) MES 302 Directed Studies in the Middle East

Other courses, which are not listed below, may be acceptable under special circumstances. Students should consult with the Middle East Studies Director before preregistering to check whether a particular unlisted course is acceptable in the Middle East Studies Option.

3. To meet the graduation requirements a student must maintain a minimum of 65% average overall in the Option.

Required Middle East Studies Courses

MES 200 Introduction to the Middle East
MES 302 Directed Studies in the Middle East

Approved List of Middle East Studies Courses

CLAS 101 Colossus – the Major Figures of Ancient Greece
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 I
CLAS 302 Ancient Myth and Religion II
CLAS 371 Christianity and the Roman Empire
CLAS 373 The Fall of the Roman Empire
ENGL 202A The Bible and Literature 1
ENGL 202B The Bible and Literature 2
FINE 110 Introduction to World Art I
FINE 218 Western Religious Art
GEOG 220A The World Region
GEOG 220B The World Region and World Issues
HIST 210X History of Law
HIST 237 Ancient Civilization I
R S 100B Religions of the West
R S 100E Biblical Studies I
R S 100F Biblical Studies 2
R S 203 Wisdom Literature in the Old Testament
R S 205 The Hebrew Prophets
R S 206 Modern Study of Jesus
R S 208 Parables of Jesus
R S 209 The Apostle Paul: Life and Letters
R S 216 Islam
R S 217 Judaism
R S 310 The Sacred Book of Islam
R S 318 Islam and Christianity
R S 334 Islamic Theology, Philosophy and Mysticism

Middle East Content Courses

Note: The following courses have some Middle East content; however, they may NOT, at present, fulfill the requirements of the Middle East Studies Option. They are listed here as an additional resource for students interested in the Middle East.

ANTH 224 Prehistoric Archaeology: Old World II
ANTH 321 Recent Prehistory in the Old World
CLAS 255 Medieval Civilization I
CLAS 256 Medieval Civilization 2
GRK 100A Introductory Ancient Greek I
GRK 100B Introductory Ancient Greek II
GRK 231 Intermediate Greek
R S 106A New Testament Greek I
R S 106B New Testament Greek II
R S 261 Women and the Great Religions
R S 305A/B Intermediate New Testament Greek

Peace and Conflict Studies

(Participating Faculty members are listed in Chapter 16.)

Peace and Conflict Studies (PACS) is an interdisciplinary program of study which may be chosen by students in conjunction with a major in some other department or in a General non-major program. It provides a course of study for those who have a special interest in the causes and conditions of international, intergroup, or interpersonal conflict, and in approaches to conflict resolution or management. PACS is especially appropriate for those considering careers in conflict resolution occupations (e.g. social work, community development, public administration, law and corrections, education, or politics). The program is administered by Conrad Grebel College in co-operation with participating departments in the University of Waterloo. The participating departments presently include Environment and Resource Studies, History, Philosophy, Political Science, Psychology, Religious Studies, Social Development Studies, and Sociology.

Programs

There are three different programs open to students participating in PACS: 1) General Program Option, 2) Honours Option, and 3) Honours Minor. Successful completion of either of the first two permits the student to add the subtitle (Peace and Conflict Studies) to the name of the degree earned.
All students in the PACS program will take the PACS Core Courses (described in Chapter 16) as well as a specified number of "PACS Content Courses" (listed below). If students are in a major program they must fulfill all the requirements for the major in their own department.

1. The General Degree Option (Peace and Conflict Studies)
The General Degree Option in Peace and Conflict Studies is available to all students in the Faculties of Arts and Environmental Studies. In addition to fulfilling the major (normally including at least ten term courses in the major field) or non-major requirements, the general degree student must meet the following PACS requirements:

   a) PACS 201, 202, 301, and 302.
   b) any six PACS Content Courses (see below).

2. Honours Option (Peace and Conflict Studies)
Students may choose joint or honours in any of the participating departments. Students are granted, upon completion of the program, an Honours BA or BES in their subject areas with the subtitle Peace and Conflict Studies.

   In addition to fulfilling the degree requirements in the Major department, students must meet the following PACS requirements in their four-year period of study.

   a) PACS Core Courses 201, 202, 301, 302, 499 A/B. (The PACS 499 A/B requirement may be met by the successful completion of any Honours Research Course or its equivalent which fulfills the requirement for an Honours degree in a participating department, if the research is in an approved PACS-related field of inquiry.)
   b) six term courses chosen from among the PACS Content Courses offered by the student's department (eight term courses if joint honours in two participating departments). These courses may also be used to meet the department's honours requirements if approved as such by the department.
   c) three term courses chosen from among any of the PACS Content Courses. (Students should use their first year to take lower-level prerequisites for PACS Content Courses in those departments where they have special interests.)

3. Honours Minor in Peace and Conflict Studies
A Minor in PACS is available to students pursuing an Honours degree in any faculty (including non-Arts faculties). The Minor consists of ten term courses chosen from among the courses approved for PACS credit in any department, and must include PACS 201, 202, 301, and 302.

---

**Peace and Conflict Studies Content Courses Offered by Participating Departments**

The following PACS-related courses are offered by the participating departments and the PACS program under their own designations. Many of the 300- and 400-level courses have specific prerequisites. Students planning to pursue study in these upper level courses should use their electives wisely to ensure that the prerequisites for these courses are met. Additions or deletions may occur from time to time. Full course descriptions are found in Chapter 16.

Where a participating department has not designated a large enough number of courses to meet the requirements for the Honours Option in PACS, or where students find the list inadequate for their needs, students are encouraged to take the listed PACS Content Courses, and/or to petition the PACS Administration to have specific courses accepted as PACS Content Courses. This should happen before registration in the course in question is finalized. Please consult the undergraduate officer for more information.

**Environment and Resource Studies**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>ERS 231</td>
<td>Environmental Issues in Global Perspective</td>
</tr>
<tr>
<td>ERS 241</td>
<td>Introduction to Environmental and Social Impact Assessment</td>
</tr>
<tr>
<td>ERS 337</td>
<td>Environmental Impact Assessment</td>
</tr>
<tr>
<td>ERS 338</td>
<td>Social Impact Assessment</td>
</tr>
<tr>
<td>ERS 351</td>
<td>Current Issues in the Canadian North</td>
</tr>
<tr>
<td>ERS 400</td>
<td>Senior Honours Seminar</td>
</tr>
<tr>
<td>ENV S 401</td>
<td>Environmental Law</td>
</tr>
</tbody>
</table>

**History**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>HIST 102C</td>
<td>The Origins of Wars in the 20th Century</td>
</tr>
<tr>
<td>HIST 102D</td>
<td>From Nationalism to Totalitarianism</td>
</tr>
<tr>
<td>HIST 102K</td>
<td>Conflict in the Caribbean and Central America</td>
</tr>
<tr>
<td>HIST 208</td>
<td>The Cold War: American-Russian Relations Since November, 1917</td>
</tr>
<tr>
<td>HIST 217</td>
<td>Irish History: The Nineteenth and Twentieth Century</td>
</tr>
<tr>
<td>HIST 222</td>
<td>History of Modern Revolutions</td>
</tr>
<tr>
<td>HIST 230</td>
<td>Church and Revolution in Modern Latin America</td>
</tr>
<tr>
<td>HIST 232</td>
<td>Revolutions in Latin America</td>
</tr>
<tr>
<td>HIST 348</td>
<td>Radical Reformation</td>
</tr>
</tbody>
</table>
Interdisciplinary PACS
PACS 230 The Politics of Nonviolence
PACS 250 The Nuclear Crisis
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 327B Philosophy of Law 2
PHIL 329 War, Peace, and Justice
PHIL 422 Political Philosophy 1
PHIL 423 Political Philosophy 2

Political Science
P SCI 101A Introduction to Politics
P SCI 102F Politics in the Third World
P SCI 102K Mass Political Violence
P SCI 102N The Politics of Nationalism and Ethnicity
P SCI 225 Political Theory 1
P SCI 226 Political Theory 2
P SCI 281 International Politics 1
P SCI 282 Foreign Policy
P SCI 321 Marxist Theory
P SCI 322 Marxism after Marx
P SCI 350A The Politics of Developing Areas 1
P SCI 350B The Politics of Developing Areas 2
P SCI 380A World Politics 1
P SCI 380B World Politics 2
P SCI 479 Violence in the Political Process
P SCI 481 Research Seminar on World Politics
P SCI 483 Power Politics and World Order Studies
P SCI 484 Contemporary Strategies: Theories and Policies

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 274 Religious Approaches to Personal Crises
RS 353 The Bible and Peace
RS 354 War and Peace in Christian Theology

Interdisciplinary Options
Peace and Conflict Studies
Personnel and Administrative Studies

Social Development Studies
PSYCH 221R Interpersonal Interaction
SOC 221R Master Trends in Modern Society
SOC 327R Minority Status in Canadian Society
SOC 328R Canadian Ethnic and Cultural Minorities
SOCWK 355R Child Maltreatment: Identification and Treatment
SOCWK 357R Family Violence
SOCWK 390 A/B Family Violence: Advanced Seminar

Sociology
SOC 214 Class, Status and Power
SOC 222 Juvenile Delinquency
SOC 236 Social Movements
SOC 255 Third World Development
SOC 256 Ethnic and Racial Relations
SOC 265 Political Sociology
SOC 326 Issues in Third-World Development
SOC 342 Sociology of Industrial Relations
SOC 354 Social Change
SOC 370 Sociology of Law

Recommended PACS-Related Courses
The courses below, offered by non-participating departments, are recommended as of special interest to PACS students.
SY DE 433 Conflict Analysis

Personnel and Administrative Studies
Personnel and Administrative Studies (PAS) is a Minor program that can be taken in conjunction with many existing Honours Majors. The program is designed to provide a broad interdisciplinary 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 administrative 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 toward their personal career development through pursuing a Personnel and Administrative Studies course. The PAS Minor may be combined with a co-operative program in order to obtain work experience in this field.

The program of study consists of 12 half-course credits that may be completed at any point in the four-year term, plus a course in statistics. Many honours programs require a statistics course, and these are acceptable.

An overall average of 70% in these courses is necessary to graduate with the Personnel and Administrative Minor.
The courses required for the PAS Minor encompass several central themes. First, analytical techniques are stressed. These “functional” tools have become increasingly important in administrative and business settings. Second, there is a strong emphasis on human resources. This focus is provided by courses in Political Science, Psychology, Management Science and Sociology. The third content area is concerned with the application of economic theory to the administrative role. Finally, there are two “core” courses in Personnel Administration. Students are encouraged to enrol in these courses in their second and third years of study. The two courses have a practical orientation and provide an integrative perspective on the topic area.

Program

A. Analytical Techniques
- Computer Science: CS 100 or 102.
- Statistics: MTHEL 102 or equivalent course within the student’s Honours program.
- Accounting: ACC 121.

B. Human Resources
- Public Administration: P SCI 331, 332
- Personnel and Industrial Psychology: PSYCH 333 and PSYCH 339 or PSYCH 333 and M SCI 211
- Industrial Sociology: SOC 242 or M SCI 311.

C. Economic Factors
- Microeconomics: ECON 101
- Management: ACC 131, 132.

D. PAS Core Courses
- Personnel Administration: PAS 200
- Issues in Personnel Administration: PAS 300

More information on this program is available from the Course Director, E.S. Lucy, ext. 4551.

Interdisciplinary Options
Society, Technology and Values

The Option comprises six courses. Three of these are core courses required of all students enrolled in the Option. The other three are chosen from a list of course offerings grouped in Theme Packages. Normally, students choose these offerings from one Package, but they may, with consent of the STV Option Co-ordinator, select from more than one. Theme Package courses are usually taken after STV 100.

Requirements
Three core courses:
- STV 100 Society, Technology and Values: Introduction
- STV 200 Society, Technology and Values: Projects
- STV 400 Society, Technology and Values: Senior Project

Three Theme Package courses

Theme Package Areas
Currently identified Theme Areas are listed below. Others may be possible.
- Values and Ethics
- Issues in War and Peace
- History and Future of Technology
- Impact Assessment Studies
- Economic and Management Issues
- Technology and Artistic Expression

The STV Program Board approves the Theme Package courses on the recommendation of the Option Co-ordinator. The courses are selected in consultation with the course instructors and with students registered for the Option. This ensures that the selected courses are offered when required, and that the program remains responsive to students’ personal needs and interests.

Sample Theme Package
If a Values and Ethics Package is chosen, three courses would be selected from the following:

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>GEN E 351</td>
<td>Information Technology and Society</td>
</tr>
<tr>
<td>GEN E 412</td>
<td>Ethics and the Engineering Profession</td>
</tr>
<tr>
<td>ERS 365</td>
<td>Technology/Lifestyles for a Conserver Society</td>
</tr>
<tr>
<td>PHIL 207</td>
<td>Science, Technology and Society</td>
</tr>
<tr>
<td>PHIL 215</td>
<td>Professional and Business Ethics</td>
</tr>
<tr>
<td>PHIL 224</td>
<td>Humankind and Nature</td>
</tr>
<tr>
<td>R S 260</td>
<td>Issues in Science, Technology and Religion</td>
</tr>
<tr>
<td>W S 380</td>
<td>Women, Science and Society</td>
</tr>
<tr>
<td>SCI 263</td>
<td>Science and Society</td>
</tr>
<tr>
<td>SOC 232</td>
<td>Technology and Social Change</td>
</tr>
</tbody>
</table>

For More Information
Eric Higgs, Option Co-ordinator
Centre for Society, Technology and Values
PAS 2061, ext. 6215
Program Board
R.D. Legge, Director
R.K. Banks, Dean of Arts
J.H. Bater, Dean of Environmental Studies
R.G. Marteniuk, Dean of Human Kinetics and Leisure Studies
G.F. Atkinson, Science (Chemistry)
R. Cohen, Mathematics (Computer Science)
R.B. Gibson, Environmental Studies (Environment and Resource Studies)
J.W. Hepburn, Science (Chemistry)
S.C. Lerner, Environmental Studies (Environment and Resource Studies)
J.A. Schey, Engineering (Mechanical Engineering)
J.A. Thomson, Human Kinetics and Leisure Studies (Kinesiology)
G.K. Warriner, Arts (Sociology)
B.L. Wills, Engineering (Systems Design Engineering)

Studies in Personality and Religion (SIPAR)

Chairman & Director of the Program
R.D. Legge, BA (Transylvania), STB (Harvard), PhD (McMaster)

Members of the SIPAR Advisory Committee

Professors
H.J. Fallding, BA, BSc, MA (Sydney), PhD (Australian National), FRCS
J.R. Horne, BA, MA (Western Ontario), BTh (Huron) PhD (Columbia)

Associate Professors
D.M. Amoroso, BA, MA (Toronto), PhD (Waterloo)
A.L. Evans, BA (Toronto), BD (Emmanuel), STM (McGill), DMin (Andover-Newton)
F.C. Gérard, MA (College St. Dominique, France), BD, STM (McGill), PhD (Hartford Seminar Foundation)

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 departments in the University of Waterloo – Philosophy, Psychology, Religious Studies and Sociology.

Interdisciplinary Options
Studies in Personality and Religion

The Core Course Curriculum
The core courses provide an introduction to the field of Studies in Personality and Religion. These courses give the student 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 (ARTS 202P) provides an historical survey of theories on the relationship between personality and religion:

Psychology of Religion (R S 270) examines the variety of religious experience from a psychological point of view; Personality and Religion (R S 271) examines personality theory and its relationship to religious development and growth: Seminar on Selected Topics in Personality and Religion (ARTS 302P) 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 different options open to students participating in the SIPAR program. The first is open to students in a General program; the second, to students in an Honours program only.

1. General Program
A SIPAR Option may be earned by students in a General program majoring in one of the sponsoring disciplines. Courses are to include ARTS 202P, R S 270 and R S 271 plus three other SIPAR designated courses outside of the major field. The subtitle “Studies in Personality and Religion” would be designated on the degree. In every case, students must fulfill all the requirements for the Major in their own departments.

2. Honours Minor in Personality and Religion
A Minor in SIPAR is available to students pursuing an Honours degree in any faculty (including non-Arts faculties). This Minor 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, ARTS 202P, R S 270, R S 271, ARTS 302P.

Note:
Each of the participating departments has designated certain course offerings as Studies in Personality and Religion content courses. Many of the 300- and 400-level courses have specific prerequisites. Students planning to pursue studies in these upper-level courses should use their elective courses wisely to ensure that the prerequisites for these courses are met.
Core Courses
ARTS 202P 0.5
Psychology of Religion in Historical Perspective
R S 270 0.5
Psychology of Religion
R S 271 0.5
Personality and Religion
ARTS 302P 0.5
Seminar on Selected Topics in Personality and Religion

Courses Selected from Participating Departments
A further understanding of this subject may be developed through the study of selected courses offered by participating departments, which will either broaden the student's comprehension of the field or permit a deeper understanding of some particular aspect of Studies in Personality and Religion.

The actual combination of courses selected by a student is subject to the approval of the SIPAR advisor.

Religious Studies
R S 274 Religious Approaches to Personal Crisis, 0.5
R S 275 Religion and Psychotherapy, 0.5
R S 370 Dreams in Religious Experience, 0.5
R S 371 Religion and Suicidal Behaviour, 0.5

Psychology
PSYCH 101 Introductory Psychology, 0.5
PSYCH 211 Developmental Psychology, 0.5
PSYCH 214 Psychology of Adolescence, 0.5
PSYCH 231 Psychology of Religious Experience, 0.5
PSYCH 254 Interpersonal Relations, 0.5
PSYCH 258 Principles and Evolution of Psychoanalytic Thought, 0.5
PSYCH 334 Theories in Counselling Psychology, 0.5
PSYCH 355 Personality Theory, 0.5
PSYCH 357 Psychopathology, 0.5

Philosophy
PHIL 102C Philosophy of Life, 0.5
PHIL 201 Love, 0.5
PHIL 236 Magic, Mysticism, and the Occult
PHIL 237 Introduction to Philosophy of Religion, 0.5
PHIL 470 Phenomenology, 0.5

Interdisciplinary Options
Studies in Personality and Religion
Studies in Sexuality, Marriage, and the Family

Sociology
SOC 101 Introduction to Sociology, 0.5
SOC 102 Social Problems, 0.5
SOC 107 Social Structure and Character, 0.5
SOC 204 Sociology of Adolescence, 0.5
SOC 206 Gender Roles, 0.5
SOC 209 Family Origin and Personal Identity, 0.5
SOC 233 Social Psychology of Beliefs and Attitudes, 0.5
SOC 234 Social Psychology and Everyday Life, 0.5
SOC 247 Sociology of Death and Social Structure, 0.5
SOC 264 Sociology of Religion, 0.5

Social Development Studies
ISS 220R Changing Concepts of Childhood

Studies in Sexuality, Marriage, and the Family (SMF)

Director of Studies in Sexuality, Marriage, and the Family
Peter J. Naus, BA, PhD (Nijmegen)

Sexuality, marriage, and the family are crucial life areas; they figure prominently in each person's experience and they are frequently written and talked about. Many people find it difficult to develop a clear idea of these realities and to sort out their feelings about them. These are ample reasons for a careful and systematic study, within an academic context, of sexuality, marriage, and the family. The program in Sexuality, Marriage, and the Family (SMF program) at the University of St. Jerome's College, University of Waterloo, provides this system of study.

The SMF program should have broad appeal. It might be of interest to anyone with questions about sexuality, marriage, and the family, but is especially valuable for those whose anticipated career or current work situation, requires a sound understanding of these important aspects of the human condition. Specifically, the program would be an appropriate choice for persons who aim for a broad general education as well as for those who intend to pursue, or are currently involved in, a career in the areas of health, social service, counselling or teaching.

The SMF program is an interdisciplinary program offered within the Faculty of Arts at the University of Waterloo, but administered by the University of St. Jerome's College which is federated with the University of Waterloo.
The program may be chosen as an Honours Option, as a Minor, or as a General Option, in conjunction with a Major in an undergraduate discipline. 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:

a) SMF 201 A Introduction to Sexuality and Sex Education 1

and

SMF 202A Introduction to Marriage and the Family 1

b) SMF 201B Introduction to Sexuality and Sex Education 2

or

SMF 202B Introduction to Marriage and the Family 2
c) 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
d) SMF 303A Introduction to Marriage and Family Therapy 1
e) 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 General Option

The General Option in SMF is available to students pursuing a General degree in any undergraduate discipline or a Non-major Arts degree at UW. The requirements for the General Option are the same as those for the Minor program in Sexuality, Marriage, and the Family, except that the cumulative average in the five SMF courses must be at least 65%.

Upon completion of the requirements of the General degree in their home discipline (or of a Non-major Arts degree), and of those of the General Option in SMF, students are granted a Bachelor’s degree in their subject area with the subtitle: Studies in Sexuality, Marriage, and the Family.

The 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, who would like some specialization in this field of study. The requirements for the Minor consist of the successful completion of at least ten term courses chosen from the Approved List of Sexuality, Marriage, and the Family Courses. The ten term courses must include:

a) SMF 201A Introduction to Sexuality and Sex Education 1

and

SMF 202A Introduction to Marriage and the Family 1

b) SMF 201B Introduction to Sexuality and Sex Education 2

or

SMF 202B Introduction to Marriage and the Family 2
c) SMF 301A Advanced Study of Sexuality and Sex Education 1

or

SMF 302A Advanced Study of Marriage and the Family 1
d) SMF 303A Introduction to Marriage and Family Therapy 1

e) 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 obtained in these five SMF courses.

Upon completion of the requirements of the Honours degree in their home discipline, 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 Family.

The UW Diploma in Sexuality, Marriage, and the Family

This 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  Sex Roles in Anthropology
ENGL 108E  Images of Women in Literature
ENGL 208E  Women Writers of the 20th Century
HIST 202X  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
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
R S 236  Human Sexuality and Christian Morality
R S 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
W S 200  Introduction to Women’s Studies
W S 300  Seminar in Women’s Studies
SMF 201AB  Introduction to Sexuality and Sex Education 1 and 2
SMF 202AB  Introduction to Marriage and the Family 1 and 2
SMF 301AB  Advanced Study of Sexuality and Sex Education 1 and 2
SMF 302AB  Advanced Study of Marriage and the Family 1 and 2
SMF 303AB  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

Interdisciplinary Options
Women’s Studies

Interdisciplinary Options

Women’s Studies

Director of Women’s Studies
Lindsay Dorney, B.A. (Louisville), M.A. (Louisville)

In the last 15 years women have been the focus of major research projects, particularly in the humanities and social sciences. Questions on topics such as social expectations for women, medical, philosophical and religious assumptions of female capacities, women’s self-perception, women’s biological role and vocational place have been raised, and the many answers have been intensely debated.

Because this relatively recent focus in research has become such an important component of contemporary scholarship, the University of Waterloo and Wilfrid Laurier University co-operate in the staffing and teaching of courses in this field of study. Students may take courses at either university to fulfill requirements for the Option. However, if a course at one institution is substantially the same as that at the other, credit will be allowed for only one of the two courses. All such courses are identified by an asterisk in the following list.

Students will normally enter the program in their second year, although appropriate courses taken during Year One can be applied to the Women’s Studies Option. To register in the Option, simply indicate “Women’s Studies Option” on the registration form. Before preregistration each spring, students should consult with the Women’s Studies Director and with the Department involved to determine which courses will be available in the coming academic year.

Requirements

1. This Option may be taken in combination with any General or Honours program.
2. Ten term courses are required for this Option. They are to be distributed as follows:
   a) W S 200
   b) W S 300 (prerequisite: W S 200 or permission of the Director or Co-ordinator)
   c) At least three courses from the Core List of courses.
   d) At least five courses from the Approved List of Women’s Studies courses. When a department offers a special topics course which is relevant to the Women’s Studies program, it may be counted toward the Option. Students should consult the Director of Women’s Studies before preregistering to ascertain what special topics courses will be offered and to ensure that they are meeting the requirements for the Option.
   e) In exceptional cases a course from the Approved List may be substituted for a Core Course with the permission of the University of Waterloo-Wilfrid Laurier University Committee on Women’s Studies.
3. To meet the graduation requirements a student must have a minimum average of 65% in the ten courses in the Option.
**Women’s Studies Core Courses**

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>English 108E (UW) or</td>
<td>Women in Literature</td>
</tr>
<tr>
<td>English 225 (WLU)</td>
<td>The Woman Writer: Theory and Practice</td>
</tr>
<tr>
<td>History 248 (WLU)</td>
<td>History of the Sexes</td>
</tr>
<tr>
<td>Philosophy 202 (UW)</td>
<td>Philosophy of Women and Men</td>
</tr>
<tr>
<td>Psychology 235 (UW)</td>
<td>Scientific Perspectives on Gender &amp; Sex</td>
</tr>
<tr>
<td>Sociology 233 (WLU)</td>
<td>Sociology of Women</td>
</tr>
</tbody>
</table>

**Women’s Studies Approved Courses**

<table>
<thead>
<tr>
<th>University of Waterloo</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Anthropology 350</td>
<td>Sex Roles in Anthropology</td>
</tr>
<tr>
<td>Anthropology 404</td>
<td>Human Development in a Cross Cultural Perspective</td>
</tr>
<tr>
<td>Arts 250A/B**</td>
<td>Introduction Topics in Family Life Education: Marriage and the Family</td>
</tr>
<tr>
<td>Classical Studies 292*</td>
<td>Modern Issues in the Ancient World (= WLU Classics 218)</td>
</tr>
<tr>
<td>Economics 353</td>
<td>Population Economics</td>
</tr>
<tr>
<td>English 108E*</td>
<td>Women in Literature (= WLU English 225)</td>
</tr>
<tr>
<td>English 208E</td>
<td>Women Writers of the 20th Century</td>
</tr>
<tr>
<td>French 391</td>
<td>French Women Writers</td>
</tr>
<tr>
<td>Health Studies 220**</td>
<td>Health and the Family</td>
</tr>
<tr>
<td>History 202X</td>
<td>The Individual and the Family in History</td>
</tr>
<tr>
<td>History 215</td>
<td>The Proper Sphere: Canadian Women in Historical Perspective</td>
</tr>
<tr>
<td>History 241**</td>
<td>Society and the Sexes in Early Modern Europe</td>
</tr>
<tr>
<td>History 242**</td>
<td>Democracy for All: American Women in Historical Perspective</td>
</tr>
<tr>
<td>Interdisciplinary Social Science 350H**</td>
<td>Values and the Contemporary Family</td>
</tr>
<tr>
<td>Music 221**</td>
<td>Women and Music</td>
</tr>
<tr>
<td>Philosophy 201</td>
<td>Love</td>
</tr>
<tr>
<td>Philosophy 202</td>
<td>Philosophy of Women and Men</td>
</tr>
<tr>
<td>Philosophy 302</td>
<td>Modern Feminism</td>
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<tr>
<td>Political Science 476</td>
<td>Research Seminar in Political Behaviour</td>
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<tr>
<td>Psychology 235</td>
<td>Scientific Perspectives on Gender and Sex</td>
</tr>
<tr>
<td>Psychology 236</td>
<td>A Psychological Analysis of Human Sexuality</td>
</tr>
<tr>
<td>Religious Studies 236</td>
<td>Human Sexuality and Christian Morality</td>
</tr>
<tr>
<td>Religious Studies 261</td>
<td>Women and the Great Religions</td>
</tr>
<tr>
<td>Religious Studies 292A/B</td>
<td>Women and the Church</td>
</tr>
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</table>

**Interdisciplinary Options**

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
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<tbody>
<tr>
<td>Sociology 206*</td>
<td>Gender Roles (= WLU Soc 234)</td>
</tr>
<tr>
<td>Sociology 379**</td>
<td>Sociology of Women</td>
</tr>
<tr>
<td>Women’s Studies 365</td>
<td>Special Topics Course</td>
</tr>
</tbody>
</table>

**Special Topics Courses**

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
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<tbody>
<tr>
<td>Anthropology 404</td>
<td>Human Development in a Cross-Cultural Perspective</td>
</tr>
<tr>
<td>Women’s Studies 365</td>
<td>Special Topics</td>
</tr>
</tbody>
</table>

*(The above courses are described fully in Chapter 16.)*

**Wilfrid Laurier University**

<table>
<thead>
<tr>
<th>Course</th>
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<tbody>
<tr>
<td>Anthropology 317</td>
<td>Psychological Anthropology</td>
</tr>
<tr>
<td>Classics 205</td>
<td>Greek and Roman Mythology</td>
</tr>
<tr>
<td>Classics 218*</td>
<td>Women in Greece and Rome (equivalent to UW CLAS 292)</td>
</tr>
<tr>
<td>English 225*</td>
<td>The Woman Writer: Theory and Practice (equivalent to UW English 108E)</td>
</tr>
<tr>
<td>English 226</td>
<td>Women in Fiction</td>
</tr>
<tr>
<td>Fine Arts 301A</td>
<td>History of Art – Women in Art</td>
</tr>
<tr>
<td>Fine Arts 301E</td>
<td>History of Art – Women Artists</td>
</tr>
<tr>
<td>History 248</td>
<td>History of the Sexes up to the Industrial Revolution</td>
</tr>
<tr>
<td>History 249</td>
<td>History of the Sexes from the Industrial Revolution to the Present</td>
</tr>
<tr>
<td>Philosophy 249</td>
<td>Consciousness and Gender</td>
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<tr>
<td>Religion and Culture 103</td>
<td>Love and Its Myths</td>
</tr>
<tr>
<td>Religion and Culture 104</td>
<td>Evil and Its Symbols</td>
</tr>
<tr>
<td>Religion and Culture 346</td>
<td>Religion and the Crisis of Daily Life</td>
</tr>
<tr>
<td>Religion and Culture 348</td>
<td>Dynamic Psychology of Religion</td>
</tr>
<tr>
<td>Social Welfare 200</td>
<td>Canadian Social Welfare Programs</td>
</tr>
<tr>
<td>Sociology 201</td>
<td>Sociology of the Family</td>
</tr>
<tr>
<td>Sociology 206R</td>
<td>Contemporary Society: Comparative Canadian Family</td>
</tr>
<tr>
<td>Sociology 233</td>
<td>Sociology of Women</td>
</tr>
<tr>
<td>Sociology 234*</td>
<td>Sociology of Sex Roles (equivalent to UW Sociology 206)</td>
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</table>

**Special Topics**

To be announced

Courses with an * have an equivalent course at the other university and are not available for credit to students who already have credit for that course.
**Women's Studies Diploma**

The new Women's Studies Diploma Program is specially designed for students who want to explore women's issues but who are not necessarily seeking a university degree, or for those who already have a degree and wish to upgrade their understanding of the dynamics of gender in social institutions, the workplace, government policy, and cultural and normative values.

The Diploma offers an opportunity to study women's history, biology and psychology, education, socio-economic status, and political activity from a wide-ranging interdisciplinary perspective. Students may choose university-credit courses from sixteen subject areas.

The Women's Studies Diploma is especially relevant for those students interested in the health care, teaching, or counselling professions as well as in social work, or in the personnel and management fields.

**Requirements**

Ten term courses with a minimum average of 65%, arranged as follows:

- **W S 200**  
  Introduction to Women’s Studies
- **W S 300**  
  Seminar in Women’s Studies
- At least three Core WS courses
- At least five Approved WS courses

**Notes**

1. Students without a university degree must achieve an average of 65% in W S 200 and 300 to continue in the Program.
2. Students with a university degree may be admitted and registered as post-degree students. See Chapter 2 for details.

**Special Topics Courses**

Currently over 20 courses in ten subject areas comprise this list. Titles include Human Development in Cross-Cultural Perspective, Women in Greece and Rome, Women Artists, History of the Sexes from the Industrial Revolution to the Present, Love and its Myths, Canadian Social Welfare Programs, and Sociology of Women. Consult the Director before pre-registering.

**Other Women’s Studies Content Courses**

(These courses are not available for credit toward the Women’s Studies Option.)

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
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<tbody>
<tr>
<td>BIOL 447</td>
<td>History of Biology</td>
</tr>
<tr>
<td>CS 492</td>
<td>The Social Implications of Computing</td>
</tr>
<tr>
<td>DANCE 110</td>
<td>Introduction to the World of Dance</td>
</tr>
<tr>
<td>DANCE 233</td>
<td>A History of Modern Dance</td>
</tr>
<tr>
<td>ECON 351</td>
<td>Labour Economics</td>
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</table>

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
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<tbody>
<tr>
<td>ENGL 211</td>
<td>The Novel 1</td>
</tr>
<tr>
<td>ENGL 212</td>
<td>The Novel 2</td>
</tr>
<tr>
<td>ENGL 316</td>
<td>Canadian Drama</td>
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<td>ENGL 335</td>
<td>Creative Writing</td>
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<td>ERS 241</td>
<td>Social Change</td>
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<tr>
<td>FINE 255R</td>
<td>Film as Social Criticism</td>
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<tr>
<td>FINE 316</td>
<td>Canadian Native Art</td>
</tr>
<tr>
<td>FR 273</td>
<td>Aspects of Quebec</td>
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<tr>
<td>HIST 213X</td>
<td>Modern Western Popular Culture</td>
</tr>
<tr>
<td>HIST 252X</td>
<td>Europe in the Nineteenth Century</td>
</tr>
<tr>
<td>HIST 254X</td>
<td>Canadian History: The National Period</td>
</tr>
<tr>
<td>ITAL 396</td>
<td>Special Topics/ Directed Readings</td>
</tr>
<tr>
<td>P SCI 272</td>
<td>Political Behaviour 2</td>
</tr>
<tr>
<td>P SCI 344</td>
<td>The Politics of Local Government</td>
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<tr>
<td>P SCI 475</td>
<td>Political Socialization</td>
</tr>
<tr>
<td>PSYCH 214</td>
<td>Psychology of Adolescence</td>
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<td>PSYCH 253</td>
<td>Social Psychology</td>
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<tr>
<td>PSYCH 311</td>
<td>Behaviour and Development of Human Infants</td>
</tr>
<tr>
<td>PSYCH 316</td>
<td>Moral Development</td>
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<tr>
<td>PSYCH 370</td>
<td>Cross-Cultural Psychology</td>
</tr>
<tr>
<td>R S 256</td>
<td>Current Ethical Issues</td>
</tr>
<tr>
<td>SCI 252</td>
<td>Biology and Society</td>
</tr>
<tr>
<td>SOC 243</td>
<td>Occupational Sociology</td>
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</tbody>
</table>
Course Description Information

Each course description begins with a line of coding as shown in the sample below. The course numbers are prefixed by a course or subject abbreviation. The terms offered, number of hours per week, type of instruction and “credit weight” are displayed. For some courses, information concerning terms offered and type of instruction was not available at the time of publication.

Course description information in the Undergraduate Calendar is accurate as to intention at the time of publication. However, actual course content and the hours/type of instruction may vary somewhat from the listings in the Calendar. Furthermore, circumstances may warrant changes to the term(s) when courses are made available. To be assured of complete information for Preregistration, students must consult the University Course Offerings List for the appropriate term, and any other information distributed by their Department/Faculty, as well as the Calendar, before arranging their programs of study.

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

The Senate and Board of Governors of the University of Waterloo reserve the right to invoke changes in this Calendar without prior notice.

Sample Course Description

<table>
<thead>
<tr>
<th>Course</th>
<th>Term(s) Offered</th>
<th>Type of instruction and Number of hours/wk</th>
<th>Credit weight (See Note 1, below)</th>
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<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 — Review of basic probability. Generating functions Theory of recurrent events, Markov chains, Markov processes, and their applications.

Additional information about course requirements

Prereq: STAT 230

Terminology

Terms Offered

<table>
<thead>
<tr>
<th>Term</th>
<th>Description</th>
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<tbody>
<tr>
<td>F</td>
<td>Fall term</td>
</tr>
<tr>
<td>S</td>
<td>Spring term (See Note 2, below)</td>
</tr>
<tr>
<td>W</td>
<td>Winter term</td>
</tr>
<tr>
<td>J</td>
<td>Summer, first half, July</td>
</tr>
<tr>
<td>A</td>
<td>Summer, second half, August</td>
</tr>
<tr>
<td>M</td>
<td>Summer, both terms, July, August</td>
</tr>
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</table>

Type of Instruction

<table>
<thead>
<tr>
<th>Type</th>
<th>Description</th>
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<tr>
<td>C</td>
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<tr>
<td>L</td>
<td>Laboratory</td>
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<tr>
<td>T</td>
<td>Tutorial</td>
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<tr>
<td>S</td>
<td>Seminar</td>
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<tr>
<td>D</td>
<td>Discussion</td>
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<td>R</td>
<td>Reading course</td>
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<tr>
<td>wkshp</td>
<td>Workshop</td>
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<tr>
<td>std</td>
<td>Studio</td>
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<tr>
<td>fdlab</td>
<td>Field lab</td>
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<tr>
<td>P</td>
<td>Practicum</td>
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Additional Information

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<th>Description</th>
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<td>prereq</td>
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<tr>
<td>coreq</td>
<td>corequisite*</td>
</tr>
<tr>
<td>antireq</td>
<td>antirequisite*</td>
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</table>

*Refer to Glossary of Terms (page 6) for details.

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>
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<tbody>
<tr>
<td>Accounting</td>
<td>ACC</td>
<td>Interdisciplinary Social Science</td>
<td>ISS</td>
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<tr>
<td>Actuarial Science</td>
<td>ACTSC</td>
<td>Italian</td>
<td>ITAL</td>
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<tr>
<td>Anthropology</td>
<td>ANTH</td>
<td>Kinesiology</td>
<td>KIN</td>
</tr>
<tr>
<td>Applied Math</td>
<td>AM</td>
<td>Latin</td>
<td>LAT</td>
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<tr>
<td>Architecture</td>
<td>ARCH</td>
<td>Management Sciences</td>
<td>M SCI</td>
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<td>Arts</td>
<td>ARTS</td>
<td>Mathematics</td>
<td>MATH</td>
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<td>Biology</td>
<td>BIOL</td>
<td>Mathematics Elective</td>
<td>MTHEL</td>
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<td>Business</td>
<td>BUS</td>
<td>Mechanical Engineering</td>
<td>M E</td>
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<td>Canadian Studies</td>
<td>CDN ST</td>
<td>Middle East Studies</td>
<td>MES</td>
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<td>Chemical Engineering</td>
<td>CH E</td>
<td>Music</td>
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<tr>
<td>Chemistry</td>
<td>CHEM</td>
<td>Optometry</td>
<td>OPTOM</td>
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<tr>
<td>Civil Engineering</td>
<td>CIV E</td>
<td>Peace and Conflict Studies</td>
<td>PACS</td>
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<tr>
<td>Classical Studies</td>
<td>CLAS</td>
<td>Personnel and Administrative Studies</td>
<td>PAS</td>
</tr>
<tr>
<td>Combinatorics &amp; Optimization</td>
<td>C&amp;O</td>
<td>Philosophy</td>
<td>PHIL</td>
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<tr>
<td>Computer Science</td>
<td>CS</td>
<td>Physics</td>
<td>PHYS</td>
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<tr>
<td>Dance</td>
<td>DANCE</td>
<td>Planning, Urban and Regional</td>
<td>PLAN</td>
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<tr>
<td>Drama</td>
<td>DRAMA</td>
<td>Pure Math</td>
<td>PMATH</td>
</tr>
<tr>
<td>Dutch</td>
<td>DUTCH</td>
<td>Polish</td>
<td>POLISH</td>
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<td>Earth Sciences</td>
<td>EARTH</td>
<td>Political Science</td>
<td>P SCI</td>
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<td>Economics</td>
<td>EXON</td>
<td>Psychology</td>
<td>PSYCH</td>
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<tr>
<td>Electrical Engineering</td>
<td>EL E</td>
<td>Recreation and Leisure Studies</td>
<td>REC</td>
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<tr>
<td>English</td>
<td>ENGL</td>
<td>Religious Studies</td>
<td>R S</td>
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<td>Environment and Resource Studies</td>
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<td>Russian</td>
<td>RUSS</td>
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<td>Environmental Studies</td>
<td>ENV S</td>
<td>Science</td>
<td>SCI</td>
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<td>Fine Arts</td>
<td>FINE</td>
<td>Sexuality, Marriage and the Family</td>
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<tr>
<td>French</td>
<td>FR</td>
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<td>General Engineering</td>
<td>GEN E</td>
<td>Society, Technology and Values</td>
<td>STV</td>
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<td>GEOG</td>
<td>Sociology</td>
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<td>Geological Engineering</td>
<td>GEO E</td>
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<td>Gerontology</td>
<td>GERON</td>
<td>Systems Design Engineering</td>
<td>SY DE</td>
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<td>GRK</td>
<td>Ukrainian</td>
<td>UKRAN</td>
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<td>Health Studies</td>
<td>HLTH</td>
<td>Women's Studies</td>
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<tr>
<td>History</td>
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</tbody>
</table>
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R.P. Bish, CA
A.H. Headlam, MBA (Wilfrid Laurier), FCA
P.A. Lubka, MBA (Wilfrid Laurier), CMA
L.M. Stilbowski, BA, MS (Kent State), PhD (Case Western), CPA

Faculty Members of Accounting holding cross appointments to:
1. Statistics
2. Management Sciences

Faculty Members holding cross appointments to Accounting from:
3. Economics
4. Statistics
5. Management Sciences

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Mr. J.C. Ballit, Retired
Mr. J.T. Black, Chairman, The Molson Companies Limited
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Mr. T.R. Turnbull, Chairman, Thorne Ernst & Whinney
Mr. W.R. Walker, Senior Partner, Peat, Marwick Mitchell & Co.
Mr. C.D. Weyman, Partner, Peat Marwick Mitchell & Co.

Course Descriptions

Introductory Notes

1. Honours Accountancy Studies courses are restricted to students who require those courses as part of their undergraduate program. If space permits, students in good standing in other Honours programs may be admitted, subject to prereq uisite 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. The minimum grade required to satisfy a prerequisite for Honours Accountancy Studies courses is C-

4. 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.
5. Students may not take both ACC 101 and ACC 121 or ACC 281 and ACC 122 for credit.

6. 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. The C- requirement indicated in Note 3, above, does not apply to these courses.

ACC 101 F 3C, 1T 0.5
Introductory Accounting 1
An introduction to the principles and practices underlying the historical-cost income determination model. Restricted to students required by their program to take ACC 101. Students with no prior background in accounting should register in ACC 101, Division Suffix C.

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.

ACC 122 W,S 3C, 1T 0.5
Understanding and Using Managerial Accounting Information
This course is designed for non-accounting majors. The use of accounting information to assist in planning, control and managerial decision-making will be examined.
Prereq: ACC 121

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 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.

ACC 281 F,S 3C 0.5
Introductory Managerial Accounting
An introduction to the principles and practices of managerial accounting.
Prereq: ACC 101 and second-year standing

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: ACC 281

ACC 351 F,W 3C 0.5
Auditing 1
An examination of the auditing process, including elements of effective control structures, concepts of evidence, ethical conduct, legal and statutory requirements and elements of audit strategy.
Prereq: ACC 291

ACC 371 F,W,S 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: ECON 221 and ACC 281 or permission of School of Accountancy

ACC 372 F,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

ACC 381 F,W,S 3C 0.5
Managerial Accounting 1
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: ACC 291 and a course in Statistics

ACC 382 W,S 3C 0.5
Managerial Accounting 2
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
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 F 3C 0.5
Accounting Theory
A review of accounting theory as a background for applying underlying concepts to current accounting problems. Emphasis is on current literature, with a major term paper required.
Prereq: ACC 392 and 371

ACC 415/419 0.5
Special Topics
Admission by consent of instructor.

ACC 432 W 0.5
Communicating Accounting Information for Decision Making
The first half 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.
This course is part of an integrated, professionally accredited sequence of courses open only to students by permission of the School of Accountancy.

ACC 441 S 3C 0.5
Accounting Information Systems
Investigates the concepts and principles of management information systems. Concentration is on the role of accounting information in the planning/decision-making process and the design and implementation of accounting information systems.
Prereq: CS 100 or equivalent, and ACC 381

ACC 443 W 3C 0.5
Creative Thinking, Problem Solving and Decision Making 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: CS 100 or equivalent
This course is part of an integrated, professionally accredited sequence of courses open only to students by permission of the School of Accountancy.
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.
This course is part of an integrated, professionally accredited sequence of courses open only to students by permission of the School of Accountancy.

ACC 453 W 3C 0.5
Control and Audit of Computer-Based Systems
An examination of the weaknesses in computer-based systems and compensating controls and their effect on the auditor’s study and evaluation of internal control, and the utilization of computer-assisted audit techniques.
Prereq: ACC 441

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 351 and fourth-year students in an Honours accounting program

ACC 461 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 392

ACC 462 F 3C 0.5
Taxation 2
A continuation of ACC 461.
Prereq: ACC 461

ACC 463 F 3C 0.5
Taxation 3
A course which integrates the topics covered in ACC 461 and 462 for individual and corporate tax planning through a study of trusts, partnerships, corporate reorganizations and estate planning.
Prereq: ACC 462
This course is part of an integrated, professionally accredited sequence of courses open only to students by permission of School of Accountancy.

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 491 W 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 Descriptions

Courses not offered in the current academic year are listed at the end of this section.

ANTH 101 F,W 3C 0.5
Human and Cultural Evolution
An overview of Physical Anthropology and Archaeology. Lectures on living and fossil primates, the fossil evidence for the origins and development of man, modern races, and archaeological evidence for the origins and development of culture.

ANTH 102A F,W 3C 0.5
Introduction to Social and Cultural Anthropology
The dynamic nature of socio-cultural systems is examined. Topics include language, technology, social organization, economics, politics, and religion. Data are drawn from a broad ethnographic base, including both "primitive" cultures and modern, developed societies.

A student may not take both ANTH 102A and ANTH 102B for credit.

ANTH 102B F 3C 0.5
Anthropology Through Science
Fiction
Basic anthropological concepts, such as biological and cultural evolution, culture, human adaptability, and culture contact will be explored through examples from science fiction and related anthropological studies.

ANTH 103 F 3C 0.5
The Nature of Language
A general introduction to the scientific study of language. Lectures on the nature of human language as compared with animal communication, some of the basic methods of historical and descriptive linguistics, and the importance of language in culture and society.

ANTH 201 F 3C,1L 0.5
Principles of Archaeology
An introduction to the working assumptions, analytic approaches, and integrative and descriptive methods of archaeological anthropology.

ANTH 202 W 3C 0.5
Principles of Social Organization
An introduction to basic concepts used by social anthropologists for the analysis of social, economic, political and ideological systems.
Prereq: ANTH 102A or ANTH 102B or permission of the instructor
ANTH 203 F 3 C 0.5
North American Prehistory
This is a general introduction to North American Archaeology. The traditional cultural ecological approach is used.

ANTH 222 W 3 C 0.5
Prehistoric Cultures of the Great Lakes Area - A Survey
A general survey of the archaeological evidence of prehistoric man in the Great Lakes area from his arrival ca. 11,000 years ago to the coming of the Europeans. Cultural ecology and cultural evolution will be stressed.
Honours Anthropology students should take ANTH 322.

ANTH 224 W 3 C 0.5
Archaeology and Growth of Cultural Complexity
Archaeological approaches to cultural complexity are examined, using New and Old World examples. Topics considered may include: agricultural origins, megaliths, chiefdoms, states, and the emergence of cities, and early civilizations. Regional emphasis may vary.

ANTH 230 W 3 C 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 3 C 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 analysed and compared, as will the contemporary problems these communities face.
Prereq: Second-year standing

ANTH 241 F 3 C 0.5
The Contemporary Canadian Indian Scene
An analysis of present-day Canadian Indian politics, economics, social organization, and education. The emergence of pan-Indianism and large-scale Indian organizations will be examined as responses to the Federal Government’s policy of withdrawing and decentralizing administrative services for native people.

ANTH 260 F 3 C 1L 0.5
Human Evolution
Data, methods, and theory in the study of the origin and evolution of humans are surveyed. Topics will include osteology, growth and development, the fossil record, and genetics.
Prereq: ANTH 101 or permission of the instructor

ANTH 300 F 3 C 0.5
Design of Anthropological Inquiry
This course systematically examines research design and methodology in anthropology.
Prereq: ANTH 202

ANTH 311 F 3 C 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 321 W 3 C 0.5
Studies in Archaeology of Complex Cultures
Cultural development from the agricultural revolution to the rise of literate. Special attention to the development of agriculture as a means of subsistence and to the rise of early civilizations. Areas and periods of emphasis will vary from year to year.
Prereq: ANTH 201 or permission of the instructor
Primarily for Honours Anthropology students.

ANTH 322 W 3 C 0.5
Prehistoric Cultures of the Great Lakes Area
An in depth study of the archaeological evidence of prehistoric man in the Great Lakes area from his arrival ca. 11,000 years ago to the coming of Europeans. Cultural ecology and cultural evolution will be stressed.
Prereq: ANTH 203 or consent of the instructor

ANTH 330 F 3 C 0.5
Cultural Ecology
An examination of the relationships among environment, technology, society, and culture. The increasing levels of complexity will be considered in the context of hunting and foraging bands, horticultural tribes and chiefdoms, pastoral tribes and agricultural peasantry.
Prereq: Full credit in Anthropology or consent of the instructor

ANTH 361 W 3 C 0.5
Comparative Policies on Native Minorities
A comparative survey of government policies on native minorities with emphasis on recent attempts to involve native groups in the policy-making processes. The course will compare policy approaches to Canadian Indians and Metis, Australian Aboriginals, New Zealand Maoris and Scandinavian Samis (Lapps).
Prereq: One of ANTH 102A or 102B, or PSY 101 or 102M, or SOC 101

ANTH 352 W 3 C 0.5
History of Anthropological Thought
An examination of the historical origins and development of culture theory. The major emphasis is on the period from the appearance of anthropology as a distinct discipline in the nineteenth century until the emergence of modern perspectives in the 1950s.
Prereq: ANTH 102A or 102B or permission 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 400 W 3 C 0.5
Special Topics in Anthropological Theory
Seminar on current topics in method and theory in Anthropology. Focus will vary from year to year.
Prereq: ANTH 201 or 202

ANTH 420 F 3 C 0.5
Social and Cultural Change
An analysis of contemporary thought on culture contact and cultural evolution. The concepts to be explored might include integration, assimilation, conflict, nativistic reactions, and general and specific evolution.
Prereq: One credit in socio-cultural anthropology
School of Architecture

Assistant Professor, Director
E.R. Haldenby, BES, BArch (Waterloo), Recipient of the Distinguished Teacher Award

Associate Professor, Associate Director
B.R. Hunt, AA Dip (London), RIBA, MRAIC

Associate Professor, Undergraduate Officer
R.M. Schuster, BS, MS (North Dakota State), PhD (Iowa State), PEng

Professors
L.A. Cummings, AB (Washington, AM (Missouri), PhD (Washington), Recipient of the OCUFA (Ontario) Teaching Award
R.H. Sims, AA Hons Dip (London), RIBA, MRAIC
F.H. Watts, AA Dip (London), MLA (Harvard), MRAIC

Associate Professors
A. Banerji, BArch (Carleton), MArch (North Dakota State)
M. Elmtt, National Diploma in Design (High Wycombe)
D.B. McIntyre, BArch (Toronto), MRAIC
L.W. Richards, BArch (Miami, D.), MArch (Yale), OAIA, MRAIC
F. Thompson, BArch, MArch (London), MRAIC
R. Wiljer, BA (Waterloo), MA (Ottawa)

Assistant Professors
T.M. Boake, BES, BArch (Waterloo), MArch (Toronto)
O. Dutta, BA (Punjab), BSc (London), MS (Wisconsin), PhD (Waterloo), PEng
D. McKay, BArch (Toronto)
R.J. van Pelt, Cand.Lit., Drs.Lit., D.Lit. (London)
L. Pignatti, BArch (Rome), MArch (Toronto)
T. Seebohm, BEng, MEng, PhD (McGill), MArch (Berkeley), OAIA, PEng
R. Siewka, Dip-Arch Assoc. Arch (Huddersfield), MArch & U Design (Washington), RIBA

Adjunct Faculty
R. Andinghetti, BES, BArch (Waterloo)
B. Bell, BES, BArch (Waterloo)
M. Ishii, BES, BArch (Waterloo)
R. Keenber, BFAED (Pratt), RCA
D. Merkels, BArch (Toronto)
V. Rynninger, BES, BArch (Waterloo)
B. Shim, BES, BArch (Waterloo)

J. Soules, BES, BArch (Waterloo)
P. Syme, BArch (Toronto)
P. Urban, AB (Merrimack), MA (Boston), BFA (Nova Scotia)

Guest Critics and Lecturers in the School of Architecture January 1 - November 30, 1987
Brian Amott
George Baird
Marc Baraness
Brian Boigon
Lawrence Cazale
Marc-Josee Chartier
David Clark
Andrew Clarke
David Cusiau
Donald Cruikshank
A.J. (Jack) Diamond
Adrian DiCastri
David Dits
Steven Dong
Andrew Fox
Sandra Franke
Adele Freedman
Cynthia Grant
Neil Harris
Odile Henaull
Peter Heywood
Tony Hiss
Spring Hurbut
David Jansen
Victor Jankinhas
Edward Jones
Michael Kirkland
Adam Kolodziej
Bruce Kwabara
Jarry Lang
Barney Lawrence
Andrew Levitt
Elliott Littman
John Macdonald
Breck McFarlane
Stephen McLaughlin
Mary Ann McKenna
Alison McKenzie
Lorna McNeur
David Miller
Tom Paine
John Patkau
Patricia Patkau
Sarah Pearce
Bruno Pfister
Steve Phillips
Rick Potrauff
Paul Reuber
Dagnar Richter
Tim Ritchie
Barry Sampson
Donald Schmidt
Tim Scott
Tony Scherman
Mark Sterling
Steven Teeple
Graeme Thompson
Sol Wassermuhl
Forrest Wilson
Morden Yolles
Faculty Members of Architecture holding cross and/or joint appointments to:
1 English
2 Civil Engineering

Course Descriptions
Courses not offered in the current academic year are listed at the end of this section.

COURSES FOR BACHELOR OF ENVIRONMENTAL STUDIES (PRE-PROFESSIONAL ARCHITECTURE)

ARCH 112 F 3C, 2L 0.5
Mathematics in Architecture
The application of mathematics to architecture through such studies as analytical and constructive geometry, trigonometry, algebra, differential and integral calculus, functions and matrices.

ARCH 142 F 4C, 2L 1.0
Iconography 1: Conventions
Selected schemes of order, such as fate, providence, natural law, the human will, as expressed in plays, poems and fiction from various ages; selected conventions in literature, cinema, and the visual arts; the development of one or two archetypal symbols in literature and the visual arts; directed to lead into more detailed studies of symbolic patterns in iconography 2.
Prereq: Consent of instructor

ARCH 143 W 4C, 2L 1.0
Iconography 2: A Survey of the Symbolic Nature of the Environment
A study centered on ancient life to irrigate the student into the stream of cultural history and the complex problems of what the artist is, the quality of the human existence, culture, environment, as well as the working of the icon form raw state of perceived image to its function as an expressive symbol in poetry, music, dance, architecture and other works of art; a study of modern work in comparison to an ancient achievement.
Prereq: ARCH 142

ARCH 163 W 1C, 2L 0.5
Statics and Structural Analysis
Fundamental concepts of mechanics and structures, as related to architectural design, study of loading conditions, forces, moments, systems of forces, conditions of equilibrium for two and three dimensional structures, centre of gravity of loads and areas, bar forces in trusses, simple frame analysis, friction, moment of inertia.
Prereq: ARCH 112

ARCH 171 F 3C 0.5
Theories and Technologies of Building
Introduction to applications of technology in the design and construction of buildings. Organized as a series of case studies concentrating on the last three centuries, it addresses, among other themes, the emergence of new structural methods and materials, the evolution of environmental control, the rationalization of building assembly, and the invention of the modern urban infrastructure.
Prereq: Consent of instructor

ARCH 172 W 2C, 2L 0.5
Building Construction I
An introduction to the fundamentals of building construction, in terms of materials, technical aspects of the making and design of buildings, basic building science and environmental concerns. Emphasis will be placed on soils, foundations, masonry construction and wood frame construction.
Prereq: Consent of instructor

ARCH 174/175 0.5 each
Experimental Courses
These courses offer a vehicle for introducing additional electives to the program on a short-term basis, and for developing future permanent courses.
Prereq: Consent of instructor

ARCH 192 F 1T, 1S, 144std 1.5
Design Fundamentals and Workshop Design Studio
Development of the means to appreciate art and science of building; introduction to a history of architecture; introduction to the study of theories of architecture; development of skills in graphic communication; introduction to a study of building structure, construction, and materials; promotion and encouragement of the theory and practice of design. Field trip (1 week).
Prereq: Architecture students only

ARCH 193 W 1T, 1S, 144std 1.5
Design Fundamentals and Studio
Reinforcement and development of the ARCH 192 program, but with emphasis upon the application of design method and practice to specific architectural problems.
Prereq: ARCH 192

ARCH 195 F 3C 0.5
Introduction to Architecture
The course provides an introduction to the discipline and profession of architecture, balancing investigations of contemporary theory and practice. The emphasis is on architecture as a building art, a social and communicative art and, most importantly, a fine art. In addition to the lectures there are visits to significant buildings.

ARCH 213 F, W 3C, 3std 0.5
Introduction to Architectural Computer Graphics
This course provides an introduction to the use of computer graphics in architectural design. The lectures cover both practical applications such as Computer Aided Design which are in use now by practicing architects and computer graphics applications which are still experimental. Hands-on exercises using three-dimensional modelling software form a major component of this course.
Prereq: CS 100, ARCH 192, 193 or consent of instructor

ARCH 224 S 2C, 2std 0.5
An Introduction to Landscape Design
An introduction to the design of landscape with emphasis upon the architectural attributes of plants and landscapes.
Prereq: ARCH 192, 193, 292 or consent of instructor

ARCH 244 F 2C, 2D 0.5
History of Gardens of Europe and Western Asia
The study of gardens as works of art reconciling man with his world. Gardens of Europe and Western Asia are studied as responses to specific human needs, the stress and aspirations of an age, and to the climate and landscape of the land in which they were created.
Prereq: Consent of instructor

ARCH 245 W 1S 1C, 2L 0.5
Survey of Contemporary Architecture
Beginning with the formative years of modern architecture, the course will analyse buildings and theories of representative architects and designers, documenting the development of architectural ideas in Europe and elsewhere.
Prereq: Consent of instructor
ARCH 246 F 4C,2L. 1.0
Foundations of Europe: Sense of Periods and Styles
Recognition of patterns of life and concepts of order and conduct, models of the universe and other, moving metaphors and myths by means of study of the thoughts, acts, art, architecture, technology, literature, music and town design of the West from the break-up of the Roman Empire until the Renaissance. Field trips to museums, concerts in Toronto, Detroit or Buffalo. 
Prereq: ARCH 143 or consent of instructor

ARCH 247 S 4C,2L. 1.0
Renaissance to Revolution: Sense of Periods and Styles
Analysis of the various styles emerging out of provincial and international Gothic, especially Italian use of classical models, the spread of this "renaissance" mode, leading to consideration of the Mannerist, the Baroque, the Rococo, the Neoclassical, investigation of the course of men's attitudes from humanism, nationalism, and Reformation through the Enlightenment until the French Revolution and Hume's deconstruction of Reason. Field trips to museums, concerts in Toronto, Quebec, Detroit or Buffalo; Stratford Festival. 
Prereq: ARCH 246 or consent of instructor

ARCH 252 F W,S. 0.5
Creative Problem Solving
Development of creative skills through group behaviour in problem solving sessions by: developing a clear understanding of each participant's own creative thought processes; increasing his/her ability to consciously and deliberately make use of his/her own creative potential; engendering an awareness of the capacity to use himself/herself and the people he/she works with to produce better solutions to the problems identified by the group. 
Prereq: Consent of instructor

ARCH 262 F 2C,2L. 0.5
Strength of Materials
Concept of simple stress and strain; statically indeterminate axially loaded members; thermal stresses, torsion, shear and bending moments in simple beam; shear and moment diagrams, qualitative deflected shapes, flexural and shearing 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 II
The study of more advanced aspects of building construction dealing with the design and technological aspects of building structure: reinforced concrete, precast concrete, and steel framing; building envelope: cladding principles, window walls, roofing and glazing; and interior finish selection and interface with mechanical and electrical systems. 
Prereq: ARCH 172 or consent of instructor

ARCH 274/275 0.5 each
Experimental Courses
These courses offer a vehicle for introducing additional electives to the program on a short-term basis, and for developing future permanent courses. 
Prereq: Consent of instructor

ARCH 276 S 2C,2L. 0.5
Timber: Design, Structure and Construction
Architectural case studies are used to examine conceptual development, structural design, building process and the selection of structural timber systems. Topics such as flexural, compression and truss members; connections; and plywood construction are studied using calculations, design aids, rules of thumb and the latest CSA design standards. 
Prereq: ARCH 252

ARCH 284/285 F,W 3C. 0.5 each
Architectural Research
This offers a student an opportunity for independent research into architectural problems not offered in the regular curriculum, guided exploration of specific architectural problem areas, of appropriate complexity to the particular term. 
Prereq: Approval of (in house) UGAC

ARCH 292 F 3C,11std 1.5
Design Concepts and Studio
To develop in each student the ability to design on a small, personal scale and explore design as a thinking process. Small space design exercises where the student is required to define and analyze a problem and generate an architectural solution. Solutions are refined through a series of evaluations. 
Prereq: ARCH 192, 193

ARCH 293 S 3C,11std 1.5
Design Concepts and Studio
Design involving problems of human perception and dimension in complex or large spaces, and to develop in each student the ability to generate solutions to architectural problems on a scale which involves "privacy and community". Emphasis is placed on programming, analysis and solution evaluation. Problems of construction, servicing, and siting will be further explored. Field trip to a major Urban Area (1 week). 
Prereq: ARCH 292

ARCH 313 W 3C,3std 0.5
Computer Aided Design
Use of Computer Aided Design (CAD) systems for the preparation of presentations and working drawings in building design. Lecture topics include the data structure of drawings and data, their storage, transmission and sharing between large and small compatible, networked CAD systems. Design theory as it pertains to CAD is also covered. 
Prereq: ARCH 213

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
Romanticism and 20th Century: Sense of Periods and Styles
Depiction of "modern" culture as one in which the notion of environmental order as the fulfillment of natural law is replaced by a notion of order as the creation of autonomous human will. 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 348A/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 precepts, 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 enroll 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 1  
The course focuses on the air and water systems of buildings and is aimed at developing knowledge and skills appropriate to architectural practice. Subjects covered include environmental parameters, heating and cooling loads, energy conservative 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 362 or consent of instructor

ARCH 373 F 2C,2L. 0.5  
Building Services II  
A study of services in buildings, covering electrical distribution, vertical transportation, lighting and acoustics. The course also addresses exterior applications, site planning and distinct services, and a survey of urban infrastructures.  
Coreq: ARCH 363 or consent of instructor

ARCH 374/375 0.5 each  
Experimental Courses  
These courses allow for additional electives to the program on a short term basis, and for developing future permanent courses.  
Prereq: Consent of instructor

ARCH 384/385 F.W. R. 0.5 each  
Architectural Research  
This offers a student an opportunity for independent research into architectural problems not offered in the regular curriculum. It allows guided exploration of a specific architectural problem area, of appropriate complexity to the particular term.  
Prereq: Approval of (in house) UGAC

ARCH 382 W 4C,17std 2.0  
Design Concepts and Studio  
Design of complex environments; the effect of legal and administrative controls on the design of process and form; the influence of mechanical, structural and industrial building components on design process and architectural form. Projects will involve co-ordination of the design task with other disciplines involved in such projects.  
Prereq: ARCH 263

ARCH 383 F 3C,18std 2.0  
Design Concepts and Studio  
The analysis and exploration of relationships between physical, social, political and economic systems that influence the physical environment; techniques for defining the patterns of interaction and predicting the influence on physical form involving other disciplines; projects to explore the techniques and design with others at the city or community scale.  
Prereq: ARCH 382

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; secondly, 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. It is 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 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 452 W.S. 2C. 0.5  
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: BES standing 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  F.W  3R  0.5 each

Architectural Research
This offers a student an opportunity for independent research into architectural problems not offered in the regular curriculum. It allows guided exploration of a specific architectural problem area, of appropriate complexity to the particular term.
Pre: Approval of (in house) UGAC

ARCH 492/493  F,W,S  3C,18std  2.0 each

Design Studio
The intent of these courses is to develop skills and gain experience in architectural design through the application of design and analysis techniques to complex building types. This is approached through a series of design/project exercises aimed at the exploration of generative factors in the definition of built form. Projects are related to existing contexts and respond to current concerns of architectural theory and practice. Both individual and group work are included. Fall term held in Rome or Waterloo.
Pre: ARCH 303 for 492 and 492 for 493

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.
Pre: ARCH 493

ARCH 555  S  2C  0.5

Architectural Practice: The Profession
Discussion of the legal and ethical aspects of architectural practice in Canada and in Ontario in particular, contracts, bonds and insurance, mechanics' liens, by-laws and regulations, architectural partnership. The legal background, client-architect relations, partial services, professional problems.
Pre: BES standing

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.
Pre: Consent of instructor

ARCH 594/595  W,S  3R  0.5 each

Architectural Research
This offers a student an opportunity for independent research into architectural problems not offered in the regular curriculum. It allows guided exploration of a specific architectural problem area, of appropriate complexity to the particular term.
Pre: 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.
Pre: ARCH 499 and consent of instructor
A letter grade for ARCH 592 will be submitted only after the completion of ARCH 593

COURSES NOT OFFERED 1988-89
ARCH 212 Computer Science Simulation
ARCH 223 Human Ecology: Social Behaviour as the Human/Physical Interface
ARCH 282 Preservation Practice-Background
ARCH 283 Preservation Practice-Technology and Technique
ARCH 347 The Roots of Civilization
ARCH 371 Designing and Building with Solar Energy
ARCH 455 Management and Estimating

Arts

Professor
P.H. Smith, Jr., BA (Harvard) PhD (Pennsylvania)

Course Descriptions

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 an interdisciplinary perspective in view.

2. Arts courses are elective courses in General and Honours programs and, except for ARTS 100, do not satisfy either the Group A or Group B requirements.

ARTS 100  F,W  3C  0.5

Introduction to the Humanities
A one-term multidisciplinary introduction to 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 through expert eyes. The sampling of fields will be helpful to the first-year student in choosing further work in the humanities, and to more senior students in relating familiar areas to new ones.
Pre: None
Counts toward the AI requirement.

ARTS 122  F  2C,1D  0.5

Quest for Meaning in the 20th Century
This course invites students to a quest for personal and corporate meaning in the context of a century in which traditional meaning definitions have been challenged by world wars, nuclear threat and rapidly shifting sexual, social, economic and religious values.
Offered by Conrad Grebel College.
ARTS 196  F.W  0.5
Introduction to Computer Technology
A general introduction to the fundamental ideas of computers. Topics treated will include the use of an interactive computing system, word processing, and the beginnings of program writing. The course will examine the history of computing, and will consider the social and economic impact of the use of computers. No previous knowledge of computing is assumed.

ARTS 202P  F  0.5
Psychology of Religion in Historical Perspective
A study of the Psychology of Religion in its historical perspective from the nineteenth century to the present day. Methods, techniques and practices of research that are applicable to the examination of religious experience will also be introduced.

ARTS 211/212  F,F,W  0.5/0.5
Computing Techniques in Language and Literature
An introduction to non-mathematical computer programming, with special emphasis on the manipulation of language data. The programming language used will be PL/1. ARTS 211 will concentrate on gaining skill in computer programming. ARTS 212 will stress file management, advanced text formatting and the use of system program utilities. Applications will include word indexes, text concordances, methods of computer-aided text comparison.

Prereq: ARTS 211 presupposes ARTS 198 or equivalent; 212 presupposes 211 or permission of the instructor

ARTS 225  W  0.5
Mennonite Authors and Artists
An examination of Mennonite cultural expression in literature (fiction, poetry, drama, children's literature) and the visual arts (especially painting and film) during the past century.

Offered by Conrad Grebel College.

ARTS 302P  W  0.5
Seminar on Selected Topics in Personality and Religion

ARTS 310A/B  F.W  0.5/0.5
The Relationship Between Society and the Individual
An interdisciplinary examination of the contributions the humanities and social sciences have made to our understanding of a basic intellectual problem: the relationship between society and the individual. Specifically, the course will provide an opportunity to discover how different disciplinary approaches can be combined to increase our insight into that relationship.

Prereq: Students in third year or above, or consent of instructor
Offered at St. Jerome's College.

COURSES NOT OFFERED 1988-89
ARTS 215 A/B Man in Crisis (Literary Views)
ARTS 300 Integrating Seminar

Department of Biology

Professor, Chairman of the Department
R.G.H. Downer, BSc, MSc (Queen's, Belfast), PhD (Western Ontario), DSc (Belfast), Recipient of the Distinguished Teacher Award

Associate Professor, Associate Chairman of the Department
S.M. Smith, BSc, MSc (McMaster), PhD (Manitoba) Recipient of the Distinguished Teacher Award

Professor, Associate Dean of Graduate Studies, Faculty of Science
W.B. Kendrick, BSc, PhD, DSc (Liverpool), FRSC

Professor, Associate Dean for Computing, Faculty of Science
C.I. Mayfield, BSc, PhD (Liverpool)

Associate Professors, Graduate Officers
N.C. Bols, BSc (Simon Fraser), MSc (British Columbia), PhD (Toronto)
B.R. Glick, BSc (City College of New York), MSc, PhD (Waterloo)

Associate Professors, Undergraduate Officers
D.G. Dixon, BSc (Sir George Williams), MSc (Concordia), PhD (Guelph)
P.E. Morrison, BSc, MSc (Western Ontario), PhD (McMaster)
C.A. Peterson, BSc, MSc (Alberta), PhD (California, Davis)

Assistant Professor, Undergraduate Officer
W.R. Hawthorn, BSc, MSc (McMaster), PhD (Western Ontario)

Professor Emeritus
H.B.N. Hyne, BSc, PhD, DSc (London), DSc (Waterloo), ARCS, FRSC

NSERC/Atelco Industry-University
Professors in Microbial Biotechnology
O.P. Ward, BSc, PhD (Dublin)

Professors
E.B. Dumbroff, BSc, MForestry, PhD (Georgia)
H.C. Duthe, BSc, PhD (Wales)
C.H. Fernando, BSc (Ceylon), DPhil (Oxford)
W.E. Innis, BSA, MSA (Toronto), PhD (Michigan State)
J.Knowl, BSc, MSc (Waterloo), PhD (Western Ontario)
J.K. Morton, BSc, PhD (Durham), DSc (Newcastle-upon-Tyne), FLS
J.J. Pastorinak, BA, MA (Toronto), PhD (Indiens)
G. Power, BSc (Durham), PhD (McGill)
J.C. Semple, BSc (Tufts), MA, PhD (Washington U, St. Louis)
J. Sivak, BSc (Montreal), MS (Indiana), PhD (Cornell), OD (Pennsylvania College of Optometry)
J.B. Theberge, BScA (Guelph), MSc (Toronto), PhD (British Columbia)
T. Viswanatha, BSc, PhD (Mysore), Recipient of the Distinguished Teacher Award

Associate Professors
R.D. Beauchamp, BA (McMaster), MA, PhD (Brown)
J.C. Carlson, BSc, MSc, PhD (Massachusetts)
A.M. Charles, BSc, MSc, PhD (Manitoba)
M. Globus, BSc, MSc (McGill), PhD (Toronto)
A.G. Kempton, BSA, MSA (Toronto), PhD (Michigan State)
J.R. Lepock, BSc, MS (West Virginia), PhD (Pennsylvania State)
W.D. Taylor, BSc, PhD (Toronto)
K. Zacharias, BSc (Madras), BA Honors (Oxford), MA, PhD (Princeton)

Assistant Professors
D.R. Barton, BA (Ohio Wesleyan), MSc (Akrkon), PhD (Waterloo)
M. Griffith, BA (Mount Holyoke), MFS (Yale), PhD (Minnesota)
J.J. Heikila, BSc, MSc, PhD (Toronto)
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)
Course Descriptions

Biology

R.E.H. Smith, BSc (Guelph), Ph.D (McGill)
S. Vothramany-Globus, BSc, MA, MSc
(Madras), PhD (Toronto)

Research Professor
N.R. Tomkur, BSc (Mysore), MSc
(Banaras), PhD (Waterloo)

Research Assistant Professor
T.J. Singh, BSc, PhD (Manitoba), NSERC
University Research Fellow

Adjoint Faculty
H.R.N. Eydt, BSc, MSc, PhD (McMaster)
A.D. Harrison, BSc, MSc, BEd, PhD
(Capetown)
P.V. Hodson, BSc (McGill), MSc (New
Brunswick), PhD (Guelph), Canada
Centre for Inland Waters
V.C. Nealis, BSc, MSc (Carleton), PhD
(British Columbia), Great Lakes
Forestry Centre
G.G. Stewart, BSc (Wales), PhD (Bath)
The Labatt Brewing Company, London
J.E. Thompson, BSc (Toronto), PhD
(Alberta), University of Guelph

Instructors
J.F. Brookfield, BA, BEd, BSc, MSc
(Dalhousie)
L. Fastnack, 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:

1Chemistry

Faculty Members holding cross appointments to Biology from:

2Physics

3Urban and Regional Planning

4Optometry

5Chemistry

6Chemical Engineering

Course Descriptions

BIOL 111 F 2C 0.5
Introductory Biology
An introduction to basic concepts in biology, including aspects of genetics, evolution and plant biology.
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.

BIOL 112 W 2C 0.5
Introductory Biology 2
An introduction to the basic principles of zoology and ecology with reference to man as a biological organism.
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.

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.
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 man; the development and 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.

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 comparative survey of the morphology and life histories of the different kinds of plants and fungi important to man and an introduction to their evolution.
Offered during the Spring term in odd-numbered years.

BIOL 222 F T 0.5
Non-Vascular Plants
An introductory course which will survey the evolution, morphology, ecology and importance to man of the fungi, algae, and Bryophytes.
By correspondence only for 1988-89.

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 233 W,S 2C.3L 0.5
Introductory Human Physiology
The physiology of the major organ systems including the nervous, muscular, circulatory, respiratory, urinary, digestive, endocrine and reproductive systems.
Antreq: SC 351-352
Offered during the Spring term in even-numbered years.

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
Bacterial and bacterial group microorganisms as agents of disease and the environment. The nature of ecosystems, ecological energetics, biogeochemical cycling, community ecology, introduction to population biology.

BIOL 239 W,S 2C.3L 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 295 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 239 W,S 2C.3L 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 295 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 F  fld lab 0.25
Field Course 1
A series of one-day field trips from campus, usually the first six Saturdays 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: A small charge to cover transportation costs. Minimum enrolment of 24 students required.

BIOL 301A/B F/W 2C,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 system, 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 311 W 2C,3L 0.5
Vertebrate Zoology
Major topics in vertebrate zoology as exemplified by both living and fossil members of the subphylum Chordata.
Prereq: BIOL 211

BIOL 315 W 2C,3L 0.5
Invertebrate Zoology
A survey of the major invertebrate phyla other than the arthropods, with emphasis on their functional anatomy, classification and ways of life.
Prereq: BIOL 210

BIOL 316 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 323 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 324 F 2C,3L 0.5
The Flowering Plants
A study of floral morphology in relation to classification and evolution. An introduction to taxonomy and nomenclature.
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 327 F 2S,3L 0.5
Myology 1
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 330 F,S 2C,3L 0.5
Molecular Biology
Molecular biological aspects of chromosome replication, expression of genetic information, functional translation of specific eukaryotic proteins, cell division, gamete formation, embryogenesis, hormone action, cellular interactions and cell differentiation.

BIOL 331 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

BIOL 333 W 2C,3L 0.5
Histology and Cytology
The structure of mammalian cells, tissues and organs interpreted in functional terms. Cell reproduction and differentiation, with some discussion of the embryological origin of tissues and the regulation of tissue growth. Light and electron microscopy techniques.
Prereq: BIOL 211 or 230 or 233

BIOL 335 W 2C,3L 0.5
Plant Physiology
A study of the principal physiological mechanisms that govern the water economy, mineral nutrition, transport processes and metabolism of plants.

BIOL 336 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 337 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 233 or permission of instructor

BIOL 338 W 2C,3L 0.5
Comparative Animal Physiology 2
A comparative study of the cardiovascular, nervous, muscular, respiratory and reproductive systems.
Prereq: BIOL 233

BIOL 342 F,S 2C,3L 0.5
Microbial Biotechnology
The role of microorganisms in biotechnology. Topics examined will include the isolation, selection, and development of microorganisms important in biotechnology, and specialized techniques for their cultivation and maintenance. Processes studied will include biomass conversions, fermentations, bioproduction of compounds, nitrogen fixation, treatment and utilization of wastes and mineral leaching.
Prereq: BIOL 240/241 or permission of instructor
It is recommended that this course be taken after completion of second year.

BIOL 344 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 350 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 356 W 2C, 1T 0.5
Population Ecology
The ecology of populations. Topics include demographic parameters and their estimation; population growth and regulation; competitive and predator-prey interactions; population genetics and evolution; applied population biology.
Prereq: BIOL 250 and STAT 222

BIOL 416 F 2C, 3L 0.5
Entomology
Introduction to morphology, systematics and biology of insects. 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 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. 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 426 W 2C, 3L 0.5
Phycolology
The taxonomy and ecology of freshwater and marine algae. Algal cytology, morphology, and life histories; biology of planktonic and attached algae; culturing of algae; experimental phycology; economic aspects of algae.
Prereq: BIOL 220 or 221

BIOL 427 W 2S, 3L 0.5
Mycology 2
The growth of mycological knowledge will be traced and current developments analyzed. Extensive literature surveys, active class participation, and a lab project, will be required.
Prereq: BIOL 327

BIOL 431 W 2C, 3L 0.5
Mammalian Reproductive Physiology
A study of the endocrine and reproductive systems of mammals. Major topics include methods of hormone assay, chemistry of the hormones, regulation of secretion, mechanisms of hormone action, neurosecretion, reproductive cycles, gametogenesis and fertilization.
Prereq: BIOL 230 recommended

BIOL 432 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 434 W 3C, S 0.5
Advanced Genetics
A detailed examination of the recent advances in molecular genetics with emphasis on the regulation of gene action in both prokaryotes and eukaryotes. Current research literature will be reviewed.

BIOL 435 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 organism differentiation stressing recent experimental methodology.

BIOL 438 W 3C, S 0.5
Advanced Molecular Biology
An examination of the current major issues in molecular biology with emphasis on the technical and conceptual advances. Current research literature will be reviewed.
Prereq: BIOL 330

BIOL 439 W 3C 0.5
Biochemistry of Natural Products
The chemistry, functions and distribution of natural products including alkaloids, isoprenoids, amines, phenolics, cytenic 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 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

BIOL 442 W 2C, 3L 0.5
Virology
The nature of viruses and their interaction with their plant, microbial and animal hosts.
Prereq: BIOL 240/241

BIOL 443 F 2C, 3L 0.5
Microorganisms of Industrial Importance
A study of the role of microorganisms in industrial processes of biosynthesis and degradation.
Prereq: BIOL 344

BIOL 444 W 2C, 3L 0.5
Microorganisms and Disease
A study of the microorganisms involved in pathogenesis, their mode of infection, symptoms and prevention.
Prereq: BIOL 240, 241, 441

BIOL 446 F 2C, 3L 0.5
Microbial Ecology
A study of the ecological roles of microorganisms. Examples from freshwater, terrestrial, marine and other ecosystems will be used to illustrate the activities and importance of microorganisms in these habitats.
Prereq: BIOL 240/241, or permission of instructor

BIOL 447 W 2C, 3L 0.5
Environmental Microbiology
A study of the environmental impact of microorganisms. Aspects of pollution, waste treatment, biodegradation of environmental contaminants, and nutrient cycling will be examined.
Prereq: BIOL 240/241, 446, or permission of instructor

BIOL 448 F 2C, 3L 0.5
Microbial Physiology 1
A study of the physiology of microorganisms including metabolic and synchronous growth, cell permeation, nutrition, physical and chemical environmental factors and metabolic mechanisms as elucidated by radioactively labelled 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 2C,3S 0.5
Marine Biology
An examination of coastal and offshore marine environments. Physical and chemical oceanography, plankton, benthos, and fish are discussed.
Prereq: BIOL 210; a marine field course
Antireq: SCI 453

BIOL 451 W 3C 0.5
Limnology
A study of the geomorphology, physical and chemical processes, and biology of lakes and streams. Ecology of zooplankton, zoobenthos, and fish are emphasized.
Prereq: BIOL 210, 250
Antireq: SCI 454

BIOL 452 F 2C,3S/Flab 0.5
Fisheries Biology
The practices of fisheries biology; life history; age and growth, fecundity, production, harvest and management of fisheries resources.

BIOL 455 F 2C,3L 0.5
Environmental Toxicology 2
Cellular, developmental and physiological effects of toxicants on multicellular organisms.
Prereq: BIOL 350

BIOL 456 W 2C,3Tlab/T 0.5
Population Ecology 2
The analysis of the structure and dynamics of plant and animal populations. Theoretical, mathematical and experimental approaches to the study of population ecology. Evolutionary processes in population biology.
Prereq: BIOL 356

BIOL 457 F 2C,3Tlab/T 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

BIOL 458 F 2C,3L 0.5
Ethology
The scientific study of the behaviour patterns of animals. The course will examine concepts, processes and methodologies developed (or studied) in the fields of animal behaviour, within an evolutionary framework.
Prereq: BIOL 250 and 233 or permission of instructor

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 473 W 3C/5 0.5
Biostatistics and Evolution
A study of the processes of evolution; the differentiation of populations and the origin of new forms of life.
Prereq: BIOL 238

BIOL 480 F 3C 0.5
Biotechnology 1
Genetic engineering entails the directed alteration of the hereditary apparatus of cells. How genetic material is manipulated (i.e., recombinant DNA technology) will be examined including the use of restriction endonucleases, cloning vehicles, transformation procedures, screening methods and expression of cloned genes.
Prereq: BIOL 330 and 342 or permission of instructor

BIOL 481 W 3C 0.5
Biotechnology 2
Biotechnology evolves the harnessing of biological processes for large-scale industrial applications. Topics examined will include industrial enzymology, and animal and plant cell culture.
Prereq: BIOL 330 and 342 or permission of instructor

BIOL 490 F/W 3C 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-$500

BIOL 491 F/W 5C 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: $100-$300

BIOL 492 F/W 5C 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 sirenians. Additional marine mammal fisheries will be dealt with in both lecture and laboratory work.

BIOL 498 F/W 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 S/F/W 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 1988-89
BIOL 310 Comparative Animal Physiology
BIOL 433 Stress Physiology and Aging in Plants
Canadian Studies

M.C. Kesik-Delfgaauw, BComm (Amsterdam), MA, PhD (Waterloo)
E. Kliman, MA, PhD (Waterloo)
R.P. Woolstencroft, BA, PhD (Alberta)

Lecturers
D.G. Draper, BA, MA, PhD, MLS (Western Ontario)
S.A. Jones, BA (Wilfrid Laurier), MA (Waterloo)
G. Loser, BA, MA (Ottawa), PhD (Paris)

Course Descriptions

Introductory Note
The core 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). These courses are given by members of the participating UW departments and by 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 201 F 2C,1S 0.5
Social Regionalism
Lecturers in Geography, Political Science, Sociology, Environment and Resource Studies, and History discuss the roles which economic disparities, social elites, federal/provincial relations and political parties play in defining Canadian regionalism. Particular attention is paid to Quebec's desire for separate status.

CDN ST 302 W 2C,1S 0.5
Cultural 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: 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 instructor

CDN ST 331 F,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. For example, francophones outside Quebec (tentative 1986-89).

CDN ST 400A/B T 0.5/0.5
Research Essay
An extensive senior research essay, supervised by a committee composed of faculty members from two or more of the participating departments, which deals with a specific aspect of Canada utilizing material and methods from several different disciplines.
A grade for CDN ST 400A is submitted only after the completion of CDN ST 400B.
Department of Chemical Engineering

Professor, Chairman of the Department
G.L. Rempe, BSc, PhD (British Columbia), FKC

Professor, Associate Chairman (Graduate Studies)
R.R. Hudgis, BASc, MASC (Toronto), MA, PhD (Princeton), PEng

Associate Professor, Associate Chairman (Undergraduate Studies)
C.E. Gall, BASc (Toronto), MSc (Queens), PhD (Minnesota), PEng

Associate Professors
L.E. Bodnar, BA, MA (Saskatchewan), PhD (McMaster)
P.L. Douglas, BASc, MASC, PhD (Waterloo), PEng
K. Enns, BASc, LLB, MASC, PhD (Toronto), PEng
J.D. Ford, BEng (McGill), MASC, PhD (Toronto), PEng
I.F. Macdonald, BEng (NSTC), PhD (Wisconsin)
G.S. Mueller, BASc (Waterloo), MSc, PhD (Manchester), PEng
F.T.T. Ng, BSc (Hong Kong), MSc, PhD (British Columbia)
J.M. Scharer, BSc, PhD (Pennsylvania)
G.R. Sullivan, BASc (Waterloo), DIC, PhD (London), PEng (DuPont-NSERC Associate Professor)

Assistant Professors
I. Chatzis, BASc, MASC, PhD (Waterloo) (DuPont-NSERC Assistant Professor)
D.A. Holden, BSc, LMus (McGill), MASC, PhD (Toronto), NSERC University Research Fellow
R.L. Legge, BSc, (Calgary), PhD (Waterloo), NSERC University Research Fellow
A. Perelis, Dipl. Eng (Thessaloniki), PhD (McMaster), PEng

Faculty Members of Chemical Engineering holding cross appointments to:
1) Chemistry
2) Management Sciences
3) Statistics
4) Biology

Faculty Members holding cross appointments to Chemical Engineering from:
5) Chemistry
6) Civil Engineering

Course Descriptions

Introductory Note
Prerequisite: For all courses in the Department of Chemical Engineering, registration in the Department or permission of the Associate Chairman (Undergraduate Studies) is a requirement.

CH E 100 F 3C, 1.0, 0.5 Chemical Engineering Concepts 1
An introduction to the basic methods and principles used by engineers in the analysis and design of physical processes: units, dimensions, and measurements; mass balances; behaviour of fluids. Laboratory on visual communication is included.

CH E 101 W,S 3C, 1.0, 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.

CH E 102 F 3C, 1.0, 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 F,W 3C, 1.0, 0.5 Transport Processes 1 (Equilibrium Stage Operations)
Equilibrium between phases; the equilibrium stage concept. Cascades of stages with and without reflux; group methods and stage-by-stage approaches; graphical solutions. Applications in the separation of components by distillation, absorption, stripping, extraction and leaching.
Prereq: CH E 100 and CH E 101
Formerly CH E 210

CH E 202 F,W 3C, 1.0, 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.
Formerly CH E 220

CH E 203 F,W 3C, 1.0, 0.5 Physical Chemistry 1
Prereq: CH E 101 and CH E 102
Alternate weeks
Formerly CH E 230
CH E 025 S,F 3C,2L 0.5
Transport Processes 2 (Fluid Mechanics)
Formerly CH E 213

CH E 026 S,F 3C,1T,3L 0.5
Physical Chemistry 2
Thermodynamics: ideal dilute solutions; equilibria in condensed phases and in non-ideal systems; activities and fugacities in non-ionic and ionic solutions. Surface phenomena: surface tension; capillarity; adsorption; electrical double layers; colloids. Transport properties: deductions of values of thermal conductivity, viscosity and diffusion coefficients from dynamic theory. Chemical kinetics: rate laws; mechanisms; catalysis; theory of reaction rates; heterogeneous reactions; photochemistry. Polymers: types; thermodynamics of solutions.
Prereq: CH E 023
Alternate weeks
Formerly CH E 231

CH E 030 W,S 3C,1T 0.5
Transport Processes 3 (Heat Transfer)
Prereq: CH E 021 and CH E 025
Formerly CH E 314

CH E 031 W,S 3C,1T 0.5
Process Flowsheeting
Process simulation and mathematical modelling of chemical engineering flowsheets involving process units. Design variables; process simulation architectures; flowsheet decomposition theories. Use of modern computer-aided process design packages such as CHEMSHARE and SPEEDUP.

CH E 032 W,S 3C,2L 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, biochemistry, bioenergetics. Elementary aspects of molecular biology, genetic engineering, biochemistry, microbiology.
Alternate weeks

CH E 033 W,S 3C,1T 0.5
Chemical Engineering Thermodynamics
Thermodynamics applied to practical situations. Examples to be chosen from such topics as: fluid flow; simultaneous generation of heat and power; refrigeration; air conditioning and water cooling; liquefaction of gases; equilibria in complex chemical reactions; separation process; surface phenomena; electrochemical reactions; plasma; global thermodynamics; biological processes; explosives; dust explosions.
Prereq: CH E 023 and CH E 026
Formerly CH E 330

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; aqueous solution thermodynamics. Inorganic materials: structure and properties of metals and alloys; ceramics; composites; semi-conductors. Selected topics in biology, polymers, metallurgy.
Alternate weeks
Formerly CH E 232

CH E 035 F,W 3C,1T 0.5
Transport Processes 4 (Mass Transfer)
Steady state and unsteady state mass transfer by molecular and turbulent motion. Heat-mass transfer analogies. Mass transfer models and applications: adsorption; extraction; desorption. Simultaneous heat and mass transfer in gas-liquid contacting and solids drying.
Prereq: CH E 030
Formerly CH E 317

CH E 036 F,W 3C 0.5
Chemical Reaction Engineering
Prereq: CH E 023 and CH E 026
Formerly CH E 331

CH E 037 F,W 3C 0.5
Applied Mathematics 2 (Advanced Mathematics in Chemical Engineering)
Prereq: MATH 216
Formerly CH E 320

CH E 038 F,W 3C,3L 0.5
Inorganic Process Principles 2
Prereq: CH E 034
Alternate weeks
Formerly CH E 332

CH E 040 S,F 1C,6L 0.5
Chemical Engineering Unit Operations Laboratory
Experiments involving physical and chemical principles using pilot scale equipment. Experiments illustrating major unit operations: distillation; absorption; reactors; extraction; drying; humidification; heat exchange.
Prereq: CH E 030
Formerly CH E 410

CH E 041 S,F 2C,1T,2L 0.5
Introduction to Process Control
Formerly CH E 321
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.
Formerly CH E 480.
Students enrolled in this course must take CH E 489 in 4B.

CH E 044  S.F. 3C  0.5
Economics for Chemical Engineering
Formerly CH E 362.

CH E 045  S.F. 2C,4T  0.5
Process Equipment Sizing and Selection
Introduction to practical methods of equipment specification critical in process design, to engineering methods and computations (including standard computer packages) for the selection and sizing of process equipment, to proper choice of materials and to equipment cost estimation. The topics include process piping systems, control valves, pressure vessels, heat exchangers and condensers including regenerators, tower contactors for one- and two-phase flow, agitated vessels, reactors, mixers etc. for two- and three-phase contacting, and special topics, as appropriate.
Prereq: CH E 035, CH E 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.
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.
Formerly CH E 581.

CH E 512  W 3C  0.5
Separation Processes
Computational approaches in the design of multiple component separation processes. Energy requirements. Capacity and efficiency of contacting devices: distillation; absorption; liquid-liquid extraction; filtration; molecular sieves; membranes; ion exchange.
Prereq: CH E 021, CH E 033 and CH E 035.
Formerly CH E 517.

CH E 514  W 3C  0.5
Fundamentals of Petroleum Production
Background for understanding the physical principles involved, and the terminology used, in petroleum production. Fundamentals of surface chemistry, capillarity, characterization of, and fluid flow through porous media. Principles of oil production performance, water flooding and enhanced oil recovery techniques.
Formerly CH E 502.

CH E 522  W 3C  0.5
Advanced Process Dynamics and Control
Prereq: CH E 041.
Formerly CH E 521.

CH E 524  W 1C,3L  0.5
Process Control Laboratory
Experiments on process dynamics, control and simulation of processes. Time constant; step and frequency response; controller tuning; multivariable control strategies. Implementation using simulation systems, mainframe computers control, microcomputers.
Prereq: CH E 037 and CH E 041.
Coreq: CH E 522.
Formerly CH E 523.

CH E 542  W 6C  1.0
Polymerization and Polymer Properties

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 and kinetic considerations. The extraction-refining-winning of industrially important metals: zinc, uranium, copper, nickel, gold, silver, aluminum and magnesium. Biometallurgy.
Prereq: CH E 033, CH E 034 and CH E 038.
Formerly CH E 551.

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 to be placed on the interplay between the underlying thermodynamics, kinetics and transport processes in these heterogeneous reactions, and on the associated process engineering considerations.
Formerly CH E 553.

CH E 562  W 3C  0.5
Fermentation Engineering
Application of process engineering principles to the design and operation of fermentation reactors which are widely used in the pharmaceutical, food, brewing and waste treatment industries. Aspects of mass transfer, heat transfer, mixing and rheology with biochemical and biological constraints.
Prereq: CH E 024.
Formerly CH E 561.

CH E 564  W 3C  0.5
Food Process Engineering
Applications of unsteady and steady state heat and/or mass transfer operations to processing natural and texturized foods. Design and analysis of sterilization, low temperature preservation, concentration, separation and purification processes. Effects of formulation, additives and processing on organoleptic and nutritional quality.
Prereq: CH E 032.
Formerly CH E 563.
Air Pollution Control

Treatement of gaseous waste products from representative Canadian industries. Characterization and toxicity of filtration, scrubbing, cycloning, electrostatic precipitation and other chemical treatments. Legal, sociopolitical, economic and engineering aspects.

Formerly CH E 570

CH E 574 W 3C 0.5

Treatment of Aqueous Inorganic Wastes

A case-study-based introduction to treatment of inorganic wastes from metallurgical processes and metals working/finishing operations. Chemical treatment; ion exchange; reverse osmosis; adsorption, electromembrane treatment; electrochemical treatment. Legal jurisdiction; economic and social implications.

Formerly CH E 571

Department of Chemistry

Professor, Chairman of the Department
A.J. Carty, BSc, PhD (Nottingham), FIC

Professor, Associate Chairman of the Department
R.G. Woolford, MSc (Western Ontario), PhD (Mines), FIC

Associate Professor, Advisor on Academic Human Resources to the Vice-President, Academic and Provost
D.A. Brion, BSc (Alberta), PhD (Toronto)

Associate Professor, Assistant Dean, Special Projects, Faculty of Science
R.J. Friesen, BSc, MSc (Manitoba)

Assistant Professor, Graduate Officer
D.A. Holden, BSc, LMus (McGill), MSc, PhD (Toronto)

Associate Professor, Undergraduate Officer
A.D. Mayne, MA, PhD (Toronto)

Professor, (University of Guelph) Director of the Guelph-Waterloo Centre for Graduate Work in Chemistry
R.J. Balahura, BSc (Waterloo), PhD (Alberta)

Emeritus Professors
W.A.E. McBryde, MA (Toronto), PhD (Virginia), FIC

W.B. Pearson, DFC, MA, DSc (Oxford), DSc (Waterloo), FRSC, FIC

Professors
J. Cizek, RNDR (Charles University, Prague), CSc (Czechoslovak Academy of Sciences, Prague)
R.H. Downe, BSc, MSc (Queen's University of Belfast), PhD (Western Ontario), DSc (Belfast), Recipient of the Distinguished Teacher Award
T.E. Gough, BSc, PhD (Leicester)
D.E. Irlin, BSc (Western Ontario), MSc (McMaster), PhD (Chicago), FIC, Recipient of the Distinguished Teacher Award
N.R. Isenor, BSc (Acadia), MSc, PhD (McMaster)
F.W. Karasek, BS (Elmhurst), PhD (Oklahoma), FIC
R.J. LeRoy, BSc, MSc (Toronto), PhD (Wisconsin)
F.R. McCourt, BSc, PhD (British Columbia)
H.G. McLeod, MA, PhD (Toronto), (Retired)*
T.B. McMahon, BSc (Alberta), PhD (California Institute of Technology)
J.B. Moffat, BA, PhD (Toronto), FIC
K.O. O'Driscoll, BSc (Pratt Institute), MA, PhD (Princeton) FIC
J. Paldus, RNDR (Charles University, Prague), CSc (Czechoslovak Academy of Sciences, Prague)
M.M. Pintar, BSc, MSc, PhD (Ljubljana)
L.W. Reeves, BSc, PhD, DSc (Bristol), FRSC, FIC
G.L. Rempel, BSc, PhD (British Columbia) FIC
A Rudin, BSc (Alberta), PhD (Western)
H.D. Sharma, MSc (Delhi), PhD (California), FIC
J.J. Sloan, BSc, PhD (Queens')
V.A. Sneckus, BSc (Alberta), MS (California), PhD (Oregon), FIC
T. Viswanatha, MSc, PhD (Mysore), Recipient of the Distinguished Teacher Award

Associate Professors
G.F. Aitkinson, MA, PhD (Toronto), CChM, FRSC (UK), FIC
L.J. Brubacher, BA (Goshen College, Indiana), PhD (Northwestern)
J.B. Capindle, MA, DPhil (Oxford)
P.C. Chien, BSc (Nat. Taiwan), MSc (Nat. Tsing Hua), PhD (British Columbia)
G.I. Dimitriou, BSc, PhD (Toronto)
W.L. Elsdon, MSc (Western Ontario), PhD (McGill), (Retired)*
J.L. Koppal, BA, PhD (Toronto), FIC, (Retired)*
D. Mackay, BSc, PhD (Aberdeen)
M.F. Toir, BSc (Alberta), PhD (Western Ontario), Recipient of the Distinguished Teacher Award

G.E. Toogood, BSc, PhD (Nottingham)

Assistant Professors
S. Collins, BSc, PhD (Calgary)
J.W. Hepburn, BSc (Waterloo), PhD (Toronto)
J.F. Honek, BSc, PhD (McGill)
G.A. Lajolie, BSc (Sherbrooke), PhD (McGill)
K.T. Leung, BSc, PhD (British Columbia)
T.B. Marder, BSc (Massachusetts Institute of Technology), PhD (UCLA)
L.F. Nazar, BSc (British Columbia), PhD (Toronto)

Research Assistant Professor
M.J. Chong, BSc, PhD (British Columbia), NSERC University Research Fellow

Adjunct Faculty
E. Jelum, BSc (Heriot-Watt University, Edinburgh), PhD (Ox) R.H. Marchessault, BSc (Montreal-Loyola), PhD (McGill)
R.G.A. Rodrigo, BA (Ceylon), PhD (Nottingham)
G. Scoles, Doctore in Chirica (Genova), LibDoc, FIC
N.J. Taylor, BSc, PhD (Surrey)

Senior Demonstrators
S.O. de Silva, BSc (Ceylon), PhD (Waterloo)
C. Fölzer, BSc (Purdue), MSc, PhD (Rutgers)
S. Forsey, BSc (Waterloo)
T. Rudensky, BSc, PhD (Waterloo)

Faculty Members of Chemistry holding cross appointments to:

1. Physics
2. Applied Mathematics
3. Chemical Engineering
4. Biology

Faculty Members holding cross appointments to Chemistry from:

5. Applied Mathematics
6. Chemical Engineering
7. Biology
8. Physics

9. Faculty Member holding joint appointment with Physics.

*Also has Adjunct appointment
Course Descriptions

Some courses are regularly given every other year, and are listed in their regular places.

Introductory Note
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 lecturer, usually for a tutorial.

COURSES CARRYING NO UNIVERSITY CREDIT

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 thermochemistry, solution chemistry, chemical equilibria, acids, bases, oxidation-reduction reactions, kinetics and bonding.
Successful completion of this course fulfills the University Admission requirements where high school chemistry is necessary. No University credit. Offered by correspondence only.

CHEM 10 W 1C 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.

YEAR 1 CHEMISTRY COURSES

CHEM 123 F 3C 1T 0.5
Chemical Reactions, Equilibria and Kinetics
The stoichiometry of compounds and chemical reactions; principles of equilibria, solubility and acid-base equilibria; electrochemistry; chemical kinetics. Prerequisites: Grade 12 Chemistry, Mathematics (Calculus). Corequisite: (for Science students) CHEM 123L.
Antirequisite: CHEM 125

CHEM 123L F 3L 0.25
Chemical Reaction Laboratory 1
Selected experiments for students taking CHEM 123 or 125.

CHEM 124 W.S 3C 1T 0.5
Organic Chemistry 1
Bonding in carbon compounds. Structures, properties and nomenclature of several important classes of organic compounds. Interconversions of functional groups. Mechanisms of organic reactions.
Prerequisites: Grade 13 Chemistry, Mathematics (Calculus).
Corequisite: (for Science students) CHEM 124L.
Antirequisite: CHEM 126, 228

CHEM 124L W.S 3L 0.25
Chemical Reaction Laboratory 2
Selected experiments for students taking CHEM 124 or 126.

CHEM 125 F 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.
Prerequisites: Same as for CHEM 123.
Corequisite: Same as for CHEM 123.
Antirequisite: CHEM 123.

CHEM 126 W.S 3C 1T 0.5
Organic Chemistry 1
An enriched version of CHEM 124 for all students in, or planning to enter, Chemistry or Biochemistry programs.
Prerequisites: Same as for CHEM 124.
Corequisite: Same as for CHEM 124.
Antirequisite: CHEM 124, 228.

UPPER YEAR CHEMISTRY COURSES

CHEM 236 F.W 3C 3L 0.5
Introduction to Analytical Chemistry
The principles underlying quantitative measurements.
Prerequisites: CHEM 123 or 125, 123L.
Corequisites: (for Science students) CHEM 220L.
Antirequisite: CHEM 228.
For Honours students only.

CHEM 220 W.F.W 3C 0.5
Analytical Chemistry Laboratory 1
Selected experiments for students taking CHEM 220.
For Honours students only.

CHEM 221 F.W.S 2C 0.5
Multi-component Analysis
Electrochemical, spectroscopic and separation methods for the quantitative description of multi-component systems.
Prerequisites: CHEM 220.
Corequisite: (for Science students) CHEM 221L.
Antirequisite: CHEM 228.
For Honours students only.
CHEM 221L F,W,S 8L 0.5
Analytical Chemistry Laboratory 2
Selected experiments for students taking CHEM 221.
For Honours students only

CHEM 229 W 2C,3L 0.5
Analytical Chemistry for Life Sciences
Selected topics of importance to Biology students, with related experiments.
Prereq: CHEM 123 or 125, 124 or 126 Antireq: CHEM 220, 221
For students in Honours Biology only

CHEM 237 F,W,S 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

CHEM 237L F,W,S 3L 0.25
Introductory Biochemistry Laboratory
Selected experiments for students taking CHEM 237.

CHEM 254 F,W 2C,1T 0.5
Physical Chemistry 1
This course emphasizes the macroscopic approach. Areas to be studied include properties of gases; the first, second and third laws of thermodynamics applied to ideal systems; chemical equilibrium.
Prereq: CHEM 123 or 125, MATH 113A/B or equivalent Antireq: CHEM 356
For Honours students only

CHEM 255 F,W,S 2C,1T 0.5
Physical Chemistry 2
Thermodynamic concepts are applied to a variety of systems, to mixtures of nonelectrolytes and to solutions of electrolytes. The difference between thermodynamic and dynamic equilibria is introduced to deal with rates of chemical reactions and their relationship to experimental data.
Prereq: CHEM 254
For Honours students only

CHEM 264 F,W 3C 0.5
Organic Chemistry 2
Preparation and reactions of typical organic functional groups examined on the basis of reaction mechanisms. Stereochemistry of organic molecules.
Prereq: CHEM 124 or 126 Antireq: CHEM 36, 286
For Honours students only

CHEM 265 F,W,S 2C,1T 0.5
Organic Chemistry 3
The detailed treatment of organic chemistry begun in CHEM 124 and 264 is continued, with further emphasis on stereochemistry, reaction mechanisms and reactivity. Introduction to spectroscopy.
Prereq: CHEM 264 Antireq: CHEM 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 2
More detailed discussions of the important classes of aliphatic and aromatic compounds. An extended look at stereochemistry and its importance in reaction mechanisms.
Prereq: CHEM 124 or 126 Antireq: CHEM 36, 264

CHEM 266L F,W 3L 0.25
Organic Chemistry Laboratory
Selected experiments for students taking CHEM 266.

CHEM 267 W 2C 0.5
Basic Organic Chemistry 3
A continuation of the concepts of CHEM 266. Introduction to carbohydrates, proteins, and lipids. Introduction to NMR and IR spectroscopies.
Prereq: CHEM 266 Antireq: CHEM 36, 265
For students needing a full year of Organic Chemistry as a prerequisite to medicine, either the sequence 266/267 and 266L, or the sequence 264/265 and 265L should be selected.

CHEM 311 W 2C 0.5
Radiochemistry
Prereq: Grade 13 Chemistry, completion of Year 1 in good standing or permission of instructor

CHEM 312 F,S 2C,1T 0.5
Transition Metal Chemistry
The transition elements and their compounds. Stereochemistry of complexes; ligand field and molecular orbital theories of metal-ligand bonding; electronic spectra and magnetochemistry 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 Main Group Elements
A systematic approach to the syntheses, properties, reactions and structures of compounds of the main group elements. Trends in chemical behaviour, bonding and stereochemistry. Electron-deficient compounds, the rare gases, chemistry of phosphorus, nitrogen and sulfur will be dealt with in detail.
Prereq: CHEM 212 Antireq: CHEM 319 For Honours students only

CHEM 314L F,W,S 3L 0.25
Inorganic Chemistry Laboratory 1
An introduction to practical inorganic chemistry.
Coreq: CHEM 312 or 313 For Honours students only

CHEM 315L F,W 6L 0.5
Inorganic Chemistry Laboratory 2
Advanced experiments in inorganic chemistry.
Prereq: CHEM 314L For Honours students only

CHEM 316 F 2C,1T 0.5
Coordination Chemistry
A basic coverage of first row transition elements for General and certain Honours students; preparation, nomenclature and general chemistry of transition metal complexes emphasizing structure, bonding, physical properties such as colour and magnetism, and chemical reactions.
Prereq: CHEM 218 or 212 Antireq: CHEM 312 By correspondence only

CHEM 320 W 2C 0.5
Analytical Separations and Surface Analysis
Basic principles, instrumentation and methods of analytical separations and surface analysis.
Prereq: CHEM 221 or permission of instructor
CHEM 321L W 3L 0.25
Advanced Analytical Laboratory
Selected experiments for students of analytical chemistry.
Prereq: CHEM 221, 221L
Coreq: CHEM 265 or 267
CHEM 332 F.S 2C 0.5
Structural Biochemistry
Prereq: CHEM 237
Coreq: CHEM 265 or 267
CHEM 333 F, W 2C 0.5
Metabolism 1
Metabolism of carbohydrates, lipids and amino acids.
Prereq: CHEM 237
Coreq: CHEM 265 or 267
CHEM 334L F.W. 3L 0.25
Advanced Biochemistry Laboratory
Selected experiments for students taking CHEM 332 and CHEM 333.
Prereq: One term course in biochemistry beyond CHEM 237
CHEM 350 W 2C 0.5
Spectroscopy and Molecular Structure
Introduction to concepts and applications of microwave, Raman, IR, electronic and resonance spectroscopy with respect to molecular parameters.
Prereq: CHEM 235
CHEM 353 F.S 3C 0.5
Introduction to Polymers: Science
Basic definitions and polymer nomenclature, molecular weight averages and distributions, constitutional and configurational isomerism, rubber elasticity, step-growth and free radical chain growth polymerizations, emulsion polymerization.
Prereq: CHEM 254, 264 or equivalents
Antireq: CH E 542
CHEM 355 F.W,S 2C,1T 0.5
Physical Chemistry 3
Introduction to the microscopic description of physical processes, laws governing electrons and atoms and the properties of atomic and molecular states, application to electromagnetic radiation interacting with atoms and molecules producing transitions between states.
Prereq: CHEM 255, MATH 215 or equivalent
Antireq: PHYS 354
For Honours students only
CHEM 355L F,W,S 3L 0.25
Physical Chemistry Laboratory 1
Selected experiments for students taking CHEM 355.
For Honours students only
CHEM 356 F.S 2C,1T 0.5
General Physical Chemistry
An introductory survey of the thermodynamics of ideal systems; the application of thermodynamic principles to the study of solutions, phase equilibria, chemical equilibrium and the properties of electrolytes.
Prereq: CHEM 123 or 125, MATH 113A/B or equivalent
Antireq: CHEM 254
CHEM 356L F.W. 3L 0.25
General Physical Chemical Laboratory 1
Selected experiments for students who have taken CHEM 356.
Prereq: CHEM 356
A special section in Winter term will be available for Honours Biochemistry students only.
CHEM 357 W 2C,1T 0.5
Physical Chemistry for the Life Sciences
An introductory survey of kinetic molecular theory and transport phenomena with applications to biological systems. Chemical kinetics. Some spectroscopies important to life sciences.
Prereq: CHEM 123 or 125, MATH 113A/B or equivalent
CHEM 357L W 3L 0.25
General Physical Chemistry Laboratory 2
Selected experiments for students taking CHEM 357.
Prereq: CHEM 356L
CHEM 358 F.W 2C,1T 0.5
Physical Chemistry 4
The statistical nature of large assemblies of atoms and molecules, kinetic theory of gases, transport processes, the collision theory and transition state theory of chemical kinetics.
Prereq: CHEM 355
For Honours students only
CHEM 358L F.W 6L 0.5
Physical Chemistry Laboratory 2
Selected experiments for students taking CHEM 358.
Prereq: CHEM 355L
Antireq: CHEM 358L
For Honours students only
CHEM 362 W (even years) 2C 0.5
Mechanistic Organic Chemistry
Simple molecular orbital theories and their use in organic chemistry. Effects of substituents and reaction conditions on the mechanism of organic reactions.
Prereq: CHEM 265
Coreq: CHEM 368
CHEM 363 W 2C 0.5
Applied Organic Chemistry
The organic chemistry involved in selected industrial processes will be discussed. Petroleum chemistry, synthesis of dyestuffs, pharmaceuticals, pesticides, organic polymers, etc.
Prereq: CHEM 265 or 267
CHEM 366 F 2C 0.5
Structural and Synthetic Organic Chemistry
Stereochemistry in organic reactions; synthesis of selected organic compounds examined in detail with emphasis on cyclo-addition reactions and condensation reactions.
Prereq: CHEM 265 or 267
Antireq: CHEM 368
CHEM 368L F 3L 0.25
Organic Chemistry Laboratory
Selected experiments for students taking CHEM 366.
CHEM 369 F.W,S 2C 0.5
Organic Chemistry 4
The design of organic syntheses, and especially the formation of enolate ions and their use in the formation of new carbon-carbon bonds. Acidity and basicity of organic molecules. Stereochemical concepts applied to organic molecules as well as conformational analysis.
Prereq: CHEM 265
Antireq: CHEM 366
For Honours students only
CHEM 369L F.W,S 6L 0.5
Organic Chemistry Laboratory 2
Selected experiments for students taking CHEM 369.
For Honours students only
CHEM 380 F.W 1C,3T 0.5
Chemical Problem Solving by Computer
Analysis of chemical problems, development of mathematical and numerical models and algorithms, implementation of programs using procedure-oriented languages (BASIC, FORTRAN, PASCAL), simulations and calculations on chemical processes, data reduction and treatment.
Prereq: CS 102 or equivalent, good standing in Year Two or higher of a chemistry program.
Formerly CHEM 280
CHEM 392A F.W.S 9L 0.75  
Research Project 1  
For students in the Honours Chemistry (Thesis Option) program.

CHEM 392B F.W.S 18L 1.5  
Research Project 2  
For students in the Honours Chemistry (Thesis Option) program.

CHEM 395 W (odd years only) 3C 0.5  
History of Chemistry  
The development of chemistry will be traced from alchemy to the 20th century. The contributions of famous scientists to the concepts and models of modern chemistry will be emphasized.  
Prereq: Completion of two years of a Chemistry Honours program

CHEM 407 F 2C 0.5  
Industrial Chemistry  
Given entirely by invited lecturers from a broad spectrum of chemistry-related industries. The range of topics will include current industrial laboratory practice, the laboratory/plant interface, and the handling of large quantities of materials.  
Strongly recommended for all chemistry majors.

CHEM 409 W (odd years only) 2C 0.5  
Solid State Chemistry  
Packing in solids; metals, alloys and molecular crystals; ionic and covalent solids; chemical factors affecting crystal structures; properties of metals, semiconductors and molecular crystals.  
Prereq: CHEM 312 or 313

CHEM 417 F 2C 0.5  
Organometallic Chemistry  
Prereq: CHEM 312

CHEM 419 W 2C 0.5  
Biological Aspects of Inorganic Chemistry  
Metalloproteins and other metal-containing biological molecules in hydrolytic enzymes; redox reactions; nitrogen fixation and oxygen transport; the role of alkal and alkaline earth metal cations.  
Prereq: CHEM 312 or 316

CHEM 420 W 2C 0.5  
Analytical Chemistry  
Selected topics in modern analysis of inorganic materials such as rocks, ores, ceramics, metals and alloys; atomic flame spectrometric methods, analytical X-ray techniques, methods for ultrapure materials, trace and micro determinations.  
Prereq: CHEM 221 or permission of instructor

CHEM 421 W 2C 0.5  
Mass Spectrometry  
Principles involved in the use of electric and magnetic fields for mass analysis. Ionization methods. Applications of mass spectrometric analysis to the identification and quantification of chemical compounds.  
Prereq: CHEM 264, or permission of instructor

CHEM 422 F 2C 0.5  
Thermal and Electrical Analytical Methods  
Techniques and fundamental principles of thermal and electroanalytical methods.  
Prereq: CHEM 221 or permission of instructor

CHEM 425A-Z F.W.S 2C 0.5  
Special Topics in Analytical Chemistry  
Prereq: CHEM 333  
Coreq: CHEM 332

CHEM 432 F 2C 0.5  
Metabolism 2  
Prereq: CHEM 333  
Coreq: CHEM 332

CHEM 433 W 2C 0.5  
Advanced Biochemistry  
Prereq: CHEM 333

CHEM 434 W 2C 0.5  
Special Topics in Biochemistry  
Special topics in biochemistry with applications. Areas covered in recent years include biochemistry of methane-producing bacteria; mechanism of action of antibiotics, antiviral agents and vitamins.  
Prereq: CHEM 333

CHEM 435 F 2C 0.5  
Bioorganic Mechanisms  
Modern techniques of biosynthetic studies. Enzyme reaction mechanisms.  
Prereq: CHEM 237 and one of 369, 366

CHEM 452 F 2C 0.5  
Colloids, Liquid Crystals and Bilayer Chemistry  
The colloidal size range, the importance of the interface, classical studies on Brownian motion, light scattering, the micelle formation of detergents in water and solubilisation. Phase diagrams of soaps and lipids and their study by X-ray diffraction and NMR. The biological membrane as an entity of colloidal size. The related spectroscopy, microscopy, etc. of lyotropic liquid crystals and bilayers.  
Prereq: CHEM 255

CHEM 453 W 2C 0.5  
Polymer Properties and Polymerization  
Copolymerization, ionic and coordinate polymerizations, introduction to polymer reaction engineering, mechanical properties of polymers, polymer mixtures.  
Prereq: CHEM 333 or equivalent  
Antireq: CHE 542

CHEM 454 F 2C 0.5  
Surface Chemistry  
An introduction to the physical chemistry of surfaces. Qualitative and quantitative descriptions of surfaces and interfaces and the development of relevant techniques and theories. Application to surface tension, spreading, wetting, adsorption, and other interfacial phenomena.  
Prereq: CHEM 358

CHEM 455 F 3C 0.5  
Electrochemistry  
Electrolytic conductance and transport, thermodynamics of electrolytic cells. Reversible and irreversible electrode processes, metallic corrosion. Study of selected industrial electrochemical processes.  
Prereq: CHEM 254 or 356
CHEM 456  W  2C  0.5  
**Catalysis**  An introduction to heterogeneous catalysis. Examination of the physical manifestations of catalysis and the development of experimental techniques and theoretical methods for the measurement and elucidation of catalytic phenomena.  
Prereq: CHEM 255

CHEM 457  W  1C,6L  0.5  
**Experimental Aspects of Polymer Science**  Selected experiments to illustrate polymerization, polymer properties and fabrication processes.  
Prereq: CHEM 353 or equivalent

CHEM 458  F  2C  0.5  
**Quantum Chemistry**  The nature of electronic structure and chemical bonding in H₂ and other simple molecules and its implications for theories of chemical reactions.  
Prereq: CHEM 265

CHEM 464  F  2C  0.5  
**Spectroscopy in Organic Chemistry**  Elucidation and identification of organic structures by contemporary spectroscopic techniques.  
Prereq: CHEM 265

CHEM 465  W  2C  0.5  
**Special Topics in Organic Chemistry**  Topics will be selected from photochemistry, organometallics, synthesis, heterocyclic, natural products, molecular rearrangements. (May be taken in third and fourth year as 465A and 466B provided topics are different).  
Prereq/Coreq: CHEM 368

CHEM 492A  F  9L  0.75  
**Advanced Laboratory**  Laboratory work on a senior year research project. See CHEM 492 co-ordinator for descriptive booklet and details.  
For Honour students only

CHEM 492B  W  9L  0.75  
A continuation of CHEM 492.  
No credit or grade is given for the first term course unless the two term sequence, CHEM 492A-B, is completed.

CHEM 495A  F  18L  1.5  
**Research Project 3**  Only for students in the Honours Chemistry (Thesis Option) program.

CHEM 496B  W  18L  1.5  
**Research Project 4**  Only for students in the Honours Chemistry (Thesis Option) program.

CHEM 496A-E  F,W,S  R  0.5  
**Independent Study in the Defined Field of Study**  
A - *Analytical Chemistry*  
B - *Biochemistry*  
C - *Inorganic Chemistry*  
D - *Organic Chemistry*  
E - *Physical Chemistry*  
Open to students in the Honours Chemistry (Thesis Option) program only.

**Department of Civil Engineering**

Professor, Chairman of the Department  
R.G.C. Haas, BSc, MSc (Alberta), PhD (Waterloo), PEng  
Professor, Dean of the Faculty of Engineering  
W.C. Lennox, BASc, MSc (Waterloo), PhD (Leigh), PEng  
Professor, Associate Chairman Graduate Studies  
J.F. Sykes, BASc, MASc, PhD (Waterloo), PEng  
Associate Professor, Associate Chairman, Undergraduate Studies  
B. Leclerc, BEng (West Australia), MSc, PhD (Waterloo), PEng  
Professors Emeritus  
H.H.E. Lephilo, 1 Dipl Ing, Dr Ing, Docent Hab (Stuttgart), DEng (Waterloo), DEng (Carleton), PEng, FRSC, Recipient of the Distinguished Teacher Award  
J.T. Pinder, Dr. of Tech Sciences (Warsaw), Docent Hab (Cracow), PEng  
Professors  
S.T. Anaradnam, BSc (Eng) (Ceylon), MSc (London), PhD (Cambridge)  
E.F.P. Burnett, BSc (Capetown), DIC, MSc, PhD (London), PEng  
M.Z. Cohn, CSC (Bucharest), PEng  
M.B. Dusseault, 2 BSc, PhD (Alberta), PEng  
G.J. Farquhar, 3 BASc (Waterloo), PhD (Wisconsin), PEng, Recipient of the Distinguished Teacher Award  
G.M.L. Gladwell, 4 BSc, PhD, DSc (London)  
R. Green, BSc (Eng) (London), MSc (Queens), MSc (Waterloo), PhD (Texas), PEng  
D.E. Grierson, BASc, MASc, PhD (Waterloo), PEng  
V.K. Hands, BSc (Calgary), BSc (Eng) (London), MSc (Queens), MASc, PhD (Waterloo), PEng  
B.G. Hutchinson, BE (Sydney), MSc (Queens), PhD (Waterloo), PEng  
N.C. Lind, MSc (Technical University of Denmark), PhD (Illinois), PEng, FRSC  
L. Matyas, BASc (Toronto), DIC, PhD (London), PEng  
E.A. McLaughlin, BASc (British Columbia), SM, PhD (MIT), PEng  
W.A. McLaughlin, BSc (Saskatchewan), MSc, PhD (Purdue), PEng  
G.M. McNeice, BASc (Waterloo), PhD (London), PEng  
T. Prasad, BSc, MSc (Banaras Hindu), PhD (Cambridge)  
J. Roorda, BASc, PEng (Waterloo), PhD (London), PEng  
A.H. Sheehean, BASc, DSc, (London), PhD, MS (Leigh), MA, PhD (Cambridge), PEng  
J. Shroot, BE, PhD (Western Ontario), MSc (Queens), PhD (Northwestern), PEng  
K.N. Smith, BASc (Toronto), MSc (Illinois), PhD (Waterloo), PEng  
H.J. Solomon, CivilEng (Bucharest), PhD (City University London), PEng, (Retired)*  
T.H. Topper, BASc (Toronto), PhD (Cambridge), PEng  
S. Yagur, BASc, MSc, PhD (California), PEng  
Associate Professors  
R.W. Cockfield, BSc, MSc (Queens), MSc (Waterloo), PEng  
J.M. Konrad, 3 BS, Dipl Ing (Strasbourg), MSc (Laval), PhD (Alberta), PEng  
N. Krouwen, BASc, PEng (Waterloo), PEng  
L. Rothenburg, Dip Phy (Moscow), PhD (Carleton), PEng  
F.F. Sacomanno, BASc, MSc (Montreal), PhD (Toronto), PEng  
R.M. Schuster, 3 BS, MS (North Dakota State), PhD (Iowa State), PEng  
J.C. Thompson, BASc (Toronto), MS, PhD (Illinois), PEng  
Assistant Professor  
N.R. Thomson, BASc, MSc, PhD (Waterloo)  
Research Professor  
J.A. Franklin, 5 BSc (London), MSc, PhD (Imperial College, London)  
Adjunct Faculty  
M.H. Eayrs  
D.E. Franks, BA (McMaster), LL.B (Osgoode Hall)
D.A. Godden, BSc (Toronto), LLB (Osgoode Hall) LLM (York)
D.T. McClurkin, Chartered Accountant
N.W. McLeod, BSc (Alberta), MSc (Saskatchewan), ScD (Michigan), FRSC, PEng
W.R. Petri, DiplEng (Berlin), PEng
D.W. Schnurr, BASc (Toronto), LLB (Osgoode Hall), PEng

Faculty Members of Civil Engineering
holding cross appointments to:
1 Mechanical Engineering
2 Applied Mathematics
3 Chemical Engineering

Faculty Members holding cross or joint appointments to Civil Engineering from:
4 Architecture
5 Earth Sciences

*Also has Adjunct appointment

Course Descriptions

CIV E 126 W.S 2C,4LT 0.5
Civil Engineering Concepts
A continuation of GEN E 115 with applications of graphics, measurement and other analytic principles to introductory problems in the various disciplines of Civil Engineering; an introduction to engineering design methods as applied to Civil Engineering and including specification development, information gathering, concept formulation, feasibility analysis and report writing.

CIV E 203 F,W 2C,2T 0.5
Statics
Equilibrium of rigid and deformable bodies. Analysis of internal forces in structures; beams, cables, arches, trusses.

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 223A F,W 1C,2T 0.25
Computer Workshop A
An introduction to Microcomputers, Spreadsheets, Word Processors and the BASIC language. Workshop includes applications selected from Year Two Civil Engineering courses.
Five weeks only
For Civil and Geological Engineering students only.

CIV E 223B S.F 1C,3T 0.25
Computer Workshop B
An introduction to the use of microcomputers, Spreadsheets and Word Processors; Application to problems in Civil Engineering.
Five weeks only
For Civil and Geological Engineering students only.

CIV E 224 F,W 2C,2T 0.5
Probability and Statistics
Empirical determination of distribution models. Regression analysis.

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. Field trip.

CIV E 265 F,W 3C,1T,3L 0.5
Structure and Properties of Materials
4 lab sessions

CIV E 290 F,S 4C,2T,2L 0.75
Fluid Mechanics and Thermal Sciences
An introduction to fluid mechanics and thermal sciences. Fluid properties, fluid statics; thermodynamic principles; Bernoulli equation; the momentum equation and applications; laminar and turbulent flow; closed conduit flow; pipe network analysis; dimensional analyses and similarity; steady flow in pipes, heat transfer.
4 lab sessions.

CIV E 291 F 1 wk fid lab 0.5
Survey Camp
A one-week course in surveying. Introduction to surveying, length measurements, levelling, transit surveys.
Approximate cost to each student $140.

CIV E 292 F,W 2C,2T 0.5
Engineering Economics
An introductory course on the principles of engineering economy. Basic concepts; capital; interest formulas and derivations; annual worth comparisons; present worth; return on investment; benefit-cost ratio depreciation effect of taxes.

CIV E 298 F,W 25 0.0
CIV E 299 S,F 25 0.0
Seminar
The engineer in society. Principles, methods and practice of Civil Engineering, Informal lectures.

CIV E 300 W,S 2C,2T 0.5
Civil Engineering Project 1
The development of problem-solving skills utilizing the systems approach to the solution of civil engineering problems. Knowledge from previous courses and the practical application of the digital computer are integrated in a team/ project-oriented environment. A written report and a verbal presentation are requirements.

CIV E 303 W,S 3C,1T 0.5
Structural Analysis

CIV E 306 F,W 2C,2T 0.5
Mechanics of Solids 3
Course Descriptions

Civil Engineering

CIV E 313 F.W 3C,1T 0.5
Structural Concrete Design 1
Reinforced Concrete Members. Concrete and reinforcing steel materials. Safety, loads, design criteria. Flexure, shear, combined bending and axial force. Serviceability. One-way slabs, beams, columns, foundations and retaining walls.
Prereq: CIV E 303

CIV E 342 W.S 3C,1T 0.5
Transport Principles and Applications
Introduction to basic principles and procedures of transport planning and engineering, as applied to Canadian intercity transport problems.

CIV E 343 F 2C,2T 0.5
Traffic Engineering
Theories of road capacity, capacity and quality of service on rural and urban roads. Traffic signals: capacity, delay, allocation and optimization of phase times. Control of combinations and networks of signals. Application of assignment in traffic models.

CIV E 344 F 3C,1T 0.5
Urban Transport Planning
Basic concepts used to explore current issues in Urban Transportation; includes planning models of trip generation, mode split distribution and assignment. Evaluation of transport proposals based on the decision environment and extensions of engineering economics. Basic notions of system continuity, historical perspectives and system operating characteristics are addressed.

CIV E 353 W.S 3C,1T,2L 0.5
Geotechnical Engineering 1
An introduction to geologic processes; subsurface exploration; classification systems; weight-volume relationships; soil mechanics principles including state of stress, ground water flow, consolidation and shear strength.
Six lab sessions.

CIV E 354 F.W 3C,1T 0.5
Geotechnical Engineering 2
Foundation engineering; earth pressure theories; retaining walls; anchors; shallow and deep foundations; braced trenches and excavations; slope stability.
Prereq: CIV E 353

CIV E 357 W.S 3C,1T,2L 0.5
Water Quality Engineering
Seven lab sessions.

CIV E 361 F.W 3C,1T 0.5
Hydraulics
Open channel flow; flood routing; dams; spillways; gates and culverts; pumps and turbines; flood mapping; urban drainage.

CIV E 366 W.S 2S 0.0
CIV E 366 F.W 2S 0.0
Seminar
The engineer in society. Principles, methods and practice of Civil Engineering. Informal lectures.

CIV E 400 F.S 3C,2T 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 required.

CIV E 401 W 4T 0.5
Civil Engineering Project 3
An independent or team project dealing with engineering design or research, under the direction and with the consent of a faculty member.

CIV E 403 F.S 3C,1T 0.5
Structural Analysis 2
Advanced structural analysis of planar and space frameworks; linear and non-linear behavior. Computer Applications.
Prereq: CIV E 303

CIV E 404 W 2C,2T 0.5
Structural Analysis 3
Approximate methods of analysis for a variety of structural forms. Application of approximate techniques to beams, building frames, shear wall structures, plates, buckling and vibration problems. Approximate structural design.
Prereq: CIV E 313, 413

CIV E 405 W 2C,2T 0.5
Structural Dynamics

CIV E 407 W 2C,2T 0.5
Building Sciences and Technology
The building process; loadings: gravity, wind, thermal, moisture, fire; enclosure design: walls, windows, roof; subgrade construction; energy related considerations: energy load, economics.
Prereq: CIV E 313, 413, 414 or consent of instructor

CIV E 413 F.S 3C,1T 0.5
Structural Steel Design
Prereq: CIV E 303

CIV E 414 F.S 3C,1T 0.5
Structural Concrete Design 2
Reinforced concrete members and structures. Torsion, Slender columns, walls, continuous beams, floor systems. Prestressed concrete.
Prereq: CIV E 313

CIV E 415 W 2C,2T 0.5
Structural Systems
Geometries, loads, safety and serviceability, structural idealizations. Building design and bridge design. Proportioning of components and structures in concrete, steel, masonry and wood.
Prereq: CIV E 313, 413, 414

CIV E 422 W 2C,2T 0.5
Finite Element Analysis
Introduction to the Finite Element Methods in field problems. Applications to the theory using available computer programs.

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,1T 0.5
Pavement Structural Design
Pavement design, soil identification, subgrade design, base courses, flexible pavement design, design and testing of asphaltic concrete mixes, surface treatments.
Prereq: CIV E 353

CIV E 454 W 2C,2T 0.5
Geotechnical Engineering 3
Simulation of geotechnical consulting practice. Students are required to complete several projects, based on actual case studies, which require problem identification, evaluation of geotechnical data, analysis, design and report preparation.
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 265. 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
Introduction to wastewater technology. Wastewater quantity; Wastewater characteristics; Primary treatment; Secondary treatment; Sludge treatment and disposal; Industrial wastewater management. Design project.
Prereq: CIV E 375

CIV E 473 W 2C,2T 0.5
Contaminant Transport
Prereq: CIV E 375

CIV E 480 W 2C,2T 0.5
Water Resources Management
A course on water resource management problems in Canada. Description of basic areas of water resource management. Application of systems analysis and operations research techniques management. Benefit-cost analysis. Social, political, legal and ecological considerations.
Coreq: CIV E 381

CIV E 486 S,F 3C,1T 0.5
Hydrology
Basic hydraulic principles; elementary hydrologic design; principles of reservoir design; mathematical modeling of hydrologic budget; data networks; design events; urban hydrology.

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
Introduction to project/construction management - network methods, critical path, crashing, resource allocation and levelling. Earth moving and heavy construction; Building construction methods; Contract construction.

CIV E 498 S,F 2S 0.0
Seminar
The engineer in society. Principles, methods and practice of Civil Engineering. Informal lectures.

Department of Classical Studies

Professor, Chairman of the Department
P. Forsyth, AB (Mount Holyoke), MA, PhD (Toronto), Recipient of the Distinguished Teacher Award

Assistant Professor and Undergraduate Officer
L.L. Neur, BA (San Francisco), MA (Oregon), PhD (McMaster)

Associate Professor
R.L. Fowler, BA, MA (Toronto), DPhil (Oxford)

Assistant Professors
L.A. Curchin, BA (Western Ontario), MA (Toronto, Carleton), PhD (Ottawa)
S.B.P. Haag, BA, MA (Queen's), MA (Waterloo), MPhil (Toronto)
R.L. Porter, BA (McMaster), MA, PhD (Princeton)

Lecturer
S.L. Ager, BA, MA (Queen's)
Participating Faculty in Classics at Wilfrid Laurier University
D. Emanuel, BA, MA (British Columbia), PhD (Texas, Austin)
H.A. MacLean, BA (McMaster), MA, PhD (Wisconsin)
G.P. Schaus, BA, MA (Dalhousie), PhD (Pennsylvania)
J. Zeyl, BA, MA (Toronto), PhD (McMaster)

Faculty Member of Classical Studies holding cross appointment to:
1. Fine Arts
2. History

Course Descriptions

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.
 Course Descriptions

Classical Studies

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
Colossos - The Major Figures of Ancient Greece
An introductory study of the achievement of ancient Greece through some of its most prominent figures. Each year two of the following will be featured: Homer and Heroic Greece; Pericles and the Rise of Democracy; Socrates, Man and Martyr; Alexander the Great and The Age of Expansion.

CLAS 102 F 3C 0.5
Colossos - The Major Figures of Ancient Rome
An introductory study of the achievement of ancient Rome through some of its most prominent figures. Each year two of the following will be featured: Julius Caesar and the Collapse of the Republic; Augustus: The Empire Rises; Nero and the Corruption of Power; Hadrian and the Imperial Machine.

CLAS 201 S.F,W 3C 0.5
Ancient Greek Society
A survey of the civilization of Classical Greece, featuring such topics as the individual (male and female), political institutions, art, religion, philosophy, literature, social life and leisure activities.

Students are advised to preregister early for this course as enrolment is limited.

CLAS 202 S.F,W 3C 0.5
Ancient Roman Society
A survey of the civilization of the Roman Republic and Empire, featuring such topics as the individual (male and female), political institutions, art, religion, philosophy, literature, social life and leisure activities.

Students are advised to preregister early for this course as enrolment is limited.

CLAS 251 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 W 3C 0.5
Roman History
A military, political, social and economic survey of Rome from earliest times to the Empire's fall.

This course is acceptable for credit by the History Department.

CLAS 253 W 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.

CLAS 254 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).

CLAS 256 3C 0.5
Medieval Civilization 1
A study of medieval literature, art, architecture, music and other expressive forms. The period from late antiquity to A.D. 1200 will be studied.

CLAS 257 3C 0.5
Medieval Civilization 2
A study of medieval literature, art, architecture, music and other expressive forms. The period from A.D. 1200 to the Renaissance will be studied.

CLAS 258 2S 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 Virgil. The evolution of the epic genre is traced in lectures and discussions. No knowledge of Greek or Latin is needed.

CLAS 259 3C 0.5
Ancient Tragedy in Translation
This course focuses upon the dramatic literature of the classical age in Athens. It features the Orestia 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

CLAS 260 3C 0.5
Modern Issues in the Ancient World
A study of selected social problems in 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 261 F 3C 0.5
Ancient Comedy in Translation
The comedy of the ancient Greeks and Romans will be examined through selected plays of Aristophanes, Menander, Plautus and Terence. The different types of comedy, and their evolution, will be studied in lectures and discussions. No knowledge of Greek or Latin is needed.

Prereq: CLAS 266 or instructor's permission

Cross-listed as DRAMA 358

CLAS 266 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, and Lucian. No knowledge of Greek or Latin is needed.

Prereq: CLAS 265 or 266 or an appropriate course in literature, or instructor’s permission
CLS 371 3C 0.5
Christianity and the Roman Empire
This course examines the relationship between Christianity and the Roman Empire, dealing in particular with the Christians in the social context of the Roman Empire generally and its various regions.

CLS 373 W 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.
Pre: CLAS 202, 252 or instructor’s permission

CLS 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.
Pre: First year science or engineering course, or CLAS 201 or 202 or 251 or 252 or instructor’s permission

CLS 402 W 3C 0.5
The Age of the Bronze Age
A senior course concentrating on the Cycladic, Minoan and Mycenaean civilizations of the Bronze Age.
Pre: CLAS 301, 351 or instructor’s permission

CLS 485 2C 0.5
Greco-Roman Civilization and History 1
Senior seminar; intensive study of various problems.
Pre: Previous work in ancient history or instructor’s permission
This course is acceptable for credit by the History Department (but not as a senior seminar).

CLS 486 F 2S 0.5
Greco-Roman Civilization and History 2
Senior seminar; intensive study of various problems.
Pre: Previous work in ancient history or instructor’s permission
This course is acceptable for credit by the History Department (but not as a senior seminar).

400A/B F.W 0.5/0.5
Senior Honours Thesis
All senior honours students should consult with the Undergraduate Advisor about writing a thesis or doing Directed Study. For further details see Classical Studies programs (Chapter 8).
A letter grade for CLAS 490A will be submitted only after the completion of CLAS 490B.

CLAS 492-498
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.

GREEK

Introductory Note
Students should consult with the departmental Undergraduate Advisor for the latest information on course offerings. Some course are offered in rotation.

GRK 100A F 4C 0.5
Introductory Ancient Greek 1
A course designed for students beginning the study of ancient Greek or who have not yet reached the level expected in GRK 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.

GRK 100B W 4C 0.5
Introductory Ancient Greek 2
Continuation of GRK 100A. Most of the rules of Greek grammar will be covered by the end of the year, and students should have a minimal competence in reading prose texts, but for the remaining grammar and further practice students should go on to do GRK 231.
Pre: GRK 100A or RS 106A

GRK 231 F 3C 0.5
Intermediate Greek
The course will complete the study of Greek grammar and begin more extensive reading in Greek authors (normally Homer and Herodotus).
Pre: GRK 100B, Grade 13 Greek or instructor’s permission

GRK 232 3C 0.5
Selections from Greek Authors
A literature course designed to follow GRK 231. Authors normally read are Euripides, Thucydidus and Plato.
Pre: GRK 100B, Grade 13 Greek or instructor’s permission

GRK 282 W 3C 0.5
Introduction to Plato
Selections from Plato.
Pre: GRK 100B, Grade 13 Greek or instructor’s permission

GRK 271 3C 0.5
Hellenistic and Later Greek Literature
Selections from Christian and pagan writers.
Pre: GRK 100, Grade 13 or OAC Greek, or instructor’s permission

GRK 301 3C 0.5
Advanced Greek Reading
A reading course designed to follow GRK 232 or GRK 282. 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.
Pre: One full 200-level course in GRK or instructor’s permission

GRK 351 2C 0.5
Advanced Composition and Grammar
Intensive study of Greek language and style through composition and translation.
Pre: GRK 251, or consent of instructor

GRK 361 3C 0.5
The Drama of Euripides
An examination of the dramatic art of Euripides by translation of selected plays and the reading of other plays in translation.
Pre: One full 200-level Greek course or instructor’s permission

GRK 362 3C 0.5
The Drama of Sophocles
An examination of the dramatic art of Sophocles by translation of at least one play and the reading of others in translation.
Pre: One full 200-level Greek course or instructor’s permission

GRK 371 3C 0.5
Introduction to the Greek Historians
Selections from Xenophon and others.
Pre: One full 200-level Greek course or instructor’s permission
GRK 372 F 3C 0.5
Herodotus
Selections from the Persian Wars.
Prereq: One full 200-level Greek course or instructor’s permission
Offered 1989-90 at Wilfrid Laurier University.

GRK 452 F 3C 0.5
Homer
Extended reading of Homer.

GRK 461 2S 0.5
The Drama of Aeschylus
Selected plays.

GRK 462 W 2S 0.5
The Comedy of Aristophanes
An examination of the dramatic art of Aristophanes by translation of at least one play and the reading of others in translation.

GRK 471 2S 0.5
Thucydides
Detailed study of the Peloponnesian War.

GRK 481 3C 0.5
The Philosophy of Plato
Detailed study of The Republic.

GRK 482 2S 0.5
The Philosophy of Aristotle
Detailed study of the major works.

GRK 490-499
Senior Seminars
By arrangement with the Department, an individual student or a small group of students will follow a course of study under the supervision of a faculty member.

Senior standing or instructor’s permission is a prerequisite for any 400-level Greek course.

LAT 100A F 4C 0.5
Introductory Latin 1
A course designed for students beginning the study of Latin or who have not yet reached the level expected in LAT 203/204. Although the teaching approach emphasizes exposure to simple texts as soon as possible, students desiring basic competence in reading should go on to do LAT 100B.

Students are advised to preregister early for this course as enrolment is limited.

LAT 100B W 4C 0.5
Introductory Latin 2
Continuation of LAT 100A. The aim is to attain basic reading competence in prose.
Prereq: LAT 100A

LAT 203 F 3C 0.5
A Survey of Latin Literature 1
A general survey of Latin prose and poetry from its origins to the beginning of the Roman Empire. The literary achievement of Rome will be examined mainly through selections in Latin with occasional readings in translation.
Prereq: 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: 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 301 F 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

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 W 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: Grade 13 or OAC Latin, LAT 100B, or instructor’s permission

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 F 3C 0.5
Tacitus
Selections from the works of Tacitus.
Prereq: One full 200-level Latin course or instructor’s permission
Offered 1988-89 at Wilfrid Laurier University.
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 461 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 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.

Course Descriptions

Dance Group

Assistant Professor, Chairman of Dance Group
J. Officer, ARAD (Adv. and ATC), (London), Recipient of the Distinguished Teacher Award

Associate Professor, Undergraduate Officer
R. Ryman, BA, MA (York), Al Chor (London)

Associate Professor
R. Priddle, BPHE (Toronto), MSc (Springfield), MA (Waterloo), PhD (Waterloo)

Assistant Professor
J. Chapman, BA, MA (York), PhD (CNAA, England)

Lecturer
L. Prada, BSc (Waterloo), ARAD (Adv. and ATC), (London)

Guest Artist
Susan Cash BFA (York)

Survey of Ballet History
An examination of the development of ballet from the Renaissance to contemporary times, focusing on the nature of dance of the past and its changes within a cultural context. Major personalities, events and forms, as well as social influences are assessed for their impact on the art.
Not for Dance Majors
By correspondence only

DANCE 233 W 3C 0.5
A History of Modern Dance
An examination of the major choreographic innovators, who have philosophically and stylistically shaped the modern dance idiom.
Prereq: DANCE 230
Offered alternate years

DANCE 242 F 3C 0.5
Labanotation 1
A theoretical and practical introduction to Labanotation to the elementary level.
Prereq: Two courses in dance technique or permission of instructor
Offered alternate years

DANCE 264A, F 2C IT
Developmental Aspects of Movement
A study integrating the theoretical and applied aspects of motor and perceptual motor development in children and adolescents. Tutorials will emphasize creative dance activities for school-age children. Opportunity is available to work with children in an applied setting.
Prereq: DANCE 111
Antireq: DANCE 264B and 264C

DANCE 264B F 2C IT
Developmental Aspects of Movement
A study integrating the theoretical and applied aspects of motor and perceptual motor development in children and adolescents. Tutorials will focus on movement education with preschool children. Opportunity is available to work with children in an applied setting.
Prereq: Early Childhood Education students only.
Antireq: DANCE 264A and 264C

DANCE 264C F 2C IT
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.
Antireq: DANCE 264A and 264B
Cross-listed as KIN 264C
DANCE 336 W 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 and slides to sharpen perceptions.

DANCE 342 W 3C 0.5
**Labanotation 2**
A study of the basic theoretical concepts of Labanotation to the intermediate level. Emphasis is placed both on reading and writing dance scores.
Prereq: DANCE 242
Offered alternate years

DANCE 351 F 2C,2std 0.5
**Ballet Choreography**
Analysis and study of themes and styles of 20th-century ballet. Through film and studio experience, consideration is given to the adaptation of the classical idiom to the artistic trends of the century.
Prereq: DANCE 111, 231 and 192D

DANCE 366 F 2C,2T,2std 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 in the applied setting with children.
Prereq: DANCE 241, 264 and KIN 200 or permission of instructor

DANCE 367 W 2C,3std 0.5
**Developmental Aspects of Movement Learning**
An examination of the developmental changes significant to the learning process with a particular emphasis on those facets which affect the learning of dance during childhood and early adolescence.
Prereq: DANCE 366 and KIN 255

DANCE 410/411 F/W 0.5/0.5
**Honours Dance Major Paper**
Students will examine dance research from different approaches including experimental, descriptive, historical and philosophical.
Prereq: Honours Dance students only
Students must consult with a faculty advisor before registering in one of the following:

DANCE 410B and DANCE 411B Skill Learning
Prereq: DANCE 264, 366, 367, KIN 255, 330

DANCE 410D and DANCE 411D Dance Notation
Prereq: DANCE 241, 341 and 482 or 474 (Benesh) or DANCE 242, 342 and 492 or 474 (Labanotation)

DANCE 410E and DANCE 411E Dance History
Prereq: DANCE 230, 231, 233 and 234, 333 or 343

DANCE 410F and DANCE 411F Developmental Studies with Children in Dance
Prereq: DANCE 264, 366, 367, 484 Recommend auditing KIN 330 and 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 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 wkshp 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 480I Historical Dance
Prereq: DANCE 230 and 231

DANCE 481I Ballet Choreography
Prereq: DANCE 351 and 392D or equivalent
Coreq: DANCE 391D

DANCE 482I Dance Notation Reconstruction
Prereq: DANCE 341 or 342

DANCE 483I Modern Dance Composition
Prereq: DANCE 333 and 394D or equivalent
Coreq: DANCE 493D

DANCE 484I Developmental Perspectives of Creative Movementable Children
Prereq: DANCE 241 and 242 or permission of instructor

DANCE 486I Dance Criticism
Prereq: DANCE 336 and 2 of DANCE 231/233/333

DANCE 488I Dance Production
Prereq: DANCE 351 or 333

The Workshop series is open only to third- and fourth-year Dance students. Two workshops in the 480 series may be taken toward the Honours degree. Workshops are offered pending sufficient enrolment.

**Technique Courses**
0.25
Each of the following technique courses consists of two 1-1/2 hour classes per week. Students are advised to check with their home department regarding the acceptability of Technique Courses for credit.

Entrance to Technique Courses is by audition only. Auditions are held during May and September. Contact the Department for details. Students holding credentials in specific technique syllabi should see the Undergraduate Officer in the Dance Department upon arrival on campus.

DANCE 191D Pre-Elementary Ballet I F

DANCE 192D Pre-Elementary Ballet II W

DANCE 193D Pre-Elementary Modern Dance I F

DANCE 194D Pre-Elementary Modern Dance II W

DANCE 291D Elementary Ballet I F

DANCE 292D Elementary Ballet II W

DANCE 293D Elementary Modern Dance I F
DANCE 391D Intermediate Ballet I  F
DANCE 392D Intermediate Ballet II  W
DANCE 393D Intermediate Modern Dance I  F
DANCE 394D Intermediate Modern Dance II  W
DANCE 491D Advanced Ballet I  F
DANCE 492D Advanced Ballet II  W
DANCE 493D Advanced Modern Dance I  F
DANCE 494D Advanced Modern Dance II  W

COURSES NOT OFFERED 1988-89
DANCE 220 Socio-Cultural Study of Western Dance
DANCE 221 Socio-Cultural Study of Non-Western Dance
DANCE 225 Dance Ethnology
DANCE 241 Bhitish Notation I
DANCE 243 Women in Western Theatre Dance
DANCE 325 Festivals: Mediators in Multiculturalism
DANCE 333 Canadian Perspectives on Theatre Dance
DANCE 341 Bhitish Notation 2
DANCE 343 An Historical Survey of Dance Notation Systems
DANCE 353 Modern Dance Composition
DANCE 484 Developmental Perspectives of Creative Movement with Children

Drama and Theatre Arts Group

Associate Professor, Chairman
W.R. Chadwick, BA, MA (Toronto), PhD (London)

Assistant Professor, Undergraduate Officer
M.G. van Dijk, BA, MA (Wellington), PhD (Toronto)

Assistant Professor
C.D. Abel, BA (Queens), MA, PhD (Toronto), LRAM (Speech and Drama)

Lecturer, Technical Director
A. Anderson

Course Descriptions
Courses not offered in the current academic year are listed at the end of this section.

Introductory Note
Laboratory sessions and rehearsal periods may be added to any course at the discretion of the instructor.

DRAMA 101A F 3C 0.5
Introduction to the Theatre 1
Introductory study of the theatre as a major art form. Selected plays as produced in their historical contexts. Contributions of the actor, designer and technician to theatrical production.

DRAMA 101B W 3C 0.5
Introduction to the Theatre 2
An extension of the studies described in 101A.

DRAMA 102 F,W 4L 0.5
Introduction to Acting.
An introduction to acting. The class will be structured as a rehearsal, where the students will explore improvisation and text work, concentrating on the practical problems of an actor's experiences in creating a role.
Prereq/Coreq: DRAMA 101A or B
Limited Enrolment. 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 and permission of the instructor
Limited enrolment

DRAMA 222 W 6L 0.5
Intermediate Acting 2
An extension of Drama 221.
Prereq: DRAMA 221 and permission of the instructor

DRAMA 223 F,W,S 4L 0.5
Speech Communication 1
Theory and practice of public speaking. Course involves design and delivery of various kinds of speeches, and the development of organizational, vocal, listening and critical skills.
Prereq: None
Open to students in all faculties but limited enrolment. Permission required.

DRAMA 224 F,W,S 4L 0.5
Speech Communication 2
Complex Speech Situations. Principles and practice of formal and informal meetings, communication for group decision-making, interviewing and media relations.
Prereq: DRAMA 223

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 period.
Cross-listed as CLAS 266

DRAMA 252 3C 0.5
Survey of Dramatic Literature and Theory 2
The Middle Ages, the Elizabethans and Jacobins (excluding Shakespeare) and the Spanish Golden Age.

DRAMA 253 3C 0.5
Survey of Dramatic Literature and Theory 3
French neo-classicism, the Restoration period and sentimental drama.
DRAMA 254 3C 0.5
Survey of Dramatic Literature and Theory 4
The late 18th, 19th and early 20th centuries, romanticism and naturalism.

DRAMA 255 3C 0.5
Survey of Dramatic Literature and Theory 5
Dramatic literature of the 20th century.

DRAMA 256 3C 0.5
Survey of Dramatic Literature and Theory 6
A survey of the modern drama of Australia, New Zealand, and the drama, in English, of Africa and the West Indies.

DRAMA 259 3C 0.5
Masterpieces of Western Drama – A Study of Performance 1
Plays of film. This course will entail studying a play and then viewing it as a movie.

DRAMA 261 F 3C 0.5
Introduction to Directing 1
A study of theories of the modern stage, the emergence of the director and the principles of stage direction, with special reference to the work of Stanislavski and Brecht.
Prereq: DRAMA 101A, 101B, 102, at least one dramatic literature class and permission

DRAMA 262 3L 0.5
Introduction to Directing 2
A workshop course consisting of the preparation of one or more detailed production books. Interpretation and analysis will be emphasized.
Prereq: DRAMA 261, two dramatic literature classes, and permission

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 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, DRAMA 222, and permission of the instructor.
Usually restricted to Drama majors

DRAMA 322 W 6L 0.5
Advanced Acting 2
An extension of the studies described in DRAMA 321.
Prereq: DRAMA 321 and permission of the instructor

DRAMA 325 F 4L 0.5
Seminar in Voice 1
A workshop course in voice for the actor, designed to increase vocal power, range, flexibility and variety in presenting the spoken word.
Prereq/Coreq: DRAMA 221

DRAMA 327 W 4L 0.5
Seminar in Voice 2
An extension of the studies described in DRAMA 325.
Prereq: DRAMA 326

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

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

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

DRAMA 343 F 2L,2C 0.5
Theatre Technology 1
Advanced studies in the theory and practice of theatre technology, including an apprenticeship program.
Prereq: DRAMA 243 and 244 and permission of the instructor

DRAMA 344 W 2L,2C 0.5
Theatre 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 arts administration. Topics include: budgeting, program selection, fund raising, publicity and audience analysis.

DRAMA 349 3C 0.5
Arts Administration 2
An extension of the studies in DRAMA 348.

DRAMA 351 3C 0.5
Canadian Drama
See ENGLISH 316.
Cross-listed as ENGL 316

DRAMA 352 3C 0.5
Russian Drama
Cross-listed as RUSS 341

DRAMA 353 3C 0.5
Russian Drama
Cross-listed as RUSS 342

DRAMA 355 3C 0.5
The Stage as Forum: German Drama in Translation
Cross-listed as GER 355

DRAMA 356 3C 0.5
The Stage as Forum: Russian Drama in Translation
Cross-listed as RUSS 356

DRAMA 357 3C 0.5
The Theatre of the Absurd

DRAMA 361 F std 0.5
Advanced Directing 1
Work as an assistant director on a major production involving the writing of a production casebook.
Prereq: DRAMA 261 or 262, at least three dramatic literature classes and permission
DRAMA 362 W std 0.5
Advanced 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 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 W 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, and permission of the instructor

DRAMA 422 W 6L 0.5
Advanced Acting Workshop 2
An extension of DRAMA 421.
Prereq: DRAMA 421 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 his or her major area of concentration.
A letter grade for DRAMA 499A will be submitted only after the completion of DRAMA 499B.

COURSES NOT OFFERED 1988-89
Consult with Drama Undergraduate Officer to determine offerings for 1988-89.

Department of Earth Sciences

Associate Professor, Chairman of the Department
J.P. Greenhouse, BSc, MSc (British Columbia), PhD (California, San Diego)
Recipient of the Distinguished Teacher Award

Associate Professor, Associate Chairman of the Department
J.A. Legault, BSc, MSc (Ottawa), PhD (Oklahoma)

Associate Professor, Graduate Officer
D.E. Lawson, BSc, MSc (New Brunswick), PhD (Reading)

Associate Professor, Undergraduate Officer
J.F. Barker, BSc, MSc (McMaster), PhD (Waterloo)

Professors
J.A. Cheney, BE (Saskatchewan), MS (California, Berkeley), PhD (Illinois), PEng
M.B. Dusseault, BSc, MSc, PhD (Alberta), PEng
R.N. Farvolden, MSc (Alberta), PhD ( Nursery)
E.O. Frid, BSc, MSc, PhD (Toronto), PEng
I.L. Gibson, BSc, PhD (Imperial College, London)
R.W. Gillham, BSc (Toronto), MSc (Guelph), PhD (Illinois)
P.F. Karrow, BSc (Queen's), PhD (Illinois)
A.V. Morgan, BSc (Leicester), MSc (Calgary), PhD (Birmingham)
E.J. Reardon, BA (St. Francis Xavier), PhD (Pennsylvania State)

Associate Professors
E.C. Appleyard, BSc (Western Ontario), MSc (Queen's), PhD (Cambridge)
S.K. Frape, BSc, MSc, PhD (Queen's)
J.M. Konrad, BS, Dipl. Ing. (Strasbourg), MSc (Laval), PhD (Alberta), PEng
R.G. Roberts, BA (Cambridge), MSc, PhD (McGill)

Assistant Professors
M. Coniglio, BSc (McGill), MSc (Manitoba), PhD (Memorial)
D.C. Nobes, BSc, MSc, PhD (Toronto)
S. Schiff, BSc (McMaster), MA, MPhil, PhD (Columbia)

Research Professor
J.A. Franklin, BSc (Eng) (London), MSc, D.I.C., PhD (Imperial College, London), PEng

Research Assistant Professors
E.A. Sudicky, BSc, MSc, PhD (Waterloo), PEng
B.G. Warner, BSc, MSc (Waterloo), PhD (Simon Fraser)

Adjunct Professors
D. Best, PhD (Alberta)
M.E. Brookfield, BSc (Edinburgh), PhD (Reading)
R.M. Brown, BSc (Bishops), PhD (McGill)
L.D. Delorme, BSc (Saskatchewan), MSc (Alberta), PhD (Saskatchewan)
P. Fritz, Dipl. Geol, Dr. rer. nat. (Stuttgart)
M. Gascoyne, BA, MSc (Lancaster), PhD (McMaster)
F. Goodarzi, BSc (Tehran), MSc, PhD (Newcastle-upon-Tyne)
I. Herrera, PhD (Brown)
D.R. Lee, BSc, MSc (North Dakota), PhD (Virginia Polytechnic Institute)
R.W. Macqueen, BA, MA (Toronto), PhD (Pistolet)
J.O. Niagu, BSc (Ibadan), MSc (Wisconsin), PhD (Toronto)
H.C. Saunders, BSc (Queens's Belfast), MA, PhD (Toronto)
L.R. Snowden, BSc (Calgary), PhD (Houston)
G. van der Kamp, BSc, MSc (British Columbia), PhD (Amsterdam)
O. White, BSc, MSc (Toronto), PhD (Illinois), PEng

Senior Demonstrators
J.L. Lang, BSc, MBA (Queens's)
K. Lai-Hay, BSc, MSc (Guelph)

Faculty Members holding cross appointments from Earth Sciences to:
1Civil Engineering
2Physics
3Faculty Member holding joint appointment with Physics
Course Descriptions

1. EARTH 121/122 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 $100-$150 per student.

3. Regular Earth Sciences students are encouraged to seek geological employment in the summers.

EARTH 121 F 2C,3L 0.5
Introductory Geology 1
An introduction to rocks and minerals and the processes of their formation. The structure of the earth, plate tectonics and its relationship to deformation, metamorphism and formation of magmas. Earth resources.

EARTH 122 W 2C,3L 0.5
Introductory Geology 2
An introduction to processes that shape the earth’s landscapes. Consideration of the time concept in geology, introduction to fossils, their occurrence and uses in earth sciences. The geological history of North America.
Prereq: EARTH 121

EARTH 221 W,S 3C,1T 0.5
Geochemistry 1
Prereq: EARTH 231 or permission of instructor

EARTH 231 F 2C,3L 0.5
Mineralogy
Introduction to systematic mineralogy. Bases of mineral classification. Interrelationships of chemical, structural and physical properties. Occurrence of major groups of rock-forming minerals. Introduction to optical properties of minerals and the use of the petrographic microscope as a tool in identifying minerals and interpreting their genetic history.
Prereq: EARTH 121

EARTH 232 W,S 2C,3L 0.5
Petrography
The study of rocks in thin section. The classification and identification of sedimentary, igneous, and metamorphic rocks.
Prereq: EARTH 231

EARTH 235 F 2C,3L 0.5
Stratigraphy
An introduction to the nature, origin and interpretation of stratified earth materials. Emphasis on principles and approaches. Stratigraphy in earth history and economic deposits.
Prereq: EARTH 121/122

EARTH 236 F 2C,3L 0.5
Principles of Paleontology
The principles of paleontology with particular stress on the species concept and evolution; examples will be drawn primarily from the fossil record of plants and vertebrates. Laboratory work will include projects related to lecture topics.
Prereq: EARTH 121/122

EARTH 238 W,S 2C,3L 0.5
Introductory Structural Geology
Prereq: EARTH 121/122

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 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

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 342 F 2C,3L 0.5
Geomorphology
Prereq: GEOG 201

EARTH 345 W 2C,2L 0.5
Historical Geology
A systematic review of the geological history of North America from the Precambrian to the Recent exemplified by regional geology. Laboratory work will include study of rocks and fossil regional suites and geological maps.
Prereq: EARTH 235

EARTH 355 F 3C 0.5
Statistical Methods in Geology
Introduction to the principles of probability and statistics and their application in the earth sciences. Evaluation of quantitative data; statistical models.
Prereq: MATH 113A/B and an introductory course in computer programming

EARTH 358 W 3C,1T 0.5
Environmental Geology
The influence of geology on the natural environment with special emphasis on hazards and the role of groundwater, hydrogeology in the runoff cycle; groundwater resources development and subsurface waste disposal; environmental geology as a factor in health and disease.
Prereq: EARTH 121/122 or GEO E 126
Antireq: SCI 250

EARTH 360A W 3C 0.5
Global Geophysics
Topics in the plate tectonics, heat flow, gravity, seismology, magnetism, electromagnetics and dynamics of the planet.
Prereq: PHYS 121/122, EARTH 260
EARTH 368 F 2C 0.5
Geophysics 1
Cross-listed as PHYS 368

EARTH 369 W 3C 0.5
Geophysics 2
The geology of the ocean basins. Topics in physical oceanography. Physical properties of ocean water, heat budget of the world oceans. Oceanic circulation, Coriolis effects. Some idealized current regimes. Prereq: MATH 113A/B and PHYS 121/122 or equivalent
Cross-listed as PHYS 369

EARTH 370 W 3C 0.5
Economic Geology
The occurrence and geological setting of metallic, non-metallic minerals and construction materials. Energy resources. Special emphasis on Canada’s resource industries. The laboratory will involve sampling methods, ore calculation and property evaluation. Prereq: EARTH 231, 232

EARTH 390 W F/Dlab
Methods in Geological Mapping
Ten day field camp at Whitefish Falls, held at beginning of spring term.

EARTH 421 F 2C 0.5
Geochemistry 2
The application of chemical thermodynamics to geochemical problems. Development of the three laws of Thermodynamics, Gibbs free energy and equilibria constants. Introduction to various topics in aqueous geochemistry such as mineral equilibria, ion exchange and redox equilibria. Various aspects of organic geochemistry and geochemical exploration will also be covered. Prereq: First year chemistry. EARTH 221
Restricted to fourth year and graduate students.

EARTH 427 W 2C 0.5
Crustal Evolution
An analytical critique of the plate tectonics theory. Tectonic syntheses based on the theory in the light of world geology. Normally restricted to fourth year Earth Sciences students.

EARTH 432 F 3C 0.5
Precambrian Geology
The geology, tectonics, stratigraphy and history of the Canadian Precambrian Shield. The early evolution of the Earth’s crust. The Precambrian time scale and problems of geochronology. Life, climate and physical conditions in Precambrian time. Prereq: EARTH 333

EARTH 433 W 2C 0.5
Applied Sedimentology
The source, migration and sedimentary environment of hydrocarbons, exploration, types of traps, extraction. Carbonate sediments and their diagenesis. The environmental impact and control of recent sedimentation. Prereq: EARTH 333

EARTH 434 W 2C 0.5
Biostratigraphy
Methods of using paleontological data to solve stratigraphic problems. Faunal provinces in space and time. Effects of continental drift and climatic change on biogeography through the Phanerozoic. Prereq: EARTH 336

EARTH 435 W 3C 0.5
Advanced Structural Geology
The geometry, kinematics and dynamics of structural geology. The relationships of structures from the microscopic to the megascopic scale; statistical studies of structural elements. Prereq: EARTH 260

EARTH 436A/B F/W 6L 0.5/0.5
Honours Thesis
(A course for Honours Earth Sciences students only.) Each student will work under the direction of a member of the Department on a short research project. The results of this will be presented in thesis form and will be critically examined by members of this and, where pertinent, other departments.

EARTH 437 F 2C 0.5
Rock Mechanics
Review of stress and strain. Mohr’s circle, strength theories, laboratory tests, classification of rocks. Rock mechanics considerations in the construction of shafts, drifts, tunnels, foundations and rock slopes. Laboratory exercises will deal with uniaxial, triaxial, flexure, hardness and tensile testing of rock. Problem sets will be assigned. Prereq: A course in Statics and Mechanics of deformable materials, or consent of instructor

EARTH 438 W 2C 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 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 students.

EARTH 441 W 2C 0.5
Introductory Quaternary Ecology
An introduction to Quaternary ecology. The morphology, biostratigraphy, 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 instructor

EARTH 456 F 3C 0.5
Numerical Methods in Geoscience
Introduction to numerical methods and their use in geology and hydrogeology. Finite differences and finite elements. Solution of boundary value problems, mathematical modelling. Prereq: MATH 113A/B and an introductory course in computer programming

EARTH 458 F S 3C 1T 0.5
Physical Hydrogeology
An introduction to the physical side of hydrogeology, including Darcy’s law, the groundwater flow equations for steady-state and transient conditions, applications to flow nets, aquifer testing, groundwater resources evaluation, and construction project dewatering. The role of groundwater in the hydrologic cycle is explored with emphasis on natural groundwater flow systems and their influence on stream flow, slope stability and soil drainage. Prereqs: EARTH 121/122 or GEO E 126 or CIV E 253, and MATH 213A/B or equivalents. Formerly EARTH 439
EARTH 459 W 3C,1T 0.5
Chemical Hydrogeology
An introduction to the chemical side of hydrogeology with emphasis on ground-
water 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 contami-
nation; processes governing contaminant behaviour including dispersion,
diffusion and adsorption, hydrogeologic aspects of site selection for waste
disposal.
Prereq: EARTH 221 or CIV 375 or equivalent, and EARTH 456
Formerly EARTH 439

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 and computer modelling of geophysical
responses.
Prereq: EARTH 260
Recommended: MATH 213A and an
introductory course in computer
programming.

EARTH 461 F 2C,3L 0.5
Applied Geophysics 3
Geophysical field methods for Engi-
eering and Hydrogeology.
Prereq: Students must be enrolled in the
Geophysics Option

EARTH 470 F 3C,2L 0.5
Metallic Mineral Deposits
The petrology and genesis of metalli-
ferous 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 micro-
copy.
Prereq: EARTH 370

EARTH 480 S 2C,1L 0.5
Field Study
Depending on the demand and the avail-
ability 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 loca-
tion. Expenses are to be paid by the
student.
Prereq: Consent of the instructor

EARTH 490 F 2C,1L 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 observa-
tions with study of specimens, core labo-
atory 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 avail-
able from department office.

Department of
Economics

Professor, Chairman
D. Wilton, BComm (McMaster), PhD (MIT)
Associate Professor, Associate
Chairman, Graduate Affairs
L.P. Fletcher, BComm (Mount Allison),
AM, PhD (Brown)
Professor, Associate Chairman,
Undergraduate Affairs
R.R. Kerton, BComm (Toronto), MA
(Carleton), PhD (Duke)

Professors
S.K. Ghosh, BSc, MSc (Calcutta), MS,
PhD (Wisconsin)
J.H. Hotson, BA (Colorado College), MA,
PhD (Pennsylvania)
L. Needlemann, MA (Oxford), PhD
(Glasgow)
W.R. Thiers, 1BA (British Columbia), MA,
PhD (Yale), (on leave 1988)

Associate Professors
A.A. Andrioupolos, BA (Athens), MA
(Wayne State), PhD (Southern Califor-
nia)
K.M. Bennett, BA, MA (Queen's), PhD
(McGill)
J.A. Brox, BA (Toronto), MA, PhD
(McMaster)
J.E. Cuenca, LIC (Madrid), MA (Western
Michigan), PhD (Toronto)
M.C. Howard, BA, MA (Lancaster), PhD
(Leicester)
S.W. Kardasz, BA (Loyola), PhD
(Queen's)
R.C. Kumar, BStat, MStat (Indian Statistical
Institute), MA, PhD (Toronto)

F.M. Naqib, BSc (Washington), MSc
(Oregon), PhD (Queen's)
W.R. Needham, BComm (Carleton), MA,
PhD (Queen's)
K.R. Stokley, BA (Southern California),
MA, PhD (Queen's)
Assistant Professors
R.A. Androkovitch, BSc (Lethbridge), MA,
PhD (Western Ontario)
R.W. Bodek, BSc (Sydney, Australia), MA,
PhD (York)
E. Carvalho, BA, MA, PhD (Waterloo)
T.T. Nguyen, BSc, CHE (Berkeley), MA
(Simon Fraser), PhD (Western Ontario)
E. Nosal, BA (Queen's), MA (McMaster),
PhD (Queen's)

Lecturers
H. Cutts, BA (Queen's), MA (Princeton)
C. Fader, BA (Windsor), MA (Western
Ontario)
B. Kwok, BA (McMaster), MA (Western
Ontario)
E. Lau, BA (Toronto), MA (Manchester)
G. Stirling, BMath (Waterloo), MA
(Guelph)

Adjunct Faculty
L. Smith, BA, MA (Waterloo)

Faculty Member of Economics holding a
Cross appointment to:
1School of Accountancy

Course Descriptions

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 prere-
gistration and students can confirm
the "term offered" with their Depart-
mental advisor.

2. The "normal" number of lectures per
week in each course is three;
however, each instructor determines
how often his or her particular class
will meet.

3. Additional courses may be offered in
the spring term from time to time.
Consult departmental listing at time of
pre-registration.

4. Due to sabbatical leaves, some
courses normally offered will be
cancelled in 1988-89. Consult depart-
mental listing at time of preregistra-
tion for 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 in algebra or calculus. When appropriate, calculus and algebra will be used in "M" sections.

ECON 102 F.W,S 3C 0.5

Introduction to Macroeconomics
Determination of national income, the banking system, government fiscal and monetary policy, international trade and finance; and current economic problems.
Prereq: "M" sections only: Grade 13 or OAC in algebra or calculus. When appropriate, calculus and algebra will be used in "M" sections.

ECON 150 F.W,S 3C 0.5

An Introduction to Micro and Macro Economies
Selected topics in both Micro and Macro economics, with emphasis on theory, practical applications and public policy. This is a one term course for students holding a credit in economics.
Prereq: OAC in Economics
Antireq: Student may not take both ECON 150 and ECON 101 and/or ECON 102 for credit

ECON 201 F,W,S 3C 0.5

Microeconomic Theory
Theory of the determination of the level of national income (GNP), the unemployment rate, interest rates, prices and inflation; analysis of macroeconomic policies to stabilize the economy and alleviate the problems of inflation and unemployment. (Prereq: ECON 101, 102, or 150

ECON 202 F.W,S 3C 0.5

Macroeconomic Theory
Theory of the determination of the level of national income (GNP), the unemployment rate, interest rates, prices and inflation; analysis of macroeconomic policies to stabilize the economy and alleviate the problems of inflation and unemployment. (Prereq: ECON 101, 102, or 150

ECON 211 F.W 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, or 150

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, statistical estimation, hypothesis testing and regression analysis.
Prereq: ECON 101, 102, or 150

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, or 150

ECON 301 F.W 3C 0.5

Intermediate Microeconomics
Theory of modern welfare economics with some applications; the meaning and measurement of economic efficiency and equity; General equilibrium theory.
Prereq: ECON 201, 202

ECON 302 F.W 3C 0.5

Monetary Theory and Banking
Monetary theory and banking in an open economy; national policies for achieving full employment, price stability, and equilibrium in the balance of payments.
Prereq: ECON 201, 202, 231

ECON 310 W 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-Mansonian framework.
Prereq: ECON 101, 102 or 150
Formerly ECON 263

ECON 311 F.W 3C 0.5

Mathematical Economics
Mathematical treatment of some micro- and macro-partial and general equilibrium models; programming and other techniques; simple growth models.
Prereq: ECON 201, 202, 211 (or MATH 130B)

ECON 321 F.W 3C 0.5

Introduction to Econometrics
Introductory level course in econometrics; includes economic model building and testing, regression and correlation analysis, and price indices.
Prereq: ECON 221

ECON 331 F.W 3C 0.5

International Trade and Finance
An examination of theories of international trade and finance at an intermediate level. Topics include theories of trade structure (Ricardian, Heckscher-Ohlin), the effects of tariffs and multinational corporation behaviour, and adjustment under flexible and fixed exchange rates.
Prereq: ECON 201, 231

ECON 333 W 3C 0.5

Interregional Economics
An examination of structural characteristics, development and growth in intersystems. Integration of economic and spatial analysis related to theory and policy through a focus on models such as neoclassical, export-base, shift-share, stages, cumulative-causation, core-periphery.
Prereq: ECON 201, 231

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
The economic rationale of governmental fiscal activity; cost-benefit analysis; the structure and economic effects of public expenditure and revenues; the analysis of income, consumption and wealth taxes.
Prereq: ECON 102 or 150, 201
ECON 343 F 3C 0.5  
Urban Economics  
Application of economic analysis to urban and metropolitan areas. Topics include location decisions of households and firms, structure and growth of cities, land and housing market, urban transportation market, urban labour market, and urban public finance - all developed within the context of economic theory. Policy issues will be stressed.  
Prereq: ECON 101 or 150  
(ECON 201 is recommended)

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 the demand for labour by firms; investment in human capital; trade unions; internal labour markets.  
Prereq: ECON 201  
ECON 102 is recommended

ECON 353 F 3C 0.5  
Population Economics  
Population objectives; demographic techniques; economic interrelationships with fertility, mortality and migration; determinants and consequences of current world population changes.  
Prereq: ECON 201

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 361 F.W.S 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  
Formerly ECON 241

ECON 363 W 3C 0.5  
Contemporary Canadian Problems 1  
A "topic oriented" seminar course. Problems are selected from a list that includes regulatory economics, poverty, unemployment, industrial policy, safety and so forth. The format assists the student in gaining analytical skill through work on the selected topics.  
Prereq: ECON 201, 202

ECON 365 W 3C 0.5  
Economic Development of Modern Europe 1780-1973  
Prereq: ECON 101, 102; or 150

ECON 381-389 3S each 0.5  
Special Topics  
One or more special half courses will be offered at different times as announced by the Department.  
Prereq: Consent of instructor

ECON 401 F.S 3C 0.5  
Advanced Microeconomic Theory  
This course considers a number of advanced topics at the forefront on modern microeconomics. Possible Topics: Uncertainty, equilibrium analysis, market structures.  
Prereq: ECON 211 or equivalent, 301 (311 is recommended)  
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 F.W 3C 0.5  
Advanced Macroeconomic Theory  
Classical, Keynesian, Monetarist and New Classical models of macroeconomics; recent contributions to the theory of consumption, investment, inflation, inflation expectations, unemployment and economic growth.  
Prereq: ECON 211 or equivalent, 221, 301, 302 and permission of the instructor or undergraduate officer for all students who are not registered in the 4th year of an Honours Economics program

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 W 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 and 302  
Recommended: Econ 402, completed or taken concurrently.

ECON 406 W 3S 0.5  
Keynes and Post Keynesian Economics  
This course draws on Keynes, Fisher, Kalecki, Weintrob, Minsky and others to explore alternatives to current macroeconomics and policies seeking solutions to problems of inflation, debt crises, high interest rates and lagging growth.  
Prereq: ECON 301, 302  
This course is primarily for fourth-year General and Honours students. However, M.A. 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 420 F 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 and 321

ECON 421/422 F/W 3C 0.5 Econometrics 2
Review of linear algebra and development of basic statistical inference; formulation, identification, estimation, and tests of single equation and simultaneous equation regression models of micro- and macro-economics; empirical models.
Prereq: ECON 201, 202, 211, 221, 321

ECON 431 W 3C 0.5 International Economic Policy
Analysis of selected policy problems of open economics from an institutional perspective. Topics include GATT and trade policy, customs union, new international economic order, multinational firms, exchange rate management and international monetary reform.
Prereq: ECON 301, 302, 331

ECON 461 F 3S 0.5 Comparative Economic Systems
This course concentrates upon the criteria which are relevant for comparing different economic systems, how well various forms of economic theory make comparisons, the development of capitalist and socialist economies, together with the analysis of alternative types of price system and planning.
Prereq: ECON 201, 202

ECON 463A/B Studies in Political Economy
Either ECON 463A or ECON 463B will be offered in the Winter term. Check departmental listing on course offering.

ECON 463 A W 3S 0.5 Political Economy of Capitalist Development
A study of the main tools and models of modern political economy. Micro and macro tools and concepts, based on the work of Robinson, Sraffa, Kaldor, Pasinetti, Rowthorn, Nell, Sweezy and others are integrated in what can be termed the "classical Marxist" tradition.
Prereq: Consent of instructor or undergraduate officer

ECON 468 B W 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, Madzved and others.
Prereq: Consent of instructor or undergraduate officer

ECON 471 F 3C 0.5 Computable General Equilibrium Modelling
Basic concepts and techniques of computable general equilibrium modelling, fixed-point theory and algorithm, data and calibration, system sensitivity, applications in various fields of economics, e.g., taxation, international trade, industrial organization, economic history, economic development, and fixed-price equilibria.
Prereq: ECON 211, 301 (ECON 311, 331, or 341 are recommended)

ECON 472 W 3S 0.5 Advanced Public Policy and Applied Economics
An advanced discussion of selected topics in macroeconomic theory, policy and empirical research. Seminar topics include the role of stabilization policy, the usefulness of income policy and evaluation of Monetarism as practiced by the Bank of Canada.
Prereq: ECON 301, 402 (may be taken concurrently)

ECON 481-489 3S 0.5 each Special Studies
Research and reading courses under the direction of individual instructors.
Admission by consent of instructor.

COURSES NOT OFFERED 1988-89
ECON 335 Economic Development
ECON 342 Urban Economics
ECON 346 Contemporary Canadian Problems II
ECON 356 Economic Development of Modern Europe 1780-1973
ECON 411 Advanced Mathematical Economics
ECON 441 Economics of the Public Sector 1
ECON 442 Economics of the Public Sector 2

Department of Electrical Engineering

Professor, Chairman of the Department
J.W. Mark, BASc (Toronto), MEng, PhD (McMaster), PEng

Professor, Associate Dean, Graduate Studies, Faculty of Engineering
J.D. Aplevich, BE (Saskatchewan), PhD (Imperial College, London), PEng

Professor, Associate Dean, Undergraduate Studies, Faculty of Engineering
H.C. Ratz, BASc (Toronto), MS (Massachusetts Institute of Technology), PhD (Saskatchewan), PEng

Associate Professor, Associate Chairman for Graduate Affairs
S.K. Chaudhuri, BE, MTech (IIT/Dehi), MSc, PhD (Manitoba)

Professor, Associate Chairman for Undergraduate Affairs
J.V. Hanson, BASc (Toronto), MSc, PhD (Imperial College, London)

Assistant Professor, Director, Computer Communications Networks Group
G.B. Agnew, BASc, PhD (Waterloo)

Professors
I.F. Blake, BASc, MSc (Queen's), MA, PhD (Princeton), PEng
P.R. Bryant, MSc (London), MA, PhD (Cambridge)
S.G. Chamberlain, MSc, PhD (Southampton)
Y.L. Chow, BEng (McGill), MASc, PhD (Toronto), PEng
J.D. Cross, BSc (Wales), MS, PhD (Carleton), PEng
M.I. Elmsley, BSc (Cairo), MASc, PhD (Ottawa), PEng
J.A. Finih, RF (Saskatchewan), MASc, PhD (Toronto), PEng
E.L. Heasell, BSc, PhD (Imperial College, London), PEng
S.N. Kaira, BASc (Punjab), MS, PhD (Illinois), PEng
R.H. MacPhie, BASc (Toronto), MSc, PhD (Illinois)
V.H. Quintana, BEng (Cohn), MSc (Wisconsin), PhD (Toronto), PEng
R.S. Ramshaw, BSc, PhD (Nottingham), PEng
J. Reeve, BSc, MSc, PhD, DSc (Manchester), PEng
Course Descriptions

Electrical Engineering

D.J. Roulston, BSc (Belfast), PhD (Imperial College, London), CEng
R.G. van Heeswijk, Ir (Deft, Holland), PEng
M. Vidyasagar, BSc, MASc, PhD (Wisconsin)
T.R. Viswanathan, BASc (Madras), MSc, PhD (Saskatchewan)
J. Vlaich, Dipl Ing CSc (Technical University of Prague)
L.A.K. Watt, BSc (Manitoba), MS (Chicago), PhD (Minnesota)
J.W. Wong, BSc, MS, PhD (California-Los Angeles)

Associate Professors
P.P. Dasewicz, BSc, MSc, PhD (Waterloo), PEng
J.S. Keeler, BASc, MASc, (Toronto), PEng
W.M. Loucks, BASc (Waterloo), MASc, PhD (Toronto), PEng
F. Mavaddat, BSc (Tehran), Diploma-Graduate Studies (Netherlands), PhD, DIC (Imperial College)
R.E. Sevola, Dipl Ing (Czech Technical University), PhD (Toronto), PEng
W.J. Wilson, BE, MSc (Saskatchewan), PhD (Cambridge), PEng

Assistant Professors
J. Barby, BTEch (Ryerson Polytechnical), MASc, PhD (Waterloo)
G.H. Freeman, BSc, PhD (Waterloo)
A.J. Heunis, BSc (South Africa), MSc, PhD (Imperial College, London)
B.R. Preiss, BASc, MASc, PhD (Toronto)
C.R. Selvakumar, BE (Madras), MTech (IIT/Bombay), PhD (IIT/Madras)
A. Vannelli, BSc, MSc (Concordia), PhD (Waterloo)

Adjunct Faculty
R.G. Anthes, BASc, MASc (Toronto), PEng
R. Bartnikas, BASc (Toronto), MEng, PhD (McGill)
J. Li, BSc, DipEd (Hong Kong), DSc (Laval)
R. Malewski, BSc, MSc (Technical University of Warsaw), PhD (Electrotechnical Institute of Warsaw)
T.R. Viswanathan, BASc (Madras), MSc, PhD (Saskatchewan)
L.Y. Wei, BS (National Northwestern College, China), MSc, PhD (Illinois)

Laboratory Director
R.L. Wright, PEng

Faculty Member of Electrical Engineering holding cross appointment to:

Computer Science

Faculty Members holding cross appointment to Electrical Engineering from:

Computer Science

Electronics

EL 206 W 3C,1T,3L 0.5

Electronic Circuit Analysis

This is an introductory course in electronic circuit analysis which follows the first circuits course EL 123. The topics to be discussed are: Operational amplifier applications, diodes, rectifiers, introduction to MOS and bipolar transistors, basic amplifier circuits, frequency response, elementary treatments of feedback, filters and oscillators. The student is introduced to computer-aided analysis techniques using WATAND.

Prereq: EL 123 or equivalent
Antireq: EL 204

Alternate weeks.

EL 222 F,W 3C,1T,3L 0.5

Digital Computers


Prereq: GEN E 121 or equivalent

Open

EL 224 F,S 3C,1T 0.5

Numerical Methods

Application of computers to engineering problems. Number systems, errors and error propagation. Roots of nonlinear equations. Solution of systems of linear equations. Interpolation and numerical integration. Solution of ordinary differential equations. A non-numerical algorithm (e.g. sorting). Emphasis will be placed on algorithm construction and programming style.

Prereq: GEN E 121 or equivalent

EL 231 F 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.
EL E 234 F 3C,1T,3L,1 0.5 Microelectronic Circuits and Devices
The first of a two course sequence in electronic circuits and devices. Topics covered are: second order networks, operational amplifiers, electronic devices, analog and digital circuits.
PreReq: EL E 123
Alternate weeks

EL E 251 F 3C,1T,3L,1 0.5 Programming Languages and Translators
Data types and representations, operations, sequence control, data control, storage management, language syntax, compilers and interpreters.
PreReq: GEN E 121
Alternate weeks

EL E 252 S 3C,1T,3L,1 0.5 Data Structures
Introduction to data and data abstraction, fundamental data structures, implementing and manipulating data structures, basic file systems.
PreReq: EL E 251
Alternate weeks

EL E 261 W 3C,1T,3L,1 0.5 Energy Systems and Components 1
Alternate weeks.

EL E 262 F 3C,1T,3L,1 0.5 Energy Systems and Components 2
PreReq: EL E 261
Alternate weeks.

EL E 269 F,W 3C,2T,3L,1 0.5 Electrical Engineering 2
Alternate weeks.

EL E 301 W,S 1C 0.0 Seminar
General Seminar

EL E 302 F,W 1C 0.0 Seminar
General Seminar

EL E 316 W,S 3C,1T,0.5 Introduction to Probability Theory
Conditional probability and independence; Bayes’ Theorem; random variables; functions of random variables; distribution functions; applications to reliability and failure rates; marginal and conditional distributions; correlation and applications to regression and statistical testing.

EL E 318 W,F,W 3C,1T,3L,1 0.5 Communications 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 DBS, AM, SSB, etc. Angle modulation and the spectrum of frequency modulated signals. Techniques for the generation and demodulation of FM signals. Introduction to noise and its effects in AM and FM systems.
Alternate weeks.

EL E 323 W,S 3C,1T,3L,1 0.5 Digital Circuits and Systems
Open.

EL E 332 S 3C,1T,3L,1 0.5 Electronic Circuits
Amplifier biasing networks, single and multi-stage small-signal amplifiers, small-signal equivalent circuits; high and low frequency effects; negative feedback amplifiers; oscillators; noise in electronic circuits; introduction to large signal amplifiers.
PreReq: EL E 208, EL E 231
Alternate weeks

EL E 333 W 3C,1T,3L,1 0.5 Microelectronic Circuits and Devices 2
The second of a two course sequence covering the following topics: theory of devices, theory of networks, analog circuits, digital circuits, operational amplifiers.
PreReq: EL E 234
Alternate weeks

EL E 342 W,S 3C,1T,0.5 Electrical Networks 1
Discrete and continuous signals, convolution, network equations, simulation graphs, Fourier transform, frequency response of networks, Laplace transform, z-transform.

EL E 353 W 3C,1T,3L,1 0.5 Microprocessor Systems and Interfacing
Microprocessor system architecture, buses, memories, peripheral connections, parallel, serial, analog interfaces, magnetic storage media, data communications, testing and debugging.
PreReq: EL E 222, EL E 251, EL E 323
Alternate weeks

EL E 354 W 3C,1T,3L,1 0.5 Real-Time Operating Systems
Introduction, basic concepts, process management, interprocess communication and synchronization, memory management, resource management, interrupt handling, concurrent programming.
PreReq: EL E 251, EL E 252
Alternate weeks

EL E 360 F 3C,1T,0.5 Electromagnetic Devices
Introduction to electric energy generation, transmission and distribution systems. Transformers. Principles of electromechanical energy conversion. DC, three-phase and single-phase rotating machines. Specialized motors.
PreReq: EL E 126

EL E 371 S 3C,1T,3L,1 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.
PreReq: EL E 126 or equivalent
Alternate weeks.
EL E 380  F,W  3C,1T,3L  0.5
Systems and Control
An introduction to control. Advantages of closed-loop feedback systems. The role
of the system mathematical model. Block diagrams and signal flow graphs. The
basic control system design problem, stability in control systems. Frequency
response analysis techniques. Root-locus analysis. Elementary lead-lag compensa-
tion. Z-transforms.
Alternate weeks.

EL E 401  F,S  1C  0.0
Seminar
General Seminar

EL E 402  W  1C  0.0
Seminar
General Seminar

EL E 402-409, 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 offer-
ings inquire at the Department.
Prereq: Permission of the instructor.

EL E 406  W  3C,3L  0.5
Robot Dynamics and Control
Homogeneous transformations. Kinematics and inverse kinematics. Denavit-
Hartenberg convention. Jacobians and velocity transformations. Dynamics. Path
Prereq: Permission of the instructor
Project

EL E 411  F,S  3C,1T  0.5
Data Communications
Random processes: stationary process, power spectral density, noise, low-pass
and band-pass processes. Sampling and pulse transmission. Signal distortion,
bandwidth for pulse transmission. Pulse detection and matched filtering. Digital
duplexing, line coding, pulse shaping, detection and error rates. ISI and equali-
zation. Pulse code modulation, delta modulation, quantization, and detection
errors. Effect of noise in PCM systems.
Prereq: EL E 318, EL E 316 or by
permission of instructor

EL E 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 noncohe-
rent 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: EL E 411 or permission of instructor

EL E 413  W  3C,1T  0.5
Digital Signal Processing
Review of continuous and discrete-time systems, Z-transform. Frequency
response. Analog filter design and transforma-
tions for digital filter design. Windowing techniques, the discrete
Fourier transform. Selected applications of digital signal processing.
Project

EL E 426  F  3C,3L  0.5
Software Engineering
Block structured languages, actual and
formal parameters, recursion, formal
description, relationship to machine
code. Compilers. Data structures, arrays,
lists, stacks, associative structures.
Searching and sorting. Operating system
organization, co-operating processes,
process synchronization primitives. Struc-
tured software design, software testing and
maintenance.
Prereq: EL E 222 or equivalent
Project

EL E 427  F,W  2C,1T,3L  0.5
Digital Systems Engineering
Complexity in digital systems and its
control. Microprogramming, multipro-
gramming, paging, segmentation, capa-
bilities. Hardware-software homomor-
phism; evolution of microprocessor
architectures. Performance estimation.
Prereq: EL E 332 and either EL E 364,
EL E 426 or CS 354 or equivalent
Open

EL E 428  F,S  3C,1T  0.5
Computer Communications Networks
Use of computer networks. Network
architecture. ISO reference model.
Network topology, connectivity analysis,
delay analysis, local access design.
Physical layer, data link layer, higher layer
protocols. Routing, flow control,
congestion control. Local area networks.
Prereq: EL E 222, EL E 316, EL E 318

EL E 429  W  3C,1T  0.5
Computer Structures
Organization and performance of
conventional unprocessors, pipelined
processors, parallel processors and multi-
processors; memory and cache struc-
tures; multiprocessor algorithms and
synchronization techniques; special-
purpose architectures.
Prereq: One of EL E 354, EL E 426 or
CS 354
Prereq/Coreq: EL E 427

EL E 435  F,S  3C,1T  0.5
Semiconductor Devices
Metal-Semiconductor junctions (Schottky
barriers), heterojunctions, solar cell, light
emitting diode, photodetector diode,
JFETs, MESFETs, MOSFETs, VLSI bipolar
and MOS devices, CCDs, Power devices
(SCRs, power switching transistors, PIN
rectifier diodes).

EL E 436  W  2C,1T,3L  0.5
Design of Integrated Circuits and
Devices
Design and process details of discrete
bipolar, JFET and MOSFET devices.
Design and implementation of VLSI and
VLSI digital and analog integrated
circuits. Process, device and circuit CAD.
Project

EL E 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

EL E 438  F,S  2C,1T,3L  0.5
Switching and Digital Circuits
Switching characteristics of transistors
and diodes, non-sinusoidal wave genera-
tion and shaping, comparators, digital
integrated circuits, including ECL, TTL,
NMOS, CMOS.
Project

EL E 439  W  2C,1T,3L  0.5
Analog Electronic 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.
Project
EL E 443 W 2C.1T.3L\textsuperscript{.1} 0.5

**Electrical Networks 2**
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: EL E 342 or equivalent
\textsuperscript{1}Project.

EL E 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.

EL E 455 S 3C.1T 0.5

**Software Engineering**
Requirement analysis, specifications, software design, software development environments, testing, software project management, quality assurance and control.

Prereq: EL E 354
Coreq: EL E 456

EL E 456 W 3C.1T.3L\textsuperscript{.1} 0.5

**Database Systems**
Introduction, data models, file systems, database system architectures, query languages, integrity and security, database design.

Prereq: EL E 251, EL E 252
Coreq: EL E 455
\textsuperscript{1}Project

EL E 459 W 2C.1T.3L\textsuperscript{.1} 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.

\textsuperscript{1}Every third week.

EL E 463 F.S 2C.1T.3L\textsuperscript{.1} 0.5

**Power Electronics**
Characteristics and ratings of power semiconductor devices with emphasis on the thyristor. General methods of achieving design objectives. Performance and analysis of power conversion circuits for both static and rotating loads.

\textsuperscript{1}Open.

EL E 464 W 3C.3L\textsuperscript{.1} 0.5

**High Voltage and Insulation Engineering**
Nature and origin of high voltage surges encountered on power systems. Travelling waves on transmission systems; insulation engineering; electrostatic fields in high voltage apparatus, insulation failure; corona; insulation testing; circuit breakers and surge protection devices; insulation coordination.

\textsuperscript{1}Alternate weeks.

EL E 465 W 3C.1T 0.5

**Power Systems**
Introduction to system concepts; aspects of power system planning and operation. Energy sources; environmental and resource implications. Per-unit and co-ordinate systems. Representation of equipment such as generators, transformers and transmission lines in system analysis. Analysis of 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.

EL E 473 W 2C.1T.3L\textsuperscript{.1} 0.5

**Microwave Engineering**
Review of Maxwell's equations, rectangular and circular waveguides, microwave circuits, scattering matrix theory, microwave filters, simple waveguide discontinuities, klystrons and magnetrons.

Prereq: EL E 371 or equivalent
\textsuperscript{1}Every third week.

EL E 474 F 2C.1T.3L\textsuperscript{.1} 0.5

**Antenna Engineering**
An introduction to the theory of radiation and of antenna and propagation engineering; linear antennas, linear arrays, aperture antennas, frequency independent antennas, measurement theory.

Prereq: EL E 371 or equivalent
\textsuperscript{1}Every third week.

EL E 475 W 3C.1T.3L\textsuperscript{.1} 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: EL E 371 or equivalent
\textsuperscript{1}Project

EL E 481 F.S 2C.1T.3L\textsuperscript{.1} 0.5

**Design of Analog and Digital Control Systems**

\textsuperscript{1}Alternate weeks.

EL E 482 W 2C.1T.3L\textsuperscript{.1} 0.5

**Multivariable Control Systems**

Prereq: EL E 446, EL E 481
\textsuperscript{1}Open lab.

EL E 485 W 2C.1T.3L\textsuperscript{.1} 0.5

**Computer Control Applications**

Prereq: EL E 426, EL E 481
\textsuperscript{1}Project.
EL E 496A F 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.

EL E 496B W 9L 0.5

Project
Either a continuation of EL E 496A or a separate one-term project.

Department of English

Associate Professor, Chairman of the Department
G.E. Stelthouw, BA (Pacific Lutheran), MA, PhD (Nebraska)

Professor, Associate Chairman and Graduate Officer
J.C. Gray, BA (Washington State), MA (Connecticut), PhD (Syracuse)

Assistant Professor, Associate Chairman and Undergraduate Officer
M.A. Gerhardt, BA (Montana), PhD (Iowa)

Professor Emeritus
G.R. Hibbard, BA, MA (London), DLitt (Waterloo)

Professors
L.A. Cummings, AB (Washington), AM (Missouri), PhD (Washington), Recipient of the OCUFA (Ontario) Teaching Award
S. Fogel, BA (Carleton), MA (British Columbia), PhD (Queens, New York)
J. Gold, BA (Birmingham), PhD (Wisconsin)
K.L. Ledbetter, BA (Central College, Mo.), MA, PhD (Illinois), Recipient of the Distinguished Teacher Award
D.R. Letson, BA (Waterloo), MA (McMaster), PhD (Toronto), Recipient of the Distinguished Teacher Award
C.F. MacRae, BA (Western Ontario), MA (McMaster), PhD (Toronto) (Retired)
W.R. Martin, BA, MA, D.Litt et Phil (South Africa), Recipient of the Distinguished Teacher Award (Retired)*
W.J. Ober, BA (Washington and Lee), PhD (Indiana)
P.H. Smith, Jr., AB (Harvard), PhD (Pennsylvania)
W.K. Thomas, MA, PhD (Toronto)

Associate Professors
P.D. Beam, BA (Waterloo), MA (McMaster), PhD (Toronto)
R.R. Dubinski, BA, MA (Western Ontario), PhD (Toronto)
A.I. Dust, MA, PhD (Illinois)
H.B. Ellis, BA (Rutgers), MA, PhD (Illinois)
R.N. Gosselin, BA (Kansas), MA, PhD (Colorado)
M. Higgins, BA (St. Francis Xavier), MA, PhD (York), J
P.M. Hinchacliffe, BA (British Columbia), MA, PhD (Toronto) J
C.C. Hultin, BA (Concordia), MA (Chicago), PhD (Johns Hopkins)
R. Lister, BA, MA, PhD (Toronto)
H.M. Logan, AB (Franklin and Marshall), PhD (Pennsylvania)
W.R. Macnaughton, BA (Toronto), MA, PhD (Wisconsin)
E.P. McCormack, MA (Glasgow), PhD (Manitoba)
C.E. McCue, BA, MA, PhD (Toronto)
S.E. McJulin, BA, MA (Carleton), PhD (Dalhousie)
J.H. Miller, BA, BLS (McGill), MA, MPhil (Waterloo), PhD (York), R
J.S. North, BA, MA (British Columbia), PhD (Alberta)
E.F. Shields, AB (Chesterhill), MA (University of Illinois)
J.S. Stone, BA, MA (British Columbia), PhD (British Columbia, Retired)*

Assistant Professors
L. Dorey, MA, BA (Louisville), J
D.G. Goodwin, BA, MA, PhD (Toronto)
A.L. Magnusson, BA (Manitoba), MA, PhD (Toronto)
N.F. Randall, BA (Guelph), MA (Waterloo), PhD (York)
P.M. Saunders, BA (Pace), MA, PhD (Toronto)
J.Z. Segal, BA (McGill), MA, PhD (British Columbia)

Adjunct Faculty
C.A. Redmond, BA (Queen’s), MA (Waterloo)

Faculty Members holding cross appointments to English from:
1. Architecture
2. Faculty of Arts

*Also has Adjunct appointment

R refers to faculty members at Renison College

Course Descriptions

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. W.K. Thomas’s Correct Form in Essay Writing is the official style sheet for all undergraduate English courses.

3. The “normal” number of lectures per week in each course is three; however, instructors determine how often their particular class will meet.

4. In all English courses, emphasis will be placed on student essays written in connection with the reading.

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 Essay Writing 1
ENGL 110 Introduction to Essay Writing 2
ENGL 128R Introduction to Written English
ENGL 140R The Use of English 1
ENGL 141R The Use of English 2
ENGL 150 English as an Instrument of Thought and Communication 1
ENGL 151 English as an Instrument of Thought and Communication 2
ENGL 240R Form and Function 1
ENGL 241R Form and Function 2
Students completing any of ENGL 109, 110, 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 Essay Writing 1
The course teaches the construction of the expository essay, with attention to the structure of good paragraphs, to techniques of putting the essay together, and to the nature of the language. Ten to 12 short writing assignments are required.
Students may receive credit for only one of ENGL 109 and ENGL 128R.

ENGL 110 W 0.5
Introduction to Essay Writing 2
The course deals with the persuasive essay. Attention will be given to the elements of logical thinking and the techniques of persuasion. The demands of the library research paper will be considered.
Prereq: ENGL 109

ENGL 128R F.W.S 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.
Prereq: Open only to students whose maternal language is not English and who lack language mastery sufficient for admission to other introductory English language courses

ENGL 140R F.W.S 0.5
The Use of English 1
The use and abuse of spoken and written English. The study and evaluation of language as it is used for various purposes (e.g., colloquial, scientific, legal, political, commercial, journalistic, literary) in order to increase critical awareness and to help students to write clearly and effectively.

ENGL 141R W 0.5
The Use of English 2
A continuation of ENGL 140R. The study of factual, emotive, scientific and imaginative writing, relevance, context, meaning, tone, feeling, and intention.
Prereq: ENGL 140R

ENGL 150 F.W. 0.5
English as an Instrument of Thought and Communication 1
The course is designed to improve the reading and writing of students from all disciplines. In order to develop clarity of thought and critical awareness, students will identify and study in several media the various ends that are served by language: objective reporting, persuasion, argument; and emotional, social, and artistic expression. About eight written exercises are assigned.

ENGL 151 W 0.5
English as an Instrument of Thought and Communication 2
A continuation of ENGL 150. From a basis of simple semantics and elementary logic, students will proceed to examine more complex language in fiction and other forms of literature. About six written exercises are assigned.
Prereq: ENGL 150

ENGL 240R F 0.5
Form and Function 1
The uses of literacy and the functions of language as acquired in ENGL 140R/141R. These will be applied to the more advanced form of the literary and critical assignment essay, involving comparison, evaluation, and exposition.

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**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 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.

ENGL 102B W 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.

ENGL 103A F 0.5
The Nature and Structure of the English Language
Introduction to the study of the English language. Topics to be discussed include the nature and origin of language, the structure of English and its development, and the relations between language and reality.

ENGL 103B W 0.5
Varieties of English
Introduction to the study of varieties of the English language - regional, social, temporal, functional, and stylistic. The relations of languages and literature and of speech and writing will be discussed.
Prereq: ENGL 103A or consent of instructor

ENGL 105A F.W.S 0.5
20th-Century Literature in English, 1900-30
A close examination of a representative selection of works by major authors writing in English such as W.B. Yeats, Virginia Woolf, D.H. Lawrence, T.S. Eliot, and Ernest Hemingway.

ENGL 105B W 0.5
20th-Century Literature in English, 1930-80
A continuation of ENGL 105A. A close examination of a representative selection of works by major authors writing in English such as William Faulkner, Dylan Thomas, and Margaret Laurence.
Prereq: ENGL 105A or consent of instructor

ENGL 108A 0.5
The Hero
A study of human excellence in thought and action embodied in representative men and women, as seen through works of literature.

ENGL 108C 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 0.5
The Rebel
A study of various works of literature in which the protagonist is a rebel against existing norms. The course will examine a number of rebel types and concepts, moral implications, and final outcomes either in successful realization or in tragic defeat.

ENGL 108H 0.5
Isolation and Alienation
The study of a variety of works centering on the theme of man in crisis, the stress being on the individual at variance with his inner self, his fellow man, or his world. The course will discuss the process in which wisdom and maturity are gained as the ultimate products of suffering.
ENGL 108M 0.5
Youth and Adolescence
Studies the portrayal of young protagonists as they respond to the mores of adult society; their own physical, mental, and psychological development; and the expectations placed upon them by themselves and by others.

ENGL 108N 0.5
The Wars
Studies the experience of war and attitudes toward it as revealed in literary works from different historical periods.

ENGL 190 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.

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.

ENGL 201 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 202A 0.5
The Bible and Literature 1
The study of major themes, stories, and literary characteristics of the King James Bible (Hebrew Scripture) and its influence on English literature.

ENGL 202B 0.5
The Bible and Literature 2
The study of major themes, stories, and literary characteristics of the King James Bible (Christian Scripture) and their influence on English literature. Prereq: ENGL 202A or consent of instructor

ENGL 203 0.5
Introduction to Folklore 1
An introduction to the scope and aims of folklore, together with a survey of the major types of folklore in the English tradition from nations of the English-speaking world. Topics such as oral literature, myth, legend, tale, and marchen will be discussed.

ENGL 204 0.5
Introduction to Folklore 2
Similar to 203 but dealing with folk-drama, ballads, songs, medicines, riddles, chants, proverbs, and charms.

ENGL 205R F W 0.5
The Canadian Short Story
Exploration of the Canadian short story, from its beginnings — in the bush, in the north, on the land, in the small towns — through the struggles of an urbanizing society to the present. Students will be expected to work in some depth with individual authors.

ENGL 206A 0.5
Forms of Fantasy
This course will deal with the history and forms of fantasy written for adults. In considering the genre, related forms like the romance, the fairy tale, the fable, and the gothic horror story will be discussed. Authors such as Morris, C.S. Lewis, Tolkien, Williams, and White will be studied.

ENGL 208B 0.5
Science Fiction
Various examples drawn, for instance, from Utopian and anti-Utopian science fiction, social science fiction, "gadget" science fiction, parapsychology, and alternate worlds and beings will be considered. Some attention will be given to the historical development of the genre.

ENGL 208C 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 Thurbur will be studied.

ENGL 208D 0.5
Modern Satire
The mode of satire in the fiction, drama, poetry, and discourse of the 20th century. Particular attention to the literary works of Waugh, Huxley, Orwell, Parker, Heller, Hiebert, and a dramatist of the absurd, but also attention to satirical cartoons and nightclub satire.

ENGL 208E 0.5
Women Writers of the 20th Century
A study of such major 20th-century writers as Woolf, Hemmatt, Murdoch, McCarthy, Lessing, Laurence, Plath, and Atwood. Emphasis will be on the concerns of these writers with the roles of women, the writer's search for new meanings, and their innovations in literary forms.

ENGL 208F 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 GERON 208

ENGL 208H 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 208K 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, Hemmatt, Buchan, Greene, Deighton, and Le Carré will be discussed. The course includes the examination of critical approaches to the form of detective fiction.

ENGL 208Q 0.5
Ordered Chaos: The Apocalyptic Vision in Literature
A study of dehumanized worlds in fiction that can be called "apocalyptic." Works by such writers as St. John the Divine, Shakespeare, Mary Shelley, Aldous Huxley, Mordecai Richler, and Kurt Vonnegut will be studied.

ENGL 209 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.

Counts as an English Major credit as of Fall 1984.
ENGL 210A 0.5
**Business and Technical Writing**
A study of the principles of business and technical writing including the styles, techniques, and forms of business and technical correspondence, application letters and résumés, abstracts, outlines, and technical description, with copious writing practice. Special attention to techniques of editing and presentation. Some practice in oral presentation.
Prereq: Second-year standing or above

ENGL 210C 0.5
**Report Writing**
A study in the principles and practice of good report writing including reports, 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

ENGL 211 F 0.5
**The Novel 1**
The study of the novel written in English from its beginnings to the late 19th century.

ENGL 212 W 0.5
**The Novel 2**
The study of the novel written in English from the late 19th century to the present.

ENGL 214 0.5
**Themes in Canadian Literature**
The course will survey a theme which is significant to the understanding of the Canadian literary mind. Topics will vary from section to section.

ENGL 219 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

ENGL 222 0.5
**The Development of Drama to 1660**
A study of the origins and development of English drama, with special concentration on 16th-century non-Shakespearean drama.
Students may receive credit for only one of ENGL 222 or DRAMA 252.

ENGL 233 0.5
**Drama from 1660**
A study of the principal playwrights, plays, and movements in dramatic history from the re-opening of the theatres in 1660 to the present day.
Students may receive credit for only one of ENGL 233 or DRAMA 253.

ENGL 251A F 0.5
**The Practice and Theory of Criticism 1**
The study and practice of skills needed for a close, analytical reading of literary texts and for the writing of critical analyses on them; studies of theories concerning literature and literary criticism.

ENGL 251B W,S 0.5
**The Practice and Theory of Criticism 2**
The continuation of ENGL 251A (see above).
Prereq: ENGL 251A

ENGL 292 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: Enrollment limited to RPW students

ENGL 305A 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 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
**English Language and Linguistics**
A study of basic linguistic principles and concepts, historical and formal.
Formerly ENGL 373 and ENGL 375

ENGL 306A 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

ENGL 306B 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
Formerly ENGL 375B

ENGL 306C 0.5
**Historical Linguistics**
Introduction to historical reconstruction and comparative analysis. Basic phonological, morphological, syntactic changes as they manifest themselves in language will be examined.
Prereq: ENGL 306A
Formerly ENGL 373A

ENGL 306D 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 Literatures**
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 307A 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 0.5
**Rhetoric: Principles and Practice 1**
A study of various theories of rhetoric. Students are assigned several essays in order to practice and apply the principles of rhetoric to discourse.
Prereq: A 203-level writing course or consent of instructor
ENGL 308B 0.5
Rhetoric: Principles and Practice 2
A continuation of ENGL 308A with an emphasis on the importance of style in rhetorical theory and practice.
Prereq: A 200-level writing course or consent of instructor

ENGL 309C 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

ENGL 309D 0.5
Approaches to Style
Theories of style and approaches to the stylistic analysis of both literary and non-literary texts. Students will consider contributions to the study of style from such areas as traditional stylistics, New Criticism, formalism, affective stylistics, speech act theory, discourse analysis, and sociolinguistics.
Prereq: Consent of instructor

ENGL 310A 0.5
Middle English 1

ENGL 310B 0.5
Middle English 2
A study of Chaucer's Canterbury Tales and related Middle English poems and prose.

ENGL 312 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 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 0.5
Canadian Poetry Since 1920

ENGL 315 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.

ENGL 316 0.5
Canadian Drama
A study of plays by such dramatists as Merrill Denison, Robertson Davies, Gratien Gélinas (in translation), James Reaney, John Coulter, George Ryga, and Michel Tremblay (in translation). Background for 20th-century drama will be provided in lectures.
Cross-listed as DRAMA 351

ENGL 325 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 330A 0.5
Elizabethan Literature 1 (excluding Drama)
A study of the principal writers of prose and of lyric and narrative poetry in England during and immediately before the reign of Elizabeth I.

ENGL 330B 0.5
Elizabethan Literature 2 (excluding Drama)
A continuation of ENGL 330A. Reserved for special attention is Spenser's epic poem glorifying England and Elizabeth I - The Faerie Queene.
Prereq: ENGL 330A is recommended

ENGL 335 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 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 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.

ENGL 344 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.

ENGL 345/346/347
Studies in American Literature
(Usually only one or two courses from this series are offered each year)

ENGL 346B 0.5
American Fiction
The Southern Myth: its origins in early literature, its flowering and ruin, as seen by white and black writers, including Twain, Faulkner, Welty, Styron, Grau, O'Connor, Wright, and Ellison.
Prereq: ENGL 343 or consent of instructor

ENGL 346C 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 347A 0.5
Contemporary American Literature
A study of American Literature from World War 2 to the present.
Prereq: ENGL 343 or consent of instructor

ENGL 350A 0.5
17th-Century Non-Dramatic Literature 1
A study of secular and religious lyric poetry by poets such as Donne, Jonson, Herrick, Herbert, Vaughan, and Marvell.

ENGL 350B 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 0.5
Shakespeare 1
A study of the plays written before 1599-1600, excluding Julius Caesar.
ENGL 363 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.
Prerequisite: Consent of instructor

ENGL 409A/B 0.5/0.5
Writing for Special Purposes 1 and 2
Each term will consist of three or four units on such topics as 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 will be made of non-academic experts in the fields covered.
Enrollment limited to fourth-year students in RPW program, or consent of instructor

ENGL 410A 0.5
Satire and Sense: The Restoration and Early 18th Century
The Restoration comedy of manners, heroic and high tragedy, poetry of the court wits and other amused commentators on society, and the major writings of Dryden, Swift, Addison, Defoe, and the early Pope.

ENGL 410B 0.5
Sense and Sensibility: The Middle and Later 18th Century
The probing of mores and manners by Pope and Johnson, the emergence of the novel with Fielding and Sterne, and the transformation (in "the age of sensibility") of literary attitudes and practice from classical to romanticism.

ENGL 430A 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 0.5
The Romantic Movement 2
The poetry and critical theory of Byron, Shelley, and Keats. Emphasis is primarily on poetry; selected minor writers may be considered.

ENGL 445A 0.5
Senior Seminar in American Literature
An examination of the "fictions" of such major American writers as Wallace Stevens, Herman Melville, and Eugene O'Neill.
Prerequisite: ENGL 343/344 or consent of instructor

ENGL 451A 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 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 0.5
British Literature, 1885-1914
A study of works by such writers as Shaw, Conrad, and Yeats.

ENGL 460B 0.5
British Literature, 1914-1945
A study of works by such writers as James Joyce, D.H. Lawrence, and T.S. Eliot.

ENGL 470A 0.5
Contemporary Critical Theory
An examination of recent influential critical theories. Among the schools studied will be feminist criticism, Marxist criticism, psychoanalytic criticism and, especially, deconstruction.

ENGL 485A/B 0.5/0.5
Supervision of Honours Essay
A letter grade for ENGL 485A will be submitted only after the completion of ENGL 495B.

Department of Environment and Resource Studies

Associate Professor, Chairman of the Department
J.E. Robinson, BSc (Waterloo), MES (York), PhD (Michigan)

Associate Professor, Undergraduate Officer
S.C. Lerner, BA (Ohio State), MA (Columbia), Recipient of the Distinguished Teacher Award

Professors
M. Chandrasekhar, B Tech (Indian Institute of Technology, Kanpur), MA, PhD (Waterloo), PEng
G.R. Francis, BA (Toronto), BA (McGill), MA (British Columbia), PhD (Michigan)
S. Kumar, BSc, MSc (Punjab), MA, PhD (Toronto)
P.H. Nash, BA, MA (California-Los Angeles), CE (Grenoble), MCP, MPA, PhD (Harvard), MCP, AICP

Associate Professors
D. Estrin, BA, LLB (Alberta)
R. Keith, BSA (Guelph), MA, PhD (Michigan State)
G.B. Pridde, BA, (Western Ontario), MA, PhD (Clark)
J.B. Robinson, BA (Toronto), MES (York), PhD (Toronto)

Assistant Professors
R.B. Gibson, BA (York), MA, PhD (Toronto)
J.J. Kay, BSc (McGill), MSc, PhD (Waterloo)
M.C. Keski-Deltiagouw, BEcon (Amsterdam), MA, PhD (Waterloo)
G.O. Michalenko, BA, PhD (Saskatchewan)

Faculty Members of Environment and Resource Studies holding cross and/or joint appointments with:
1Geography, Urban and Regional Planning, and School of Landscape Architecture, University of Guelph
2Systems Design Engineering
3Planning

Faculty Members holding cross and/or joint appointments to Environment and Resource Studies from:
4Environmental Studies
5Systems Design Engineering
Course Descriptions

Courses not offered in the current academic year are listed at the end of this section.

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: Second year or above

ERS 241 W 3C: 0.5
Introduction to Environmental and Social Impact Assessment
An introduction to means of assessing proposed actions, particularly 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.

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

ERS 280 S 1C: 2T lab: 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

ERS 291 W,S 4S:wkshp: 0.5
Seminar-Workshop
Continuation of project begun in ERS 290
Prereq: ERS 290

ERS 318 W 3C: 0.5
Case Studies in Sustainable Environmental and Resource Systems
Detailed analysis of selected environmental systems and resource use activities. Particular attention will be given to opportunities for sustainable development and issues in implementation. Case studies will be drawn from local, regional and international experiences.
Prereq: Third-year standing and ERS 218 or consent of instructor

ERS 320 W 2C: 1T: 0.5
Environmental Economics
Evaluation of various economic approaches to the environment. Introduction to various models used to analyse environmental quality and used in the design of environmental policy and management initiatives.
Prereq: ERS 220 or consent of instructor

ERS 337 F 3C: 0.5
Environmental Impact Assessment
Major problems and issues in the management of environmental impacts stemming from development projects. Synthesis of ecological, economic and institutional aspects. Integrating environmental management with social and economic development policies and programs.
Prereq: ERS 241 or consent of instructor
ERS 338 W 3C 0.5
Social Impact Assessment
Introduction to the background, theory and methodology of social impact assessment (SIA). SIA as a type of social science research and as a key element in achieving more informed and responsible decision-making in society. Experience in SIA design for environmentally relevant cases.
Prereq: ERS 241 or consent of instructor

ERS 350 W 2C 0.5
Community Action on Environmental Problems
The citizen’s role in the solution of environmental problems. The work of various community groups is examined and evaluated. Students select topics of particular interest to them for in-depth study.

ERS 362 2C,1T 0.5
Current Issues in the Canadian North
Introduction to contemporary environmental, social, economic and political issues in Canada’s North, principally Yukon, Northwest Territories and Northern Quebec and Labrador. Lectures and tutorials will discuss homeland and frontier perspectives, economic development and environmental conservation, the northern economies, native land claims and political development.
Prereq: Second-year standing

ERS 360 F 3C 0.5
Man and Nature
An exploration of man’s position in nature as viewed in science and arts and in different cultures. Course materials will be drawn from many sources including philosophy, psychology, religions, biology and literature.
Prereq: Third and fourth year students and consent of instructor

ERS 361 W 3C 0.5
International Communication System and Development
Information and ideas constitute the most basic resource of a people. This course will explore the role of various mass media, newspapers, TV, cinema, magazines, radio, travelers, in the process of development. What is the nature of mass education in a developing society? How do the media hinder or contribute to social change? These and many related questions will be explored in the context of a number of different societies.

ERS 375A/B/C F,W,S 2R 0.5
Special Readings or Seminars on Selected Topics
Prereq: Consent of instructor
The letter designation allows this course to be taken more than once for credit

ERS 385 F 3C,1S 0.5
Technology/Lifestyles for a Conserver Society
What is a Conserver Society? What must we do to make our society into a Conserver Society? How do we evaluate the appropriateness of a lifestyle or technology for a Conserver Society? Is a Conserver Society realistic? This course will explore these questions, with emphasis on student participation in discussion and seminar presentations. Lectures will focus on the basics of various technologies and lifestyles, and on quantitative techniques for comparing them.
Prereq: Second year or above

ERS 390A F,W,S 4S,wkshp 0.5
Seminar-Workshop
Individual or small group project emphasizing multidisciplinary treatment of environmental problems. Work encouraged on situations of interest to community organizations, government agencies or other groups.
Prereq: Environment and Resource Studies students only

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 390B

ERS 396 W 2C,1S 0.5
Development of Environmental Thought
2
Examination of twentieth century concerns about industrial progress and treatment of people and the environment. Focus on problems and promises of efforts to dominate nature through scientific and technological advance; alternative views on the nature of scientific knowledge and human well-being, and the rise of modern environmentalism. Assessment of alternative futures.
Prereq: ERS 295 and third-year standing or consent of instructor

ERS 400 F,W 3C 0.5
Senior Honours Seminar
Provides time for applying skills that are useful to people working in different kinds of organizations. Readings, discussions and exercises emphasize: problem perceptions and diagnoses, actor system analyses, and planning, management and evaluation activities as these are carried out by and within organizations. Special attention given to roles that persons having an environmental studies background may be particularly well prepared to develop and refine.
Prereq: Third or fourth year Environment and Resource Studies students only

ERS 418 F 3C 0.5
Seminar on Strategies for Sustainable Development
Using selected environmental systems and resource use activities the course will analyse selected policy, planning and implementation strategies for sustainability development. The analysis will include consideration of organizational and institutional arrangements. Various approaches reflecting local, regional and international experiences will be compared and contrasted.
Prereq: Fourth-year standing and ERS 318 or consent of instructor

ERS 445 W 3C 0.5
Impact Assessment and Policy Analysis: Practicum
Students will draw on knowledge and experience gained in the prerequisite theme courses to critique and/or design impact analyses of a variety of "real-world" activities, including policy initiatives, technological choices, environmentally-relevant proposals, economic strategies and others of special interest or significance.
Prereq: ERS 241, 337 and 338, or consent of instructor
ERS 490A F.W.S 2C 0.5
Senior Honours Assignment
A project of sufficient scope to demonstrate mastery of problem-solving and communication skills on a selected problem or issue concerning human relationships with the environment. Credit weights for 490, 491 and 492 vary depending on the amount of work involved and the depth of the subject matter. Study beyond the 490 level requires faculty approval.
Prereq: Honours Environment and Resource Studies students only.
A letter grade for ERS 490A will be submitted only after the completion of ERS 490B

ERS 490B F.W.S 2C 0.5

ERS 491A F.W.S 4C 1.0
Senior Honours Assignment
See description for ERS 490A.
Prereq: Honours Environment and Resource Studies students only.
A letter grade for ERS 491A will be submitted only after the completion of ERS 491B

ERS 491B F.W.S 4C 1.0

ERS 492A F.W.S 6C 1.5
Senior Honours Assignment
See description for ERS 490A.
Prereq: Honours Environment and Resource Studies students only.
A letter grade for ERS 492A will be submitted only after the completion of ERS 492B

ERS 492B F.W.S 6C 1.5
Senior Honours Assignment
Continuation of ERS 492A.
Prereq: ERS 492A

Courses Offered in India
Courses on the student academic record with the letter I as part of the course number are offered in India.

COURSES NOT OFFERED 1988-89
ERS 351 Organizations and Environmental Management
ERS 450 Environmental Design
ERS 470 Environmental Teaching and Learning

Course Descriptions

Courses not offered in the current academic year are listed at the end of this section.

Introductory Note
There are a number of courses offered in the Faculty of Environmental Studies of an integrative nature which extend across the academic interests of the four units: School of Architecture, Department of Geography, Department of Environment and Resource Studies, and School of Urban and Regional Planning. The courses are of a general interest and are open to all students in the University. There is no actual Department of Environmental Studies. Students interested in this area are urged to consult the course offerings of the four individual units mentioned above. These four departments/schools offer a variety of related courses allowing in depth studies of topics covered in the Environmental Studies courses.

ENV S 111 F 3C 0.5
Introduction to the Study of the Future
Non-technical survey of current approaches to thinking about and refining your views of the "Future". The role of images and scenarios, contributions of the arts and concepts of space and time. Impacts of regional science, ecotics, bioethics, synergetics, and prognostics. Paths of "inventing" the future and the comprehensive design of "optimum" environments.

ENV S 178 F.W 3C 1L 0.5
Introduction to Environmental Research Methods
Introduction to methods of developing, evaluating and using evidence in Environmental Studies. Methods for summarizing and critical appreciation of data describing environmental systems. Skill development in applying statistical techniques and in using microcomputers as a research tool.
While not a prerequisite for this course, CS 100 or a high school computing course is helpful.

ENV S 196 F 2C 1S 0.5
Introduction to Environmental Studies
Theories, methods and concepts in study of the environment. Emphasis on natural and built environment and relationships between elements of the environment. Environmental planning, management, and design discussed.
ENV S 200 F 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.
Prerequisite: Second, third and fourth year students only
Lab fee of $5
Students may receive credit for only one of ENV S 200 and BIOL 250

ENV S 201 F,W 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 ENV S 402. Topics to be covered include Sources of Law, Nature of Legal Remedies, Common Law, Judicial Review, Administrative Agencies and the law relating to them, Planning Act, Environmental Protection and Assessment Acts, and Federal Fisheries 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.
Prerequisite: ENV S students; others with consent of instructor
Lab fee of $5 for (optional) use of ES Student Darkroom
Materials at student's expense

ENV S 278 F 3C,1L 0.5
Advanced Environmental Research Methods
Advanced methods for developing, evaluating and using evidence in Environmental Studies. Systematic approaches to problems of measurement and problems in time and space. Skill development in applying parametric statistical inference, systems of equations, finite differences, mathematical interpolation and extrapolation with computer aids to analysis.
Prerequisite: ENV S 178

ENV S 334 F 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.
Prerequisite: REC 230
Cross-listed as REC 334
Students may receive credit for only one of ENV S 334 and REC 334

ENV S 378 W 2C,4L 0.5
Applications of Computer Programming in Environmental Studies
The course will provide an opportunity to apply microcomputers as a tool for the analysis of environmental problems. A top-down step-wise refinement approach to problem solving through using micro computer high level programming (currently pascal) will be followed. The basis of graphics, data structures and their application to map data sets, algorithms for modelling and image processing will also be considered.
Prerequisite: CS 102 and ENV S 178 or consent of instructors

ENV S 392Z F 2.5
Waterloo in Australia - Victoria
Description in Environmental Studies program section (page 10/6).

ENV S 393Z W 2.5
Waterloo in Australia - Victoria
As 392Z.

ENV S 394Z S 0.5
Waterloo in Australia - Victoria
As 392Z.

ENV S 395Z F 2.5
Waterloo in Australia - Griffith
Description in Environmental Studies program section (page 10/6).

ENV S 396Z W 2.5
Waterloo in Australia - Griffith
As 396Z.

ENV S 397Z S 2.5
Waterloo in Australia - Griffith
As 395Z

ENV S 417 F 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.
Prerequisite: Consent of instructor
Lab fee of $20

ENV S 433 W 3C,2st 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 publics and indigenous people in the design and management of natural areas will be studied.
Prerequisite: REC/ENV S 334
Cross-listed as REC 433
Students may receive credit for only one of ENV S 433 and REC 433

ENV S 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.
Prerequisite: REC/ENV S 334
Cross-listed as REC 434
Students may receive credit for only one of ENV S 434 and REC 434

COURSES NOT OFFERED 1988-89
ENV S 202 Social Science Approaches to Environmental Problems
ENV S 310 Behavioural Studies
ENV S 401 Environmental Law
ENV S 411 Alternative Future Environments 1
ENV S 500 Professional Development in Environmental Management
Department of Fine Arts

Associate Professor, Chairman
A. Roberts, BA (Guelph), MA (Claremont)

Professor, Undergraduate Officer
N.L. Patterson, BA (Washington)

Professors
V. Burnett, BS (Columbia), MA (California)
P. Forsyth,1 AB (Mount Holyoke), MA, PhD (Toronto) Recipient of the Distinguished Teacher Award
A.M. Urquhart, BFA (Buffalo)

Associate Professors
M.S. Bird,2 BA, MA, PhD (Iowa), R
A. Green, BFA (Art Institute of Chicago)
E. Kliman, MA, PhD (Toronto)
D.I. MacKay, BFA (Mt. Allison), MFA (Cornell)
J. Udnie, MA (Gurkyn's University Brno), PhD (Waterloo)

Adjunct Faculty
P. Swann, BA, MA (Oxford), DLitt (Brock), DLitt (Queen's)

Faculty Members holding cross appointments to Fine Arts from:
1Classical Studies
2Religious Studies
R refers to faculty member at Renison College.

Course Descriptions

Students should consult the "Fine Arts Course Offerings" lists, available from the departmental secretary, before each semester, to ensure that the courses they select are offered. Budget restrictions, enrolment and availability of faculty may cause some courses to be withdrawn.

ART HISTORY OFFERINGS

FINE 111 F 3C 0.5
Introduction to World Art 1
A comparative survey of Prehistoric and Ancient Art, and of Oriental, African, New World and Oceanian Art, emphasizing visual form as an expression of its historical and cultural context.

FINE 211 W 3C 0.5
Modern Art 2
A comparative survey of Western Art from the Classical to the Modern Period, 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 F 3C 0.5
Modern Art 2
A continuation of FINE 210, commencing with impressionism and proceeding through the major trends of the early 20th century up to the contemporary period.

FINE 212 F 3C 0.5
Italian and Northern Renaissance Art 1
A survey of the innovations in European painting, sculpture, and architecture between 1260 and 1500.
Prereq: FINE 111 or consent of instructor

FINE 213 W 3C 0.5
Italian and Northern Renaissance Art 2
A continuation of FINE 212 starting with the masters of the High Renaissance and concluding with the art of the Mannerists.
Prereq: FINE 212 or consent of instructor

FINE 214 F 3C 0.5
Medieval Art and Architecture
A study of Early Christian Romanesque and Gothic Art.
Prereq: FINE 111 or consent of instructor

FINE 215 F 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 F 3C 0.5
Art of the 18th Century in Europe
A study of painting, sculpture, graphic arts and architecture in 18th century Europe.

FINE 218 W 3C 0.5
Western Religious Art
An introductory survey of the visual art and architecture of Judaism and Christianity in the Common era.

FINE 219 F 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 W 3C 0.5
Greek Art and Architecture
A survey of the art and architecture of the ancient Greek world from the Minoan to the Hellenistic periods.
Prereq: 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.
Prereq: Classical Studies
Cross-listed as CLAS 332

FINE 313 F 3C 0.5
Special Topics in 18th- and 19th-Century Art
A seminar course that examines the Neoclassic and Romantic currents of art between 1750 and 1850.

FINE 316 F 3C 0.5
Canadian Native Art
The arts and crafts of Canadian Indian and Inuit (Eskimo) peoples are examined with slide lectures, films, and student presentations.

FINE 318 W 3C 0.5
Canadian Ethnic and Traditional Arts
An historical survey of Canadian ethnic, Folk and traditional arts and crafts with particular focus on the ethnic and traditional arts of the Waterloo Region.
Prereq: consent of instructor

FINE 319 W 3C 0.5
Contemporary Art
A seminar exploring the contemporary avant garde art movements through critical analysis, historical correlation, discussions with artists and trips to Toronto and New York. Topics covered will include environmental sculpture, conceptual trends, earth works, performance, technology, postal art, and the business aspects of art.

FINE 218A S,W 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.
Prereq: Religious Studies
Cross-listed as RS 269
FINE 319A  F  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 319B  F  3C  0.5
Special Topics in 20th-Century Art: 1940-1960
A survey of the major movements during the 20-year period following the beginning of World War II, including Op Art, Action Painting, the Beat Consciousness, Happenings, Pop Art, Assemblage, Post-Painterly Abstraction and Field Painting, and Kinetic and Light Sculpture.

FINE 330  W  3C  0.5
Fine Arts Exhibition Curatorship
The development, design, documentation, security, conservation, installation, and interpretation of arts and craft exhibitions will be explored through lectures on the history, purpose and function of fine arts exhibitions; gallery visits; student projects; and the creation and presentation of an actual exhibition.

FINE 390  F  R  0.5
Selected Subjects in Fine Arts
Research and reading courses under the direction of individual instructors.
Admission by consent of instructor.

FINE 390A  W  3S  0.5
Methods in the History of Art
For students planning a Senior Honours Presentation in Art History. Students will examine methods of formal and stylistic analysis, iconographical interpretation and the application of social and political history to the understanding of works of art. Required of all art history majors who take FINE 490A/B 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.
Admission by consent of instructor.

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
Course description on last page of Studio Offerings.

FINE 490A  F  S, std, R  0.5
Senior General Seminar
As in FINE 390A, each student will work under the direction of a Fine Arts faculty member on an advanced research project. Required of all fourth-year general art history majors.
Admission by permission only.

FINE 491  W  S, std, R  0.5
Senior Honours Presentation 2
Course description on last page of Studio Offerings.

FINE 491A  W  S, std, R  0.5
Senior General Seminar 2
Course description on last page of Studio Offerings.

FILM STUDIES OFFERINGS

FINE 250  F  3S, 2D  0.5
History of Film 1 (1895-1940)
General 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. Regular film screenings.

FINE 251  W  D, M, C  0.5
History of Film 2 - Sound Film
A continuation of FINE 250. The expression of film history into the sound era (since 1929) including the most recent period. Regular film screenings.

FINE 252  F  2C, ID  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, ID  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, ID  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  W  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  W  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  F  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  W  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 350  F  D, C  0.5
French Film After 1945
A study of major achievements of the French cinema after World War II. Discussion and comparison of the two main creative impulses of the period: the "Academic tradition" of the 40's and 50's, and the rebellious nouvelle vague of the 60's (Bresson, Carné, Céphas, Renoir, Chabrol, Godard, Malraux, Truffaut, Resnais, and others.) Regular film screenings.
FNE 351 W D,C 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 USSR, and Yugoslavia will be discussed (Chytilová, Forman, Jancsó, Makavejev, Tarkovsky, Wajda, and others). Regular film screenings.

FNE 352 F 2L,2D 0.5
The Cinema of Science Fiction
A chronological survey of one of the richest and 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, Lucas, Marker, Siegel, Tarkovsky, Truffaut and other directors). Regular film screenings.

FNE 353 W 2L,2D 0.5
Contemporary Italian Film
A study of major achievements of the Italian cinema in its post-Neo-Realist period. Discussion of the works of major directors since the late 1950’s: Antonioni, Bertolucci, Fellini, Olmi, Taviani, Rosi, Visconti and others. Regular film screenings.

FNE 360R/357R 0.5/0.5
Special Topic in Film
Special topics will be announced from year to year.

FNE 359 F,W 3C 0.5
Film and Literature in Germany
This course introduces students to significant aspects of modern German culture through film, and links this study with that of literature. It involves viewing and analyzing films and establishing a connection to related literary and cultural traditions.
Prereq: Open to all students above first year
Cross-listed as GER 300
Taught in English

FNE 360 F,D,C 0.5
Film and Television 1
Examination of principles of the audiovisual language and the main structural elements of the cinematic work. Discussion of the relationship between film, television and other arts/media. Regular film screenings.

FNE 361 W D,C 0.5
Film Theory 2
Development of critical judgement and expression in respect to the film and television media. Investigation of the role of motion pictures and TV in society. Review of major theories (Eisenstein, Kracauer, Bazin, Metz, Elsenlin). Regular film screenings.

FNE 380Z and 381Z
Film Studies Seminar
These two courses will offer an introduction to key aspects of motion picture and TV production, film preservation and restoration with visits to studios, film archives, film museums. Screening of selected quality films will be complemented by discussions focusing on material which is unavailable in Canada, with special attention paid to Third World production. Direct contact and interaction between course participants and scholars/students in France is expected. (Three weeks Paris.)

FNE 390 F R 0.5
Selected Subjects in Fine Arts
Research and reading courses under the direction of individual instructors. Admission by consent of instructor.

FNE 391 W R 0.5
Selected Subjects in Fine Arts
Research and reading courses under the direction of individual instructors. Admission by consent of instructor.

FNE 470 F 0.5
Senior Seminar in Film Concepts 1
Film screenings. Admission by consent of instructor.

FNE 471 W 0.5
Senior Seminar in Film Concepts 2
Film screenings. Admission by consent of instructor.

FNE 490 F,S, std,R 0.5
Senior Honours Presentation 1
Course description on last page of Studio Offerings.

FNE 490A F std,R 0.5
Senior General Seminar
Course description in Art History offerings.

FNE 491 W S, std,R 0.5
Senior Honours Presentation 2
Course description on last page of Studio Offerings.

STUDIO OFFERINGS

FNE 120 F 8L 0.5
Fundamentals of Visual Art 1
An introduction to the fundamental principles and concepts of visual art through a series of experimental studio projects in two and three dimensional materials and media.

FNE 121 W 9L 0.5
Fundamentals of Visual Art 2
A continuation of FNE 120 with emphasis on colour.
Pre req: FNE 120

FNE 220 F 12L 0.5
Fundamentals of Painting 1
An exploration of the problems and possibilities of painting as a vehicle for serious creative expression. The fundamentals of composition and painting techniques will be presented through a series of studio projects.
Pre req: FNE 120/121 or consent of instructor

FNE 220A F std 0.5
Watercolour Painting
An exploration of the technique of watercolour painting as a means of creating both non-objective and representational forms on a two-dimensional surface.
Pre req: FNE 120/121

FNE 221 W 12L 0.5
Fundamentals of Painting 2
A continuation of the studio projects begun in FNE 220 with a greater emphasis on the development of individual expression.
Pre req: FNE 220 or consent of instructor

FNE 222 F 12L 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 an expressive medium enhanced by surface treatment.
Pre req: FNE 120/121

FNE 223 W 12L 0.5
Fundamentals of Sculpture 2
An introduction to multi-media sculpture. Additive and subtractive use of wood, metal and plaster casting together with a mastery of three-dimensional forms in a variety of media.
Pre req: FNE 222
FINE 223A W 6std 0.5
Clay Studies
Using a variety of clay bodies and firing techniques, students will explore figu-
raive and abstract sculptural concepts, to develop a working knowledge of clay as a
sculptural medium.

FINE 224 F 9L 0.5
Introduction to Drawing
Students will make analytical and expres-
sive drawings in a variety of media, in
order to develop accurate observation and understand-
ing of form.
Prereq: FINE 120/121

FINE 225 W,S 9L 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 226
Printmaking
Introduction to materials and methods of
printmaking. Current offerings are given
below.

FINE 226A W 12L 0.5
Printmaking (Intaglio)
An introduction to basic intaglio tech-
niques including etching and engraving
through workshops and class demonstra-
tions.
Prereq: FINE 120/121 or consent of
instructor

FINE 226B F 12L 0.5
Printmaking (Relief)
An introduction to relief printing including
collagraph, wood block, lino cut and type
using press and non-press materials to
make print images in a series of work-
shops and demonstrations.
Prereq: FINE 226A or permission of
instructor

FINE 226C F 12L 0.5
Printmaking (Screen)
An introduction to screen printing, with
emphasis on exploration of ink properties
and stencil techniques.
Prereq: FINE 120/121 or consent of
instructor

FINE 227 F 5L 0.5
Scientific Drawing
Through studio experiences, students will
learn techniques for making accurate
drawings of biological subjects in
line and value, using various media.
Methods of preparing drawings for repro-
duction will be included.

FINE 228
Applied Arts
The history, design and practice of
various applied arts will be explored in
slide lectures and studio projects.
Specific arts will vary from year to year;
current offerings are given below.

FINE 228A W 12L 0.5
Expressive Textile Forms
The history of textile arts and problems
of design for textile media will be
explored combining lectures and studio
projects in both 2 and 3 dimensional
expressive forms. Traditional textile
materials and methods will be applied to
the creation of contemporary expressive
and autonomous forms. Students will
supply their own materials.

FINE 228C W 3std 0.5
Images and Effigies
A study of contemporary and historical
images and effigies in art, ritual, and
popular culture, and a series of studio
projects in which images are
constructed.

FINE 228D F 3std 0.5
Applied Graphics
A studio course using applied graphics
techniques, including illustration, typo-
graphic composition, and perspective
drawing. Methods of preparing work for
reproduction will also be explored.

FINE 228E W 9L 0.5
Photography for Artists
Introduction to photographic techniques for
use as a tool for artists. Basic tech-
niques will be taught through a series of
exercises, with emphasis on applications
for creative artistic expression and docu-
mentation. Intended for Fine Arts majors.
Supplies at student’s expense.
Prereq: FINE 120/121

FINE 228F F 8L 0.5
Calligraphy
A study of the art of written forms,
combining studio projects with slide
lectures on the history of writing, illumi-
nating and lettering. Students will strive
for mastery in various calligraphic forms
selected from among historic styles such
as Roman, Uncial, Bookhand, Gothic,
Italic and Fraktur.

FINE 228H F 8L 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 120 or consent of
instructor

FINE 320 F 12L 0.5
Advanced Painting 1
Drawing upon the experience gained in
FINE 220/221 this course will emphasize
the student’s individual development as a
beginning painter, through independent
problems, along with class discussions and
individual critiques.
Prereq: FINE 220/221 or consent of
instructor

FINE 321 W 12L 0.5
Advanced Painting
A continuation of Fine arts 320 with a
further emphasis on independent prob-
lems.
Prereq: FINE 320 or consent of
instructor

FINE 322 F 12L 0.5
Advanced Sculpture 1
An exploration of sculpture problems in
a variety of media as vehicles for serious
creative expression.
Prereq: FINE 222/223

FINE 323 W 12L 0.5
Advanced Sculpture 2
Organization and integration of sculptural
concepts in clay to develop a series of
representational or abstract sculptures.
Clay and glaze technology for oxidation
stoneware firing will be stressed.
Prereq: FINE 322

FINE 323A W S, std 0.5
Assemblage
A two and three dimensional study of the
various aspects of assemblage, including
visual poetry, processes, events, concep-
tualization, and structuralism.

FINE 324 F 9L 0.5
Advanced Drawing
A course in which drawing is investigated
as a means of expression and communi-
cation. The human figure, objects, and
the landscape will be studied as sources
of artistic imagery. The student will be
couraged to experiment with imagery,
to develop personal vision, and to devise
individual formal means of expression.
Prereq: FINE 224 or consent of
instructor
FINE 325 W 9L 0.5  
**Advanced Drawing 2**  
Continuation of FINE 324

FINE 326 W 6L 0.5  
**Advanced Printmaking (Lithography)**  
An introduction to plate lithography with the emphasis on printmaking as a vehicle for serious creative expression. Integration with other forms of printmaking can be explored by senior printmakers.  
*Admission by permission of instructor.*

FINE 328 W 3std 0.5  
**Advanced Calligraphy**  
A combination of tradition and experiment with the letter as art form. Students will work with traditional materials and explore new or unusual materials or combinations of materials. They will also be encouraged to develop their own classical or experimental projects.

FINE 328G W 9L 0.5  
**Advanced Applied Graphics**  
A continuation of FINE 228D, a critical exploration of commercial illustration, type and symbol of design, multi colour print reproduction and various other advanced graphics techniques.  
*Preq: FINE 228D*

FINE 328H W 8L 0.5  
**Electronic Imaging II**  
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.  
*Preq: FINE 228H or consent*

FINE 329 F 3std,C 0.5  
**Illustration**  
Studio work in techniques and theory of book illustration, together with slide lectures on the history of printed forms.  
*Preq: Consent of instructor*

FINE 362 F R,std 0.5  
**Selected Subjects in Fine Arts**  
Studio and practice courses under the direction of individual instructors.  
*Admission by consent of instructor.*

FINE 383 W R,std 0.5  
**Selected Subjects in Fine Arts**  
Studio and practice courses under the direction of individual instructors.  
*Admission by consent of instructor.*

FINE 420 W 9L 0.5  
**Senior Graphics Techniques 1**  
*Admission by consent of instructor.*

FINE 472 F R 0.5  
**Senior Seminar 1**  
Independent study/practice course under the direction of individual instructors.  
*Preq: Consent of instructor*

FINE 473 W R 0.5  
**Senior Seminar 2**  
Independent study/practice course under the direction of individual instructors.  
*Preq: Consent of instructor*

FINE 474 F R 0.5  
**Senior Seminar 3**  
Independent study/practice course under the direction of individual instructors.  
*Preq: Consent of instructor*

FINE 475 W R 0.5  
**Senior Seminar 4**  
Independent study/practice course under the direction of individual instructors  
*Preq: Consent of instructor*

FINE 480 0.5  
**Fine Arts Praxis**  
A seminar for students in their final year of Fine Arts study, in which studio exercises will be combined with research into current issues in Canadian and international art.  
*Preq: Consent of instructor*

FINE 490 F,S 1SL 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 (i.e. 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.  
*Required of all students in Honours Fine Arts.*  
*Admission by permission only.*

FINE 491 W 1SL 0.5  
**Senior Honours Presentation 2**  
A continuation of FINE 490.  
*Admission by permission only.*

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**Department of French**

Associate Professor and Chairman of the Department  
W.D. Wilson, MA, PhD (Trinity College, Dublin)

Associate Professor and Graduate Officer  
P.G. Socken, BA (Toronto), MA (Iowa), PhD (Toronto)

Associate Professor and Undergraduate Officer  
H.S. Fournier, BA (Toronto), MA, PhD (Western Ontario)

**Professors**  
A. Ages, BA (Carleton), MA, PhD (Ohio State)

Associate Professor  
P.H. Dube, BA, MA (Toronto), PhD (Ohio State)

J.R. Dugan, BA, MA (Toronto), PhD (Yale)

D.W. Russell, BA, MA, PhD (Toronto)

Assistant Professors  
C.A. Abbott, BA, MA, PhD (Ohio State), J

R.J. Fournier, BA, MA, PhD (Western Ontario)

G. Losier, BA, MA (Ottawa), PhD (Paris)

Lecturers  
A. Brunelle, BA, MA (Montreal)

N. Rolland, Baccalaurat és Arts, Licence ès Lettres (Laval), MA (Toronto)

Language Instructors  
P. Aplevich, BA, MA (Waterloo)

C. Black, MA (Waterloo), Licence ès Lettres (Grenoble)

J. Forster, BA (Queen’s)

H. McLennan, Licence en Phil. Rom. (Brussels), MA (Waterloo), PhD (Western Ontario)

T. Sabeyn, Licence ès lettres (Toulouse)

J refers to faculty members at St. Jerome’s College
Course Descriptions

Courses not offered in the current academic year are listed at the end of this section.

FIRST-YEAR COURSES

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 195/196.

5. Students may enrol only in courses for which they have secondary school antirequisites with the written permission of the Department of French.

6. All students intending to register in any University of Waterloo French language course at the 100 level (FR 151, 152, 155, 192A, 192B) who have Ontario Grade 13 or Ontario Academic Course French or equivalent must take the French Language Placement Test to be held on Thursday, September 8, 1988 at 11:30 a.m. to 1:30 p.m. in Arts Lecture Hall 116.

7. Students should consult the Departmental brochure "French at Waterloo" for further details, and for any changes in offerings after the Calendar goes to press.

8. Linguistics, Language, Civilization, and Literature courses are listed separately below.

FR 151  F,W,S  3C,1L  0.5
Basic French
For students with some elementary or secondary school French not exceeding Year Two (Grade Ten in Ontario) or equivalent. Emphasizes comprehension, grammar and basic speaking skills.
Antireq: Ontario Grade 11 French or equivalent. See above, notes 1-6
Also offered at St. Jerome's College.

FR 152  F,W,S  3C,1L  0.5
Basic French
A continuation of the work done in FR 151.
Prereq: FR 151 or equivalent
Antireq: Ontario Grade 12 French or equivalent
Also offered at St. Jerome's College.

FR 155  F,W,S  4C,1L  0.5
Intensive Review of French
A one-term intensive review 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
French Language
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
French Language
Continuation of FR 192A.
Prereq: FR 192A
Also offered at St. Jerome's College.

FR 193  3C  0.5
French for Bilingual Students
A course for francophones and for graduates of immersion programs. This course will focus on the language difficulties particular to fluent and near-fluent speakers of French. Emphasis will be on grammatical accuracy.
Prereq: Consent of department

FR 198  F  3C  0.5
Reading French
A course for graduate students with no knowledge of French who wish rapidly to develop an adequate reading knowledge of French. Not open to undergraduate or post-degree students except with the written consent of the Department of French.
This course may be taken on a CR/FAIL basis only. There is no grade assigned.
Note to Graduate Students: The Department of French provides a written "French Reading Proficiency Test" for graduate students wishing to prove an already acquired reading knowledge of French.
Students who do not yet have this knowledge should enrol in FR 198. Successful completion of FR 198 satisfies the requirement for a reading knowledge of French in some disciplines. Graduate students should consult their home departments on this matter.

FR 199  W  3C  0.5
Reading French
A continuation and completion of the work begun in FR 198.
Prereq: FR 198 or consent of the Department. Not open to undergraduate or post-degree students except with the written consent of the Department of French.
This course may be taken on a CR/FAIL basis only. There is no grade assigned.

FR 205  3C,1L  0.5
Spoken French
Intensive oral and aural training in the classroom. There will be particular emphasis on comprehension and conversation, with the class being divided into small groups for practice in speaking. These groups will be streamed according to the fluency of the students.
Prereq: One of FR 155, 192, or consent of department
Maximum enrolment of 15 in each section.

FR 206  3C,1L  0.5
Spoken French
Continuation and completion of work begun in FR 205.
Prereq: FR 205 or consent of Department
Maximum enrolment of 15 in each section.
Course Descriptions

French

FR 207  3C, 1L  0.5
Spoken French
Advanced level for continued intensive oral and aural training in the classroom. Particular emphasis on comprehension and conversation, with the class divided into small groups for practice in speaking.
Prereq: FR 192, 195/196, 206, 251 or consent of department
Maximum enrolment of 15 in each section.

FR 208  3C, 1L  0.5
Spoken French
Continuation and completion of work begun in FR 207.
Prereq: FR 207 or consent of Department
Maximum enrolment of 15 in each section.

FR 209  3C  0.5
Spoken French Through Drama
A special section of FR 208 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 207 or consent of department
Maximum enrolment of 12

FR 210  2C  0.5
Report Writing in French
This course is designed to give students practice in the research, the organization and the writing of a variety of reports in the French language.
Prereq: FR 192, 195/196 or consent of department
May only be used for elective credit by French Major or Honours students.

FR 251  3C, 1T  0.5
French Language
Continued training in spoken and written French, with emphasis on more difficult problems of the language. Taught in French.
Prereq: FR 192, 195/196 or consent of department

FR 252  3C, 2T  0.5
Written and Spoken French
Continued training in spoken and written French, with emphasis on more difficult problems of the language. Taught in French. Free composition will be stressed.
Prereq: FR 251 or consent of department

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 192, 195/196 or consent of department

FR 293  3C  0.5
French for Bilingual Students II
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 department

FR 301  2C, 2T  0.5
French Language
This course includes a review of advanced grammar. It aims to develop writing skills through compositions, and to provide practice in advanced oral skills with work in small groups. Taught in French.
Prereq: FR 205, 252, or consent of department

FR 302  2C, 2T  0.5
French Language
This course concentrates on the development of writing skills through a study of the practical stylistics of French, and provides practice in advanced oral skills, with work in small groups. Taught in French.
Prereq: FR 251 and 207 or 208 or 252 or 255, or consent of department

FR 401  0.5
Advanced Language Study
A course in advanced translation, dealing with both the theories of translation and their implementation. Special attention will be paid to metalinguistic problems which affect style and meaning.
Prereq: FR 301, 302, or consent of department

FR 402  0.5
Advanced Language Study
A continuation of the work done in FR 401. Special attention will be given to the practice of translation.
Prereq: FR 401 or consent of department

LINGUISTICS COURSES

Language of Instruction:
Courses are normally taught in French. However, in the case of students not enrolled in a French Major or Honours Program, permission may be given for written assignments and examinations to be done in English.

FR 203  3C, 1L  0.5
Introduction to the Phonetics of French
This course introduces the student on a practical level to the phonetic system of contemporary French, and on a theoretical level to a phonological description of that system. Taught in French.
Prereq: FR 192 or consent of department

FR 303  3C, 1L  0.5
Introduction to Linguistics
This course will introduce students to a basic theoretic reflection on language. Various important schools of modern linguistic thought ranging from Sausure to Chomsky will be discussed. Taught in French.
Prereq: FR 251, 252, or consent of department

FR 403  0.5
Topic in Linguistics
An area in Linguistics of particular interest to the instructor and the students will be chosen. Taught in French.
Prereq: FR 251, 252 or consent of department

FR 409  3C  0.5
Medieval French Language
Introduction to the early development of French. Offered at St. Jerome's College

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 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, 196 or consent of 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 are encouraged to take this course as an elective.

FR 302A/B 0.5/0.5  
**French Civilization, 1884-1914**  
Offered in the Nantes Program.

FR 305A/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.

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**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 196 3C 0.5  
**French Literature 2**  
For students with Ontario Grade 13 French. A study of various critical approaches and their application to French literature, with emphasis on the literature of France. A continuation of FR 195. Taught in French.  
Prereq: Grade 13 French or equivalent, FR 155 or consent of department.

FR 231 3C 0.5  
**Survey of 17th-Century French Literature**  
This course will trace the development of French literature from 1600-1700. Taught in French.  
Prereq: FR 192, 196 or consent of 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 192, 196 or consent of department.

FR 233 3C 0.5  
**Romanticism**  
This course will deal with French literature between 1789 and 1848. This course will explore the principal literary movements of this period: Romanticism. Taught in French.  
Prereq: FR 192, 196 or consent of 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 192, 196 or consent of department.

FR 275 3C 0.5  
**Contemporary French-Canadian Novel**  
A study of a limited number of texts by authors such as Gabrielle Roy, André Languevin, Hubert Aquin, Gérard Bessette. Taught in French.  
Prereq: FR 192, 196 or consent of department.

FR 342 3C 0.5  
**18th-Century French Literature**  
This course will trace the development of French literature from 1700-1800. Taught in French.  
Prereq: FR 192, 196 or consent of department.  
Also offered at St. Jerome's College.

FR 343 3C 0.5  
**Topics and Problems in 18th-Century French Literature**  
A more detailed study of one or more aspects of the Enlightenment. Taught in French.  
Prereq: FR 192, 196 or consent of department.

FR 354 3C 0.5  
**Realism and Naturalism**  
This course will study the literature from 1848 to 1900. It will cover not only the major writers but also the theories behind the social, artistic and intellectual trends in this part of the century.  
Prereq: FR 192, 196 or consent of department.  
Not open to students who have taken FR 254.

FR 363 3C 0.5  
**20th-Century French Novel**  
A survey of the Novel from Proust to the present day through the study of a selection of Key Texts. Taught in French.

FR 371 3C 0.5  
**French-Canadian Poetry**  
A study of its evolution from Octave Crémazie to Anne Hébert and the present. Taught in French.  
Prereq: FR 192, 196 or consent of department.

FR 372 3C 0.5  
**Contemporary Quebec Theatre**  
A study of contemporary Quebec theatre, from Gratien Gélinas to the present. Taught in French.

FR 391 3C 0.5  
**French Women Writers**  
A study of selected works by women writers in France from the Middle Ages to the twentieth century. The course will focus on the literary features of these works and on their value as reflections of the position of women in French society throughout the period. Taught in French.

FR 410 3C 0.5  
**Medieval French Literature**  
An introduction to French literature of the Middle Ages through the study of representative texts, including excerpts from the epic, courtly and satirical works. Taught in French.  
Prereq: FR 192, 196 or consent of department.  
Offered at St. Jerome's College.

FR 421 3C 0.5  
**French Prose of the Renaissance**  
Readings in 16th-century literature: Rabelais, Montaigne, etc. Taught in French.
FR 422 3C 0.5
French Poetry of the Renaissance
Readings in 16th-century poetry: Marot, the Pédale, the baroque poets, etc. Taught in French.
FR 451 3C 0.5
Symbolist Poetry
The course will concentrate on the works of four poets - Baudelaire, Verlaine, Rimbaud and Mallarmé. Special emphasis will be placed on the "explication de texte" as a technique in the analysis of poetry.
Prereq: FR 192, 196 or consent of department
FR 482 3C 0.5
Study of Individual Authors
Each year a different author is the subject of specialized study to permit an in depth exploration of his/her literary qualities. Taught in French.
Prereq: FR 192, 196 or consent of department
FR 490-498 0.5
Senior Tutorials
A small group of students follows a course of study under the supervision of a faculty member. For details, inquire of the Department.

General Engineering

Assistant Professor
D.A. Fraser, BSc, MSc, B.Ed (Toronto), PhD (Waterloo)

Lecturers/Demonstrators
S.H. Birkett, BSc (London)
J. Lowe, BSc (Carleton), Recipient of the Distinguished Teacher Award
K. Repert, BASc (Waterloo)

Course Descriptions

GEN E 082 F 3C 0.5
Introduction to Human Communications Systems
The processes involved in man-man, man-machine and mass communications will be discussed. Models of communication systems. The contributions and points of view of the various disciplines which make up the spectrum of communication studies today.
Not open to Year One students.

GEN E 115 F 2C, 4L 0.75
Engineering Concepts
An introduction to some of the basic methods and principles used by engineers including fundamentals of graphics, projections, spatial co-ordinate plotting, free-hand sketching, vector graphics.

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, 3L (4 times/term) 0.5
Electrical Engineering
Introduction to electric charge and fields; ac circuit analysis; Kirchhoff's circuit laws; 2 ports and op-amps; capacitance, induced voltage; introduction to motors and their characteristics.
For Year One Chemical, Civil and Geological Engineering students.

GEN E 124 W, S 3C, 1T, 3L (4 times/term) 0.5
Electrical Engineering
Introduction to electric charge and fields; ac circuit analysis; Kirchhoff's circuit laws; 2 ports and op-amps; capacitance, inductance and impedance; magnetic force and induced voltage. Semiconductors. Instrumentation.
For Year One Mechanical Engineering students.

GEN E 301 W, S 4D 0.5
Special Directed Studies
This course is provided to allow enrichment for students in Engineering who have fulfilled the requirements of one or more of the courses in the 3A 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 Chairman of the Department in which the student is registered.

GEN E 302 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 3B term by means of passing a course or courses taken during one or more work terms. The course comprises a special project pursued under the direction of a Faculty member, normally in the Department of the student's program.
Prereq: Permission of the Associate Chairman of the Department in which the student is registered.

GEN E 351 W 2C, 2S
Information Technology and Society
The social and technological concepts of an information society. Overview of information technology; current states and future directions in computers and communications. Study of an information system, its promises and problems including privacy, security, user acceptance, retraining, control, etc. Impact of information technology on the quality of life, employment, freedom of information, leisure, creativity, etc. One application area will be selected for study each term from Computer-Aided Learning, Office Automation, Computer-Aided Design and Manufacturing, Telecomputing, etc.
Prereq: Open to third or fourth-year students in any faculty with at least one university-level computing course, or consent of the instructor.

GEN E 352 W 2C 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.

GEN E 401 F, S 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 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 Chairman of the Department in which the student is registered.
GEN E 402 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 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 Chairman of the Department in which the student is registered.

GEN E 411 S.F. 3C 0.5
Engineering Law

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 Year One students. Cross-listed as PHL 315

GEN E 460 F 3C 0T 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 structure.
Prereq: Students must have background study in properties and mechanics of materials equivalent to CIV E 204 and CIV E 265. Registration in this course will be assessed on an individual basis through scheduled interviews. Cross-listed as CIV E 400

P.J. Howarth, BA (Cambridge), PhD (Glasgow)
R.M. Irving, BA, MA (Toronto), PhD (Minnesota)
C.K. Knapper, BA Hons (Sheffield), PhD (Saskatchewan)
R.R. Krueger, AB, MA (Western Ontario), PhD (Indiana), Recipient of the Distinguished Teacher Award
A.G. McLellan, BSc, PhD (Glasgow)
G.G. Mulamoot, BSc (Omsore), MSc (Bombay), PhD (Delhi)
J.G. Nelson, BA (McMaster), MA (Colorado), PhD (Johns Hopkins)
R. Preston, BA (Central Washington), MA (Washington), PhD (Clark)
D.F. Walker, BSc (London), MA, PhD (Toronto)

Department of Geography

Professor, Chairman of the Department
W.B. Mitchell, BA, MA (British Columbia), PhD (Liverpool)

Professor, Dean of Graduate Studies
J.S. Gardner, BSc (Alberta), MSc, PhD (McGill), Recipient of the Distinguished Teacher Award

Professor, Dean of the Faculty of Environmental Studies
J.H. Bater, BA, MA (British Columbia), PhD (London)

Associate Professor, Advisor on Interdisciplinary Programs to the Vice-President, Academic and Provost
T.E. Bunting, BA (York), MA (Western Ontario), PhD (Toronto)

Professor, Associate Dean,
Undergraduate Studies and Educational Liaison
G.R. McBoyle, BSc, PhD (Aberdeen)

Professor, Associate Chairman,
(Graduate Studies)
G. Wall, BA (Leeds), MA (Toronto), PhD (Hull)

Assistant Professor, Associate Chairman,
(Graduate Studies)
D. Dutycha, BA (Waterloo Lutheran), MA (Waterloo), PhD (London)

Professors
C.R. Bryant, BA, PhD (London)
A. Darm, BA (Wayne State), MA (Clark), PhD (Michigan)
L.T. Guille, BSc (Cape Town), MA (York), PhD (Toronto)

R.A. Bullock, BA, MA (Belfast), PhD (London)
B. Hyma, BSc, MSc (Madras), MA (Sheffield), PhD (Pittsburgh)
A.B. Keski, MA, PhD (UMCS/Lublin, Poland)
E.F. LeDrew, BA (Toronto), MA, PhD (Colorado)
G.B. Fiddle, BA (Western Ontario), MA, PhD (Clark)
J.B. Robinson, BA (Toronto), MES (York), PhD (Toronto)
S.L. Smith, BA (Wright State), MA (Ohio State), PhD (Texas A&M)

Assistant Professors
C. Dufournaud, BA (Sir George Williams), MA (Laval), PhD (Toronto)
G.B. Hall, BA, Hons (Otago, New Zealand), MA, PhD (McMaster)

Adjunct Faculty
P.O. Adeniyi, BSc (Ife), MSc (I.T.C. Enschede), PhD (Waterloo)
R. Bell, BA, MA (McMaster)
G. Brannon, CC
D.I. McKenzile, BES, MA (Waterloo)
S. Paia, BSc (Ankara), PhD (Freiburg)
M.E. Sanderson, BA (Toronto), MA (Maryland), PhD (Michigan)
E.M. Strome, BSc (Alberta), MSc (British Columbia), PhD (Carnegie-Mellon)

Faculty Members of Geography holding cross and/or joint appointments to:

1. Planning
2. History
3. Recreation and Leisure Studies

Faculty Members holding cross and/or joint appointments to Geography from:

4. Renison
5. Recreation and Leisure Studies
6. Environment and Resource Studies
7. Planning
8. Environmental Studies
Course Descriptions

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 man's cultural environment. Directed towards man-land and location analysis themes.

GEOG 102 F/W 3C.1L  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 125F F 3C  0.5
Introduction to the Third World
A study of the Third World. Topics include: population issues, planning and practices; education and health in the social development process; urbanization and industrialization; planning for rural and urban development in Asia, Africa and Latin America.

GEOG 160 W 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 development of maps, collection of data and symbolization.

Lab fee: $15-$25

GEOG 201 F/W 2C.2L  0.5
Geomorphology and Soils
The roles of geomorphological and soil forming processes in creating and modifying landscapes. The utility of geomorphological information in our everyday lives.

Prereq: GEOG 102

GEOG 202 W/S 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.

Prereq: A first-year human geography course or equivalent

GEOG 203 F.S 2C.2L  0.5
Regional Geography
The approach of the regional geographer is illustrated using one or more specific regions. Political, social, and historical processes are studied as they affect perception of the regional environment. Example regions used are Austria, Alpine and Mediterranean World, Greece, Hungary, Switzerland.

Prereq: A first-year human geography course.

GEOG 204 F 3C  0.5
Soviet Union
Introduction to the geography of the Soviet Union, with a focus on selected problems in urbanization, industrialization, resource use and regional economic development in a planned economy.

GEOG 205 F 2C.2L  0.5
Africa
The geography of modern Africa south of the Sahara in the context of changing attitudes to the continent on the part of the "developed" countries. Attention will focus on problems of the physical, social and economic environments.

GEOG 208 W 2C.2L  0.5
Applied Climatology
World climate and weather patterns and their impact on man. Topics include atmospheric circulation, climate classifications, air pollution, urban climate, climate change and weather modification.

Prereq: GEOG 102

GEOG 221 W 3C  0.5
The United States
Focuses on population shifts, urban developments, and regional economic development in the context of the nation and selected regions.

GEOG 230 F 3C  0.5
Cultural Geography
The Geography of culture and the role of cultural factors in environmental relationships.

Prereq: GEOG 101

GEOG 251 F 3C  0.5
Cities in Canada
An introduction to some basic concepts in urban studies emphasizing a systematic approach to processes and problems of urban development in Canada.

Field trip fee: $6-$10

GEOG 275 F.W 2C.2L  0.5
Introductory Air Photo Analysis and Remote Sensing
Basic characteristics of various remote sensing techniques and their application in the broad field of geographic and environmental studies. Emphasis on the analysis and interpretation of air photos in 3 dimensions.

Lab fee: $20

GEOG 300 F.S 2C.2L  0.5
Geomorphology and the Southern Ontario Environment
Study of the origin and evolution of landforms of Southern Ontario. Analysis of contemporary geomorphic processes. Study of human impact on geomorphological landscapes. The lectures will be supplemented by field trips and field work required for term projects.

Prereq: Third and fourth year students only with GEOG 201 or consent of instructor

Lab fee: $10-$15.

GEOG 303 W 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 socioeconomic significance.

Prereq: GEOG 201 and one of GEOG 208 or 309

GEOG 304 F.S 4F/2L  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 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; nonsurvey 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.
GEOG 309 F.W 2C,1D 0.5
Physical Climatology
Principles of physical climatology with emphasis on climate regions of Canada. Topics include radiation and energy balances, general circulation patterns, synoptic development, climatic variability and microclimatology.
Prereq: GEOG 102

GEOG 311 F.S 3C 0.5
Regional Industrial Development
Manufacturing in the context of economic development at regional and urban scales. Focus on empirical studies and related planning issues in Canada and the United Kingdom.
Prereq: GEOG 202 or consent of instructor

GEOG 315 F 3C 0.5
Agricultural Geography
The geographical dimensions of agricultural systems. Diffusion of innovations, regional evolution of agricultural structure and vertical integration. Comparative study of programs of government intervention in agriculture in Canada and Europe. Some field trips.
Prereq: GEOG 202 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 319 S 3C 0.5
Spatial Analysis
Advanced quantitative analysis and sampling in a spatial context. A selection of techniques from gravity models, linear programming, nearest neighbour analysis, Markov chain analysis, graph theory, simulations and trend surface analysis.
Prereq: ENV S 278 or consent of instructor
Cross-listed as PLAN 318
Students may receive credit for only one of GEOG 318 and PLAN 318

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 2C 0.5
Geographical Study of Canada
Geographical basis of Canada and Canadian issues. Selected problems relating to nationalism, regionalism, environmental quality, urbanization, regional disparities and resource development.

GEOG 322 F 3C 0.5
Topics in Population Geography: Health and Disease
Population geography 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.
Prereq: Second-year students or higher

GEOG 333 F 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 202 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
1
The changing geographies of settlement and resource use from the Discoveries to the early nineteenth century.
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 202 or 251 or consent of instructor
Field trip fee $5-$10

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 202 or GEOG 251 or consent of instructor

GEOG 352 F 3C 0.5
The Rural-Urban Fringe
Comparative study of the natural, economic and cultural environments of the rural-urban fringe in the Western World. Emphasis on the use, ownership, development and management of land and the interrelationships between the resource base and urban demands on it.
Prereq: GEOG 202 or consent of instructor

GEOG 353 W 3C 0.5
Marketing Geography
Emphasized are consumer behaviour, firm organization and behaviour, and modelling and analysis of commercial location patterns at both inter- and intra-urban scales.
Prereq: ENV S 278 and a third-year urban or quantitative geography course or consent of instructor

GEOG 354 F 2C 0.5
Advanced Marketing Geography
Case study orientation with emphasis on computer modelling and market area analysis.
Prereq: GEOG 353

GEOG 356 F 3C 0.5
Resources Management
Reviews selected theories, methods, and terminology related to economic, behav- ioural, institutional and decision-making aspects of resources and environmental problems.
Prereq: ENV S 178 or consent of instructor
Field Trip fee $10-$15
GEOG 357 F.W 3C 0.5
Conservation and Resource Management
History of the conservation movement; ecological principles of conservation and resource management. Analysis, use and planning of recreational resources.
Section one of this course uses a self-directed learning approach.
Prereq: ENV S 200
Cross-listed as PLAN 357
Lab fee $10.5
Students may receive credit for only one of GEOG 357 and PLAN 357

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 $10.5

GEOG 360 F 1C.2L 0.5
Preparation of Maps and Illustrations
Equipment, materials and techniques involved in the practical construction of maps and cartographic illustrations. Conventional drafting and plotting procedures, symbolization of data and map editing for reproduction.
Prereq: GEOG 160
Lab fee $15.25

GEOG 375 W 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 GEOG 201
Lab fee $20

GEOG 376 S 2C.3L 0.5
Environmental Remote Sensing
Analysis of non-photographic systems of remote sensing (e.g. radar, Landsat, SPOT). Study of remote sensing methods and data processing for analysis of physical and human environments.
Prereq: GEOG 275
Lab fee $10.5

GEOG 381 F 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 flt/lab 0.5
Field Research
One week field camp in which a specific area will be analyzed from a geographic point of view. Individual or group analysis of specific field problems. Fourth year General students may take this course only in fourth year.
Prereq: Honours or fourth year Geography students only
Estimated cost to student: $125-$150

GEOG 400 W 2C.2L 0.5
Climatic and Periglacial Morphology
Characteristics of the main principles of climatic and climatogenetic geomorphology. Examination of processes and forms related to the periglacial environment. Analysis of periglacial geomorphology of the Canadian north.
Prereq: One of GEOG 300, EARTH 342 or consent of instructor

GEOG 401 F 3S 0.5
Glacial Geomorphology and Some Contemporary Applications
Glacial and fluvioglacial erosion and deposition and their effects on landscapes. Focus on the environmental influences of glaciation and on practical applications of glacial geomorphologists’ techniques and information.
Prereq: One of GEOG 300, EARTH 342

GEOG 408 W 2C.1L 0.5
Atmospheric Resource Management
Advanced study of the atmosphere as a natural resource system. Emphasis on weather modification and economic, social and political aspects of climate.
Prereq: GEOG 208 or equivalent

GEOG 414 S 2S 0.5
Energy Resources Management
Energy management emphasizing ecological and economic approaches. Issues related to managing conventional energy resources and development of alternatives. Techniques for studying energy issues are also presented.
Prereq: GEOG 359 and either GEOG 311 or GEOG 356 or consent of instructor

GEOG 425 W 3C 0.5
Africa
Selected aspects of a major region with particular reference to problems of development. Normally the region will be East Africa. Selection of topics will be related to the interests of participants.
Prereq: GEOG 205

GEOG 430 S flt/lab 0.5/1.0/1.5
Field Research in Regional Geography
430A (0.5 course credit) or 430B (1.0 course credit) or 430C (1.5 course credits).
A detailed analysis of a selected region with major emphasis upon a field examination of the region (several weeks duration).
Prereq: Third- or fourth-year geography students or consent of instructor

GEOG 448 F 2S 0.5
Urban Historical Geography
An examination of the process of city growth during the 19th and early 20th centuries. The course will focus on internal urban structure and cover both the European and North American cities. Emphasis on student projects.
Prereq: GEOG 349 or consent of instructor
Hist 204C recommended

GEOG 451 F 1C.3L 0.5
Soils Geography
Prereq: GEOG 201

GEOG 461 F.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 471 F.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
Lab fee $10.5
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 Chairman, 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 482 F 2S 0.5
Geography and Education
Prereq: Environmental Studies students in third or fourth year, or consent of instructor

GEOG 490A F.W.S 2S 0.5
Honours Thesis Preparation
Preparatory work and first draft of thesis.
Prereq: GEOG 390; only fourth year
Honours students
A letter grade for GEOG 490A will be submitted only after the completion of GEOG 490.

GEOG 490B F.W.S 3S 0.5
Honours Thesis Completion
Completion of thesis.
Prereq: GEOG 390 and GEOG 490A; only fourth year Honours students

COURSES NOT OFFERED 1988-89
GEOG 126R Development in the Third World
GEOG 225R Urbanization in the Third World
GEOG 226R Food, Agriculture and Rural Development in the Third World
GEOG 232 Geography of Population
GEOG 307 Social Survey Techniques
GEOG 317 Nonparametric Statistics
GEOG 331 Special Topics in Cultural Geography
GEOG 342 Historical Geography of Canada 2
GEOG 345 Political Geography
GEOG 359 Geography of Energy
GEOG 401 Glacial Geomorphology and Some Contemporary Applications
GEOG 403 Computer Cartography
GEOG 406 Tropical Geomorphology
GEOG 407 Field and Lab Techniques in Geomorphology
GEOG 409 Energy Balance Climatology

GEOG 411 Geography of Manufacturing Firms and Industries
GEOG 423 Central and Eastern Europe
GEOG 424 Soviet Union
GEOG 430 Field Research in Regional Geography
GEOG 448 Urban Historical Geography
GEOG 450 City and Regional Systems
GEOG 452 Problems of Rural Land Use
GEOG 462 Land Dereliction and Rehabilitation
GEOG 481 Frontiers in Geography

Geological Engineering
Professor, Chairman of the Geological Engineering Board
M.B. Dusseault, BSc, PhD (Alberta), PEng

Members of the Board of Geological Engineering
Professor, Dean of the Faculty of Engineering, Department of Civil Engineering
W.C. Lennox, BSc, MSc (Waterloo), PhD (Lehigh), PEng

Professor, Chairman of the Department of Civil Engineering
R.C.G. Haas, BSc, MSc (Alberta), PhD (Waterloo), PEng

Associate Professor, Chairman of the Department of Earth Sciences
J.P. Greenhouse, BSc, MSc (British Columbia), PhD (California)

Professor, Department of Civil Engineering
E.L. Matyas, BASc (Toronto), DIC, PhD (London), PEng

Professors, Department of Earth Sciences
J.A. Cherry, BE (Saskatchewan), MS (California Berkeley), PhD (Illinois), PEng
P.F. Karrow, BSc (Queens), PhD (Illinois)

Associate Professors, Department of Civil Engineering
B. Le Lievre, BEng (West Australia), MSc, PhD (Waterloo), PEng
L. Rothenburg, Dipl Phys (Moscow) PhD (Carleton) PEng
J.C. Thompson, BASc (Toronto), MS, PhD (Illinois), PEng

Associate Professor, Department of Earth Sciences
J.M. Konrad, BSc, Dipl Ing (Strasbourg), MSc (Laval), PhD (Alberta), ing.

Assistant Professor, Department of Chemical Engineering
I. Chatzis, BASc, MSc, PhD (Waterloo), PEng

Research Professor
J.A. Franklin, BSc, MSc, PhD (London), PEng

Adjunct Faculty
D. Best, BSc, PhD (Queens), PEng

Course Descriptions
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, radiocative dating, hydrogeology, pedology, resources, mass wasting, erosion.

GEO E 400 F 1C.4T 0.5
Geological Engineering Thesis I

GEO E 401 W 1C.4T 0.5
Geological Engineering Thesis II

These two courses 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. Under special circumstances, two suitable courses may be substituted for GEO E 400 and 401.

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 311, ESC building.
Course Descriptions

Germanic and Slavic

GERMANIC

Introductory Note
Not all courses listed in this section are available. Please consult the 1989-90 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 13 or equivalent. If in doubt, consult the Department.

GER 102 F,W,S 3C,1L 0.5
First Year German
As 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 13 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

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: At least Grade 12 High School German, or equivalent

GER 121/122 are first year courses for students who have completed at least Grade 12 High School German or have an equivalent background in the language. If in doubt, consult the Department.

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 211 F 3C 0.5
Intermediate Scientific German
Grammar review and more advanced study of German structure and idiom. Reading and translating of scientific writings for vocabulary building and mastery of difficulties peculiar to technical style. Reading material is selected according to the field of the individual student.

Prereq: GER 112 or equivalent

GER 212 W 3C 0.5
Intermediate Scientific German
As GER 211

Prereq: GER 211

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: At least two years of high school 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.

GER 281 F 3C 0.5
Post-War Literature
Reading and interpretation of major works since 1945 in prose, drama and poetry. Main authors: Borchert, Böll, Frisch, Dürenmatt, Grass, Eich, etc.
Prereq: GER 122, 252 or equivalent

GER 282 W 3C 0.5
Post-War Literature
As GER 281
Prereq: GER 122, 252 or equivalent

GER 291 F 3C 0.5
Survey of German Literature
Introduction to the major periods of German literature. Reading and interpretation of representative texts.
Prereq: GER 122, 252, 202 or equivalent

GER 292 W 3C 0.5
Survey of German Literature
As GER 291
Prereq: GER 122, 252 or equivalent

GER 300A-Z F,W 3C 0.5
Film and Literature in Germany
This course introduces students to significant aspects of modern German culture through film, and links this study with that of literature. It involves viewing and analyzing films and establishing a connection to related literary and cultural traditions.
Taught in English
Prereq: 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. 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: GER 212 or equivalent.

GER 312 W 3C 0.5
Theory of Translation
As GER 311
Prereq: GER 311

GER 351 F 3C 0.5
Intermediate Conversation and Composition
Conversation on modern topics. Exercises in advanced grammar, stylistics, and composition.
Prereq: GER 252 or equivalent

GER 352 W 3C 0.5
Intermediate Conversation and Composition
As GER 351
Prereq: GER 351 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 Dürenmatt.
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 366.
Cross-listed as DRAMA 355

GER 361 F 3C 0.5
Young Germany and Biedermeier
Reading, interpretation and critical analysis of prescribed prose, drama and poetry. (Grillparzer, Mörke, Stifter, Gottfried, etc.);
Prereq: GER 122, 252 or equivalent

GER 362 W 3C 0.5
Poetic Realism
Reading, interpretation and critical analysis of prescribed texts in prose, drama and poetry (Storm, Keller, Ludwig, Hebbel, Raabe, Fontane, etc.).
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 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 Man and Revolution, Duty vs. Inclination, Flesh vs. Spirit, Modern Germany East and West. Works studied include Kantor's Death (Büchner), Maria Stuart (Schiller), Demian (Hesse), Galileo (Brecht), and Cat and Mouse (Grass).

GER 392 W 3C 0.5
Masterpieces of German Literature in Translation
As GER 391

GER 395Z F 2.5
Waterloo in Germany Program
Description in Arts program section.

GER 396Z W 2.5
Waterloo in Germany Program
As 395Z.

GER 421 F 3C 0.5
Introduction to German Linguistics
Study of the major linguistic structures of German, especially in contrast to the structures of English. Coverage of phonetics and phonology, morphology and lexicology, syntax and semantics, and differences between spoken and written German.
Prereq: GER 352 or equivalent

GER 422 W 3C 0.5
Introduction to German Linguistics
As GER 421
Prereq: GER 421
GER 441 F 3C 0.5
Humanism, Reformation and Baroque
Reading, interpretation and critical analysis of prescribed texts (Erasmus, Luther, Sachs, Opitz, Gryphius, Grimmelshausen, etc.).
Prereq: Second-year standing in German

GER 442 W 3C 0.5
Enlightenment and Storm and Stress
Reading, interpretation, and critical analysis of prescribed texts (Lessing, Wieland, Klopstock, Lenz, Klinger, etc.).
Prereq: Second-year standing in German

GER 451 F 3C 0.5
Advanced Conversation, Composition and Stylistics
This course provides intensive practice in spoken and written German on the advanced level.
Prereq: GER 352 or equivalent

GER 452 W 3C 0.5
Advanced Conversation, Composition and Stylistics
As GER 451
Prereq: GER 451 or equivalent

GER 461 F 3C 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 3C 0.5
Middle High German Literature
Reading and interpretation of samples from the major works of the MHO period, with emphasis on writers of the first “Blützeit” in German literature (1170 to 1250); Early Minnesang, Walther von der Vogelweide, Nibelungenlied, Hartmann von Aue, Wolfram von Eschenbach, etc.

GER 471 F 3C 0.5
German Poetry
A study of the main thoughts, themes, forms and schools in German poetry from the beginning to Goethe.
Prereq: GER 122, 252 or equivalent

GER 472 W 3C 0.5
German Poetry
A study of the main thoughts, themes, forms and schools in German poetry from German Romanticism to the present.

GER 495-498 F.W,S,JA R 0.5 each
Reading Courses in Approved Topics
Prereq: Approval of the Department

DUTCH
DUTCH 101 F 3C 0.5
First Year Dutch
The basic elements of Dutch grammar with emphasis on oral practice and pronunciation, along with appropriate texts from Dutch literature. Introduction to aspects of Dutch culture.
Open to all students with little or no knowledge of Dutch.

DUTCH 102 W 3C 0.5
First Year Dutch
As DUTCH 101
Prereq: DUTCH 101 or equivalent

DUTCH 201 F 3C 0.5
Intermediate Dutch
This course will be conducted partly in Dutch and offers advanced study in grammar, composition, and conversation. Special emphasis will be given to comprehension and practice in the spoken language.
Prereq: DUTCH 102 or equivalent

DUTCH 202 W 3C 0.5
Intermediate Dutch
As DUTCH 201
Prereq: DUTCH 201 or equivalent

RUSSIAN
Introductory Note
Not all courses listed in this section are available. Please consult the 1988-89 Course Offerings List or the Department for current course information.
Russian Workshop in the USSR
A "Total Immersion" Russian language workshop for a full month at the Russian Language Seminar in Leningrad. Daily instruction by Russian faculty at the elementary, intermediate, and advanced levels, according to the proficiency of the students.
Prereq: At least one year of Russian language at the University level or equivalent
Credits: 1.5 for completion of
The Workshop may be attended more than once. However, a maximum of 1.5 credits will normally be granted towards a degree.

RUSS 101 F 3C,1L 0.5
First Year Russian
A study of Russian grammar and composition with emphasis on oral practice and pronunciation.
Language lab
Open to all university students with little or no knowledge of Russian, except those who have credit for RUSS 111 or 112

RUSS 102 W 3C,1L 0.5
First Year Russian
As RUSS 101
Prereq: RUSS 101 or equivalent

RUSS 111 F,S 3C 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 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 112 W 3C 0.5
First Year Scientific Russian 2
As RUSS 111.
Prereq: RUSS 111 or equivalent
Taught in English

RUSS 201 F 3C 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 102, 112 or equivalent

RUSS 202 W 3C 0.5
Intermediate Scientific Russian
As RUSS 201
Prereq: RUSS 201 or equivalent

RUSS 251 F 3C 0.5
Conversation, Composition, Grammar and Phonetics
This course is basically a continuation of First-Year Russian. It provides intensive practice in spoken and written Russian. Vocabulary building, comprehension, pronunciation and intonation are stressed.
Prereq: RUSS 102, 112 or equivalent
RUSS 252 W 3C 0.5
Conversation, Composition, Grammar and Phonetics
As RUSS 251
Prereq: RUSS 251 or equivalent

RUSS 251 F 3C 0.5
Introduction to Russian Literary Movements
Reading of representative works from Russian Classicism, Romanticism, 19th Century Realism, and various periods of 20th century Russian literature.
Prereq: RUSS 102 or equivalent

RUSS 262 W 3C 0.5
Introduction to Russian Literary Movements
As RUSS 261
Prereq: RUSS 261 or equivalent

RUSS 271 F 3C 0.5
Russian Thought and Culture
A survey of cultural history from the 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.

RUSS 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.

RUSS 311 F 3C 0.5
Theory of Translation
Theory, methodology, and techniques of translation. Patterns and problems in the translation of scholarly texts from the arts and sciences, with special emphasis on idiom and structure as compared with the target language.
Prereq: RUSS 232 or equivalent

RUSS 312 W 3C 0.5
Theory of Translation
As RUSS 311
Prereq: RUSS 311

RUSS 341 F 3C 0.5
Russian Drama
A study of the origins and development of Russian drama up to 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.
Open to all students
Cross-listed as DRAMA 362

RUSS 342 W 3C 0.5
Russian Drama
As RUSS 341
Taught in English.
Extra work in Russian required of Russian majors only.
Open to all students
Cross-listed as DRAMA 363

RUSS 351 F 3C 0.5
Intermediate Conversation and Composition
In principle, this course is a continuation of RUSS 251/252. In terms of vocabulary building, apart from the spoken language, the comprehension of the literary language is especially stressed.
Prereq: RUSS 252 or equivalent

RUSS 352 W 3C 0.5
Intermediate Conversation and Composition
As RUSS 351
Prereq: RUSS 351 or equivalent

RUSS 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

RUSS 362 W 3C 0.5
Russian Short Story
As RUSS 361

RUSS 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

RUSS 382 3C 0.5
The Peoples of the Soviet Union
As RUSS 381
Open to all students

RUSS 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.

RUSS 392 W 3C 0.5
Great Russian Novels
Reading and interpretation of 19th- and 20th-century novels selected from the works of Gorky, Zamyatin, Pasternak, and Solzhenitsyn. Lectures on social and intellectual background.
Taught in English.
Extra work in Russian required of Russian majors only.
Open to all students.

RUSS 441 3C 0.5
East Slavic Epic Tradition
A study of the origins and development of the Epic tradition in East Slavic Literature.
Taught in English.
Open to all students

RUSS 442 3C 0.5
Russian Epic Tradition
As RUSS 441
Taught in English.
Open to all students

RUSS 451 F 3C 0.5
Advanced Conversation, Grammar and Composition
This course is conducted in Russian and provides intensive practice in spoken and written Russian on the advanced level.
Prereq: RUSS 352 or equivalent
RUSS 452 W 3C 0.5
Advanced Conversation, Grammar and Composition
As RUSS 451
Prereq: RUSS 451 or equivalent

RUSS 461 F 3C 0.5
20th-Century Russian Literature
Reading, interpretation, and critical analysis of selected fiction and drama (Andreev, Bunin, Gorky, Kataev, Sholokhov, A.N. Tolsoty).
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 (Blokh, 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

POLISH 101 F 3C 0.5
First Year Polish
The fundamentals of Polish grammar are taught with emphasis on oral practice and pronunciation. An introduction to Polish culture is given as well.
Taught in English
Open to all university students with little or no knowledge of Polish.

POLISH 102 W 3C 0.5
First Year Polish
As POLISH 101
Prereq: POLISH 101 or equivalent

POLISH 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: POLISH 102 or equivalent

POLISH 202 W 3C 0.5
Intermediate Polish
As POLISH 201
Prereq: POLISH 201 or equivalent

UKRAINIAN

UKRAINIAN 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.

UKRAINIAN 102 W 3C, 1L 0.5
Beginners' Ukrainian
As UKRAINIAN 101
Prereq: UKRAINIAN 101 or equivalent

UKRAINIAN 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: UKRAINIAN 102 or equivalent
Offered in alternate years

UKRAINIAN 202 W 3C, 1L 0.5
Intermediate Ukrainian
As UKRAINIAN 201
Prereq: UKRAINIAN 201 or equivalent
Offered in alternate years

UKRAINIAN 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

UKRAINIAN 272 W 3C 0.5
Ukrainian Civilization (From 1800 to the Present)
Ukrainian 272 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

UKRAINIAN 301 F 3C 0.5
Introduction to Ukrainian Literature
Reading and critical interpretation of texts chosen from the works of Skvozoda, Kotляревский, Shevchenko, Franko, L. Ukrainka and others.
Taught in English
Open to all students

UKRAINIAN 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. Korolych, and others).
Taught in English
Open to all students
Gerontology

Professor, Director of the Program
W.F. Forbes, BSc, PhD, DSc (London)

Associate Professors, Undergraduate Advisors
J.C. Carlson, MSc, PhD (Massachusetts)
N.H. Charness, MS, PhD (Carnegie-Mellon)

Associate Professor, Part-time Studies Advisor
P. Naus, PhD (Nijmegen, Netherlands)

Professors
H.S. Coblenz, BA Hons (Durham), MRP (North Carolina), FRPTI, ACP, FSS, MIES
M.E. Woodruff, OD (College of Optometry of Ontario), PhD (Indiana), FAAO

Adjunct Faculty
C. Kluck Davis, BA (Western Ontario), MA (McMaster)
J.F. Gentleman, BA, MS (Chicago), PhD (Waterloo)
J.A. Jackson, MA, MB, BChir (Cambridge)
B.D. McPherson, MA (Western Ontario), PhD (Wisconsin)
A. Water, BA Hons, MA, PhD (Western Ontario)

Course Descriptions

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 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 enrol 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.

GERON 403 S 2C 0.5
Topics in Mathematical Aspects of Chemistry, Biology and the Medical Sciences 1
Topics will be selected from the area of epidemiology and mathematical models of disease processes with special reference to heart disease and cancer.

Department of Health Studies

Associate Professor, Chairman of the Department
A.J.R. Cameron, BA, MA, PhD (Waterloo)

Professor, Associate Dean, Graduate Affairs, Faculty of Human Kinetics and Leisure Studies
M.E. Houston, BSc (Toronto), PhD (Waterloo)

Associate Professor, Associate Chairman, Graduate Affairs
D. Mills, BSAg (Purdue), PhD (Indiana)
Recipient of the Distinguished Teacher Award

Assistant Professor, Associate Chairman, Undergraduate Affairs
S.E. Evers, BSc (Ottawa), MA (Cornell), PhD (Western Ontario)

Professors
J.A. Best BA (Queens), PhD (Waterloo)
V.T. Farewell, BMath, MMath (Waterloo), PhD (London)
R.P. Schlegel, BA (Western Ontario), MSc (Illinois), PhD (Ohio State)
M.P. Zanna, BA, PhD (Yale)

Associate Professors
K.S. Brown, BMath, PhD (Waterloo)
L. Hoffman-Goetz, BA (SUNY, Binghamton), MA, PhD (Michigan)
S.A. McDaniel, BA (Massachusetts), MA (Cornell), PhD (Alberta)
Recipient of the Distinguished Teacher Award
M.T. Sharratt, BA, MA (Western Ontario), PhD (Wisconsin)

Assistant Professors
R.L. Cohen Silver, BA, PhD (Northwestern)
M.E. Haight, BSc, MSc, PhD (McMaster)
R.S. McColl, BSc (McGill), PhD (Purdue)
A. Myers, BA (Winnipeg), MA, PhD (York)
K. Pikachkin, BA, MA, PhD (British Columbia)
E.A. Smith, BS (Frostburg), MA (West Virginia), DRPH (U. North Carolina, Chapel Hill)
P. Wainwright, BSc (Rhodes, S.A.J.), MA, PhD (Waterloo)

Research Professor
B. Suttle, MB, ChB (St. Andrews)

Adjunct Faculty
H. Best, BA (Toronto), MA, PhD (Waterloo)
N. Kreiger, 3A (Pennsylvania), MPH, PhD (Yale)
A.E. LeBlanc, BA (Queen's), MSc, PhD (Toronto)
N. White, MD, CM, DPsych (McGill), FRCP (C) (Royal College)
C.J. Young, BSc (Guelph), MSc (Western Ontario)

Faculty Members of Health Studies
holding cross appointments to:
1Psychology
2Statistics

Faculty Members holding cross or joint appointments to Health Studies from:
3Kinesiology
4Psychology
5Statistics
6Sociology
7Urban and Regional Planning

Course Descriptions

Introductory Note
HLTH 101/102 have replaced HLTH 140/141.

HLTH 101 F 3C 0.5
Introduction to Health Studies 1
An exploration of current issues and controversies in the promotion of optimal health with emphasis on the biological factors contributing to health or disease. Strategies and procedures for the reduction of risk factors for disease are described. Topical areas include: (1) human reproduction and sexuality, (2) nutritional factors and heart disease, and (3) genetic diseases and cancer.
Prereq: Students with HLTH 140 and/or 141 may not take this course for credit

HLTH 102 W 3C 0.5
Introduction to Health Studies 2
The same as HLTH 101, with emphasis on behavioural factors as they interact with biological processes. The topics will include (1) the neurological bases and (2) the psychological bases of health related behaviour such as stress and addiction and (3) community health.
Prereq: Students with HLTH 140 and/or 141 may not take this course for credit

HLTH 210 W 3C 0.5
Growth, Development and Aging
The physiology of human growth, development and aging is examined, with special reference to the influence of diet, environment, exercise and disease on the normal processes.
Prereq: BOL 230, 233
Cross-listed as KIN 210

HLTH 220 F 3C, 1T 0.5
Health and the Family
The course focuses on the family as the basic social unit responsible for the development and maintenance of the effective physical and mental health of its members. The interaction of biological, behavioural, and socio-cultural factors will be considered as the family is examined using a lifespan approach.
Prereq: HLTH 101/102 or 140/141, PSYCH 101 and Recommended SOC 101

HLTH 245 F 3C 0.5
Community Health
This course examines the Canadian health care system by considering organizational principles, health resources and economics, 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 340 W 3C 0.5
Environmental Health
An introduction to the basic biological and toxicological processes that determine the effects of environmental pollutants on human health. Emphasis is placed on the mechanisms that give rise to chronic or delayed health effects, such as cancer, genetic mutations, and birth defects.
Prereq: KIN 317 or equivalent

HLTH 341 F 3C 0.5
Disease Process
An introduction to the study of biological factors governing the occurrence of disease in human populations, using selected diseases to illustrate disease mechanisms and identification of risk factors.
Prereq: BOL 230, 233, KIN 317 or equivalent

HLTH 344 W 3C 0.5
Program Evaluation
A comprehensive and systematic introduction to the key concepts, methodologies, and issues related to program evaluation in general and their application to health programs in particular. Administrative and policy implications as well as the technical/methodological evaluation issues that face individuals involved in administering, planning, implementing, and evaluating health programs will be discussed.
Prereq: Basic courses in Statistics and in Research Design

HLTH 346 W. S 3C 0.5
Nutrition
An elementary course in nutrition with special emphasis on diet for sport and certain physiological conditions.
Cross-listed as KIN 346

HLTH 348 W. S 3C 0.5
Social Psychology of Health Behaviour
The study and application of basic social psychological processes in relation to selected health-related behaviours (e.g. family planning, overeating, smoking, non-medical drug use, cardiovascular risk factors, patient compliance, medical care utilization).
Prereq: PSYCH 101 or consent of instructor
Cross-listed as KIN 348

HLTH 349 F.S 3C 0.5
Principles of Behaviour Modification
A general overview of behaviour modification principles and procedures. Basic principles of reinforcement, punishment, modeling and desensitization are examined as they relate to health behaviour.
Prereq: PSYCH 101 or consent of instructor
Cross-listed as KIN 349

HLTH 350 F. 1C.2S 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 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 431 F,W,S 0.5 Research Project
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 Research Project
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 Project
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 a thesis format.
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 investigation of the epidemiology of selected non-communicable diseases. 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 various behavioural strategies for the prevention of coronary heart disease, hypertension, chronic obstructive pulmonary disease, and lung cancer. The role of behaviour in the pathogenesis of disease and the feasibility of behavioural change for prevention of disease will be discussed.
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 persistent 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

Department of History

Associate Professor, Chairman of the Department
D.A. Davies, BA, PhD (Washington), Recipient of the Distinguished Teacher Award

Associate Professor, Undergraduate Officer
K.D. Eagles, BA (Cambridge), MA, PhD (Washington)

Professors
M.J. Craton, BA (London), MA, PhD (McMaster) FRHistS
J.R. English, BA (Waterloo), AM, PhD (Harvard)
P. Forsyth, AB (Mount Holyoke), MA, PhD (Toronto), Recipient of the Distinguished Teacher Award
L.T. Gielke, BSc (Cape Town), MA (York), PhD (Toronto)
P.J. Harrigan, BA (Detroit), AM, PhD (Michigan)
J.F.H. New, BA, MA (Melbourne), PhD (Toronto), FRHistS

Associate Professors
R.L. Fowler, BA, MA (Toronto), DPhil (Oxford)

F.C. Gerard, MA (Collège St. Dominique, France), BD, STM (McGill), PhD (Hartford, Conn.) P
S.K. Johannessen, BA (Evangel College), MA, PhD (Missouri)
R.C. MacGillivray, BA (Queen's), AM, PhD (Harvard)
K.M. McLaughlin, BA (Waterloo), MA (Dalhousie), PhD (Toronto)
W.L. Mitchell, BA, MA, PhD (York)
W.O. Packull, BA (Guelph), MA (Waterloo), PhD (Queen's)
E.P. Patterson, BA (Baylor), MA (Kansas), PhD (Washington)
R. Sawatsky, BChEd (OMBC), BA (Bethel College), MA (Minnesota), PhD (McMaster) G
J.A. Wahl, CR, BA (Western Ontario), MA, PhD (St. Louis) J
J.W. Walker, BA (Toronto), MA (Waterloo), PhD (Dalhousie)

Assistant Professors
L.A. Curchin, BA (Western Ontario), MA (Toronto), MA (Carleton), PhD (Ottawa)
D.J. Horton, BA (Waterloo Lutheran), MA (Waterloo), PhD (McGill)
H.A. MacDougall, BA, MA, PhD (Toronto)
K.J. MacHardy, BA, MA (Western Ontario), PhD (Berkeley)
L.L. Neur, BA (San Francisco), MA (Oregon), PhD (McMaster)
C.A. Snyder, BA (Waterloo), MA, PhD (McMaster), G
G.J. Stortz, BA, MA (Waterloo), PhD (Guelph), J
D.E. Wright, BA (Cambridge), MA, PhD (McMaster)

Adjunct Faculty
R.P. Fuke, BA (Toronto), MA (Maryland), PhD (Chicago)
W. Klaassen, BA (McMaster), DPhil (Oxford) G
J.O. Stubbs, BA (Toronto), MSc (Econ) (London), DPhil (Oxford)

Lecturer
L.G. Friesen, BA (Waterloo), MA (Toronto), G

Faculty Member holding cross appointment to History from:
1Geography
2Classical Studies
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
Course Descriptions

Courses not offered in the current academic year are listed at the end of this section.

HIST 100 F 0.5
Landmarks in World History
A thematic introduction to the development of the world's major civilizations.

HIST 102C W 0.5
The Origins of War in the Twentieth Century
An analysis of the diplomatic, political, economic, ideological, social and cultural explanations of the causes of the major wars of this century with special emphasis on Canada.

HIST 102E F,W 0.5
Canadian History
Selected major themes from pioneer life to Canadian involvement in 20th century wars.
Offered at St. Jerome's College

HIST 102F W 0.5
An Introduction to Western Intellectual History Since the Renaissance
An exploration of some of the questions and answers posed by thinkers on the human predicament from Renaissance and Reformation times to the modern period. Readings range from Luther to J.P. Sarte, Shakespeare to Marx and Freud.

HIST 102K W 0.5
Conflict in the Caribbean and Central America
A study of the historical origins and nature of contemporary problems in the Caribbean and Central America.

HIST 102M W 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 103P W 0.5
Nationalities in Eastern Europe Since 1914
This course will examine the problems and possibilities posed by the emergence of national movements and independent nation-states in Eastern Europe in connection with the decline and fall of the Ottoman, Russian, and Austrian Empires at the beginning of the twentieth century.
Offered at Conrad Grebel College

HIST 130 F,W,S 0.5
The Modern World in Historical Perspective
This course will introduce students, through interrelationships 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
Twentieth Century History as Documented by Films
A history of the 20th century through films. The First World War, Europe between the Wars, the Second World War, North American society in the 20th century and other political, moral and social themes will be explored.

HIST 204 F 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 206 W 0.5
History of Canadian Minorities
An introduction to the history of selected racial and regional minorities in Canada. The course examines the emergence of minority communities, and their position in modern Canadian society.

HIST 207 W 0.5
Canadian Labour History
This course deals with the history of organized labor 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 system.
Offered at St. Jerome's College

HIST 208 F 0.5
The Cold War: American-Russian Relations Since November, 1917
Traditional and radical historians examine the Cold War: American-Russian rivalry, 19th century; Wilson vs. Lenin; F.D.R., Truman and Stalin; containment, coexistence, and the politics of crisis from 1945 to the present.

HIST 210 F 0.5
History of Law
An historical introduction to law in the Ancient world, Babylonian, Assyrian, Hittite and Roman law and legal practices and concepts will be examined.
Offered at St. Jerome's College

HIST 211 F 0.5
British History to 1603
A survey of the main stages in the transition of Britain from a remote province of the Roman Empire to a prominent state of post-Reformation Europe. Within the chronological framework, political and constitutional as well as ecclesiastical and social developments will be examined.
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 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.

HIST 216 F 0.5
Irish History: Achievement, Unification, Revolt
Political, social and religious history of Ireland from the beginning of the golden age of Irish medieval civilization to the Act of Union, c.400 to 1800.

HIST 217 W 0.5
Irish History: The Nineteenth and Twentieth Centuries
Political, social and religious history of Ireland emphasizing social change, the struggle for Home Rule and the Republic, 1800 to present.

HIST 218 F 0.5
German History 1740-1945
The development of Germany from the Austrian-Prussian rivalry of 1740 through to the end of World War II.
Offered at Conrad Grebel College
HIST 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 modern revolutions with special emphasis on social change and revolutionary theories. The French, Russian and Chinese Revolutions will be used as case studies.
Offered at Conrad Grebel College.

HIST 230 W 0.5
Church and Revolution in Latin America
A study of the relationship between church and political systems and movements in Latin America. The course will focus on contemporary revolutionary political movements in Latin America and the newly-defined role of the church as a force for human liberation.
Offered at Conrad Grebel College.

HIST 232 W 0.5
Revolutions in Latin America
An evaluation of the causes and effects of revolutions in Latin America with special emphasis on Nicaragua.
Offered at Conrad Grebel College.

HIST 234 F 0.5
The Catholic Church in Canada Since Confederation
An examination of the Catholic Church in Canada since Confederation, with an emphasis on social and political influences.
Offered at St. Jerome’s College.

HIST 255 F 0.5
History of Christianity
The development of Christianity in its Roman Catholic, Eastern Orthodox and Protestant traditions from the time of Christ to the present.
Offered at Conrad Grebel College.
Cross-listed as RS 230.

HIST 241 W 0.5
Society and the Sexes in Early Modern Europe
This course will examine the changing importance of gender roles from the 15th to the 18th centuries. It will focus on topics such as sexuality, marriage, the family and the role of women in society and the work force.

HIST 247 W 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 248 F 0.5
History of Canadian-American Relations to 1914
An examination of the history of relations between the two countries until 1914. Topics of a political, economic, social and cultural nature will be studied.
Offered at St. Jerome’s 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.
Highly recommended for Year Two History majors.

HIST 253 F 0.5
Canadian History: The British Period
The evolution of Canadian society in the face of dominant British and American influences.
Offered with St. Jerome’s College.

HIST 254 W S 0.5
Canadian History: The National Period
This course studies the development of Modern Canada. Themes of the course include immigration, industrialization, feminism, labour unrest, and regionalism. Offered with St. Jerome’s College.

HIST 256 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 257 F 0.5
The British Empire and Commonwealth
The history of British imperialism between the loss of the American colonies and the Falklands Islands War of 1982, tracing the rise of the settlement colonies to dominion status, the huge expansion of the dependent empire during the age of the New Imperialism, the imperial apogee after World War I, and the rapid change from Empire to New Commonwealth after World War II.

HIST 258 W 0.5
History of the United States since 1860
A survey of American society, politics and thought and of the relations of the United States with the outside world from 1865 to the present.

HIST 259 W 0.5
Modern African History
An issue-oriented examination of some of the major developments in African political, social and economic history in the 20th century.

HIST 260 F 0.5
Europe: 814-1303
The political, cultural, economic and ecclesiastical development of Europe from Charlemagne to Philip IV of France. Offered at St. Jerome’s College.

HIST 261 F 0.5
Europe: 14th to 16th Century
A study of 15th- and 16th-century economic, social, political and popular cultural trends. The expansion of Europe to the New World.

HIST 262 F 0.5
Europe: 16th to 18th Century
An introduction to the social and cultural history of Europe (including England) from the 16th century to the French Revolution. The course will focus on topics such as the social structure, daily life, the role of women and the family.
HIST 283 W 0.5  
Europe: 1789-1914  
This course will examine European society amidst the dramatic changes of the nineteenth century. It will consider class, the family, gender, religion, and institutions during this century of political and social transformation.

HIST 273 F 0.5  
Canadian Social History I  
This course will cover the period from the early settlement of Canada to the beginnings of urban industrial development. Focus will be on the experiences of Canadians in their daily lives.

HIST 274 W 0.5  
Canadian Social History II  
The social and cultural development of Canada from the late nineteenth century to the present day

HIST 300 F 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 302 F 0.5  
Medieval Church History from 312 to 1096  
The development of the Church from the time of Constantine to the eve of the Crusades. Topics will include the development of the papal office and the church-state controversy.  
Offered at St. Jerome's College

HIST 303 W 0.5  
Medieval Church History from 1096 to 1449  
The emergence of the Church as a monarchical institution and the tensions of order and prophecy. Topics will include the Crusades, heresy, the Inquisition, the Schism and Conciliarism.  
Offered at St. Jerome's College

HIST 305 F 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 1867  
A study of the British experience and of Britain's part in world history from the 1860's to the 1980's.

HIST 320 W 0.5  
The History of Modern Quebec  
The course will treat the history of Quebec from 1867 to the present. Nationalism, separatism, language and cultural problems, economic and social issues are all examined in their historical context.

HIST 325 F 0.5  
History of Canadian Indians to 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 326 W 0.5  
History of Canadian Indians since 1870's  
"Life under coercion" and the "New Indian". The history of Indians on reserves and under government administration. Contemporary themes and issues of concern to native people are examined.

HIST 329 W 0.5  
History of the Common Law  
The emphasis will be on the early development of the common law in England.  
Offered at St. Jerome's College

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.  
Offered at Conrad Grebel College.  
Cross-listed as R S 322

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 357 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 377 F 0.5  
The Historian and the Computer  
This course will introduce students to quantitative analysis of historical data. After a brief introduction to basic SPSS statistical programs, students will develop a research scheme and analyze machine-readable historical data.

HIST 379 F 0.5  
Reformation History  
An analysis of the economic changes, the rise of "new monarchs," the nature of and effect of the "religious reformation," the expansion of Europe to the "new world" with their implications for 16th century Europe.  
Offered at Conrad Grebel College.

HIST 385 W 0.5  
Canada: From Macdonald to Laurier  
An analytical and historical examination of the development of the Canadian nation from Confederation to the First World War.  
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 396 F 0.5  
The History of the American South  
This course traces the main eras and issues in Southern history from the 16th century to the mid-20th century. Topics examined will include pre-revolutionary and antebellum 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.
Course Descriptions

**History**

- **HIST 397 F 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 W 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.

- **HIST 400A/B 1.0/1.0**
  - Reformation

- **HIST 401A/B 1.0/1.0**
  - European

- **HIST 402A 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

- **HIST 435A/B 1.0/1.0**
  - Ethno-History

- **HIST 491 F,W,S 1.0**
  - Independent Study in Special Subjects

### COURSES NOT OFFERED 1988-89

- **HIST 102B** Imperialism in the 20th Century
- **HIST 102J** Asian History
- **HIST 102N** Introduction to African History
- **HIST 201** Canadian Urban History
- **HIST 202** Individual and Family in History
- **HIST 203** Modern Quebec
- **HIST 209** Health, Disease and Medicine in Canadian History 1500-1984
- **HIST 213** Modern Western Popular Culture
- **HIST 214X** Empires and Missionaries
- **HIST 219** Local History in Ontario
- **HIST 233** Civil-Military Relations in Latin America
- **HIST 237** Ancient Civilization I
- **HIST 238** Ancient Civilization II
- **HIST 239** Modern China, 1911 to Present
- **HIST 240** 20th Century Japan
- **HIST 245** Religious and Cultural Minorities in Canada
- **HIST 249** History of Canadian-American Relations since 1914
- **HIST 307** British History 1760-1867
- **HIST 311** Western European Cultural History 1600-1950
- **HIST 319** French-Canadian History
- **HIST 323** The United States in World Affairs
- **HIST 339** History of France in 19th Century
- **HIST 342** Mystical and Utopian Movements from the 12th to the 17th Century
- **HIST 344** Mystical and Utopian Movements 2
- **HIST 345** Minorities in International Perspective
- **HIST 346** Mennonite History: Special Topics
- **HIST 350** West Indian History
- **HIST 386** Ontario History to Confederation
- **HIST 383** Seven Faces of Evil

**Italian**

- Associate Professor
  - V.F. Golini, BA (McMaster), MA (Colorado), PhD (California-Berkeley)

- Assistant Professor
  - G.A. Niccoli, BA, MA, PhD (British Columbia), J

J refers to faculty members at St. Jerome's College

**Course Descriptions**

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. In the first year of Italian, emphasis will be placed on the fundamentals of grammar and speech.

**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.

Preq: ITAL 101 or consent of instructor

**ITAL 191** 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.

Preq: ITAL 101 or consent of instructor

**ITAL 192** W 3C,1L 0.5

**Intermediate Italian 2**

A continuation of ITAL 191 with emphasis on discussion of modern texts as illustrations of the creative possibilities and the limitations of the language.

Preq: 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 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 302 W 2S 0.5
Modern Italian Poetry
A survey of the major Italian poets from the Futurists through to Montale and their influence on European poetry.
Prereq: ITAL 191/192 or consent of the instructor

ITAL 306 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 307 W 3R 0.5
Special Topics/Directed Readings
Winter term of ITAL 306

COURSES NOT OFFERED 1988-89
ITAL 311 Medieval Italian Literature
ITAL 312 Renaissance Italian Literature
ITAL 351 Italian Styletics
ITAL 391 Modern Italian Novel

Course Descriptions

ITALIAN KINESIOLOGY

Department of Kinesiology

Associate Professor, Chairman of the Department
P.J. Bishop, BSc, BPE (Waterloo), MSc (Western Illinois), PhD (Minnesota)

Professor, Dean of the Faculty of Human Kinetics and Leisure Studies
R.G. Marteniuk, BPE, MA (Alberta), EdD (California-Berkeley)

Professor, Associate Dean, Graduate Affairs, Faculty of Human Kinetics and Leisure Studies
M.E. Houston, BSc (Toronto), PhD (Waterloo)

Associate Professor, Associate Dean, Undergraduate Affairs, Faculty of Human Kinetics and Leisure Studies
W.N. Widmeyer, BA (Western Ontario), BPE (McMaster), BPE (California), PhD (Illinois)

Associate Professor, Associate Chairman, Graduate Affairs
F. Allard, BA, BPE, PhD (Waterloo), Recipient of the Distinguished Teacher Award

Associate Professor, Associate Chairman, Undergraduate Affairs
I.D. Williams, MS, PhD (Illinois)

Associate Professor, Head of School of Anatomy
D.A. Ranney, BA, MD (Toronto), FRCS (England)

Professors
N.J. Ashton, BSc (McGill), MS (Michigan)
H.J. Green, BA, BPE (Queen's), MA (Alberta), PhD (Wisconsin)
R.L. Hugheon, BSc (Western Ontario), MSc (British Columbia), PhD (McMaster)
R.W. Norman, BA, BPE (McMaster), MSc (Alberta), PhD (Pennsylvania State)
D.A. Winter, BSc, MSc (Queen's), PhD (Dalhousie)

Associate Professors
L.R. Brawley, BPE (Calgary), MSc (Oregon), PhD (Pennsylvania State)
N. Charness, BA (McGill), MS, PhD (Carnegie-Mellon)
J.E. Curtis, BSc (Waterloo), MPE (British Columbia), PhD (Waterloo)
M.T. Shaner, BA, MA (Western Ontario), PhD (Wisconsin)

N. Theberge, BA (Massachusetts), MA (Boston), PhD (Massachusetts)
J.A. Thomson, BA, MSc (McMaster), PhD (Waterloo)
R. Wells, BSc (Manchester), MEng (McMaster), PhD (Manchester)

Assistant Professors
J.S. Frank, BSc, MSc (Waterloo), PhD (Southern California)
C.L. MacKenzie, BSc, MSc, PhD (Waterloo)
S.M. McGill, BPE (Toronto), MSc (Ottawa), PhD (Waterloo)
A.E. Patla, BTech (Indian Institute of Technology), MSc Eng (New Brunswick), PhD (Simon Fraser)

Adjunct Faculty
J.A. Israel, MD (Toronto), FRCS (Canada)
D.R. McTavish, MD (Western Ontario), FRCS
G.H. Mann, MB, BS (London), DRCOG (London)

Senior Demonstrators
L.L. Jones, BSc, MSc (Waterloo)
D.C. Painter, BA (Queen's), MSc (Waterloo)
H.E. Scoggan, BA, MSc (Queen's)

Faculty Members of Kinesiology holding cross and/or joint appointments to:
1 Sociology
2 Psychology
3 Systems Design
4 Health Studies
5 Optometry

Faculty Members holding cross and/or joint appointments to Kinesiology from:
1 Sociology
2 Psychology

KN 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.

KN 103 F 3C, 1T 0.5 Psycho-Social Basis of Kinesiology
An introduction to the study of human physical activity from psychological, sociological, anthropological and historical perspectives.
KIN 200 W 3C, 2L  0.5
Human Anatomy of the Limbs and Trunk
Functionally-oriented study of the limbs and trunk by regions using predissected cadavers. A brief introduction to Neuroanatomy is included.
Prereq: Kinesiology, Health Studies and Dance students or consent of instructor
No Year One students are admitted.

KIN 201 W 3C, 2L  0.5
Human Anatomy of the Brain, Head and Neck
The anatomical structure and function of the brain, cranial nerves and sense organs of the head are emphasized. Included is an introduction to the histology of the nervous system. An opportunity for some dissection of the head and neck is provided.
Prereq: KIN 200 or consent of instructor

KIN 210 W 3C  0.5
Growth and Development, and Aging
The physiology of human growth, development and aging is examined with special reference to the influence of diet, environment, exercise and disease on the normal processes.
Prereq: KIN 200, BIOL 230 and 233
Cross-listed as HLTH 210

KIN 222 F 3C, 2L  0.5
Statistical Techniques Applied to Kinesiology
An introduction to descriptive and inferential statistics and the interpretation of data. A major consideration of the course is the use of statistics in the solution of problems in Kinesiology and Health Studies.
Prereq: KIN and Health Studies students only

KIN 242 W 3C, 2L  0.5
Introduction to Movement Disorders
An introduction to selected movement disorders and their implications for physical activity. The movement disorders examined include those which accompany neuromuscular and perceptual-motor impairment, mental retardation, cardiovascular and respiratory disease.
Prereq: KIN 102 and 103

KIN 252 W,S 3C  0.5
Introduction to the Sociology of Sport
An introduction to the characteristics, processes and problems of sport as a social system. In addition, the social psychological aspects of sport involvement are considered.
Prereq: KIN 103 and SOC 101
Cross-listed as REC 203 and SOC 348

KIN 255 W 3C, 2L  0.5
Introduction to Psychomotor Behaviour
An information processing approach is used to introduce the principles of learning and performing fine and gross motor skills. In addition, social psychological variables are studied as they relate to the facilitation or decrement in learning and performance.
Prereq: KIN 103 and PSYCH 101

KIN 264C F 3C, 1T
Developmental Aspects of Movement
A study integrating the theoretical and applied aspects of motor and perceptual motor development in children and adolescents. Tutors will examine children in an applied setting.
Prereq: DANCE 264A and 264B
Cross-listed as DANCE 264C

KIN 300 F,S 3C, 3L  0.5
Physiology of Physical Activity
A study of the effects of physical activity on the muscular, circulatory and respiratory systems and the mechanisms through which the body adapts to activity and environment.
Prereq: BIOL 230 and 233

KIN 317 F 3C  0.5
Human Biochemistry
An elementary course in human biochemistry including the metabolism and function of proteins, carbohydrates, lipids, and hormones. Emphasis is placed on the application of biochemical principles to human movement.

KIN 321 W,S 3C, 2L  0.5
Introduction to the Biomechanics of Human Movement
Anatomical, neural and mechanical considerations in the qualitative and quantitative analysis of human movement are examined. Concepts related to the biomechanics and kinematics of linked joint models of human motion are introduced.
Prereq: PHYS 103, KIN 200 and 222

KIN 330 W,S 3C  0.5
Research Design
An introduction to the basic principles of scientific inquiry in Kinesiology. A systematic treatment of the logic and practice of methods and techniques employed in research related to physical activity with an examination of design, sampling, data gathering and analysis.
Prereq: KIN 222

KIN 335 W,S 3C  0.5
Evaluation of Human Motor Performance
The nature and methodology of assessment is reviewed from theoretical and empirical perspectives. Taxonomies of motor performance are examined and principles developed for the measurement of specific constructs in field and laboratory situations.
Prereq: KIN 222

KIN 340 F 3C, 2L  0.5
Introduction to Sports Medicine
An introductory course to the area of sports medicine, including the prevention, care and rehabilitation of common sports injuries. Considerable attention is directed towards the mechanisms of traumatic injuries as well as the management in the acute, intermediate and advanced stages of injury care.
Prereq: KIN 200, third and fourth year students only

KIN 341 W 3C, 2L  0.5
Select Topics in Sports Medicine
A course for those students wishing additional study in the area of sports medicine. Topics to be presented include trauma to the head and vertebral column, internal injuries, heat problems and the medical and non-medical use of drugs in sport.
Prereq: KIN 340

KIN 346 W,S 3C  0.5
Nutrition
An elementary course in nutrition with special emphasis on diet for sport and certain physiological conditions.
Cross-listed as HLTH 346

KIN 348 W,S 3C  0.5
Social Psychology of Health Behaviour
The study and application of basic social psychological processes in relation to selected health-related behaviours (e.g., family planning, overeating, smoking, non-medical drug use, cardiovascular risk factors, patient compliance, medical care utilization).
Prereq: PSYCH 101 or consent of instructor
Cross-listed as HLTH 348

KIN 349 F,S 3C  0.5
Principles of Behaviour Modification
A course providing a general overview of behaviour modification principles and procedures. Basic principles of reinforcement, punishment, modelling and desensitization are examined as they relate to health behaviour.
Prereq: PSYCH 101 or consent of instructor
Cross-listed as HLTH 349
KIN 352 F 3C 0.5  
**Sociology of Aging**  
An introduction to individual and population aging. Topics discussed include: aging from an historical and comparative perspective; aging in subcultures; aging and the social structure; aging and social processes; aging and the environment; work and retirement; and aging and leisure patterns.  
Prereq: SOC 101 and one other SOC course  
Cross-listed as SOC 344

KIN 354 W 3C 1T 0.5  
**Social Psychology and Physical Activity**  
An examination of sport and other forms of physical activity as social situations. Topics such as social facilitation, modelling, person perception, expectancies, group structure, unity, motivation, leadership, conformity, and intergroup relations are introduced in relation to motor performance.  
Prereq: PSYCH 101  
Cross-listed as REC 307

KIN 356 F 3C 0.5  
**Information Processing in Human Perceptual Motor Performance**  
An information processing model of perceptual-motor behaviour is presented. Human performance theory is used to study processes mediating input and output information. Specifically, the subprocesses of storage of information in memory, perception, retrieval of information from memory and execution of movement are examined.  
Prereq: KIN 222, 255

KIN 357 W 3C 0.5  
**Motor Learning**  
A course focused on the bases and applications of theories of motor learning. Included are selected psychological and neuropsychophysical processes as they relate to these theories.  
Prereq: KIN 222, 255

KIN 401 W, S 3C, 3L 0.5  
**Physiological Adaptations to Physical Activity**  
An analysis of the physiologic adaptations that occur in response to protracted physical activity and the influence of such adaptations on the response to work in a variety of environmental conditions. Special emphasis is given to the changes occurring in skeletal and cardiac muscles and the neuroendocrine mechanisms involved.  
Prereq: KIN 300 and 317

KIN 402 F 3C 0.5  
**Hydrostatic, Altitude and Aerospace Physiology**  
An examination of man’s cardio-respiratory responses at rest and during work to selected stresses of hypobaric and hypobaric environments.  
Prereq: KIN 300

KIN 405 W 3C, 2L 0.5  
**Exercise Management**  
An examination of the rationale and procedures used in the development of exercise programs for normally healthy individuals.  
Prereq: KIN 300 and 321

KIN 407 W 3C 0.5  
**The Physiology of Coronary Heart Disease**  
An examination of the pathology, risk factors and rehabilitation programs related to coronary heart disease. Major emphasis is placed on the cardiorespiratory implications of exercise in the rehabilitation process.  
Prereq: KIN 300 or equivalent  
Cross-listed as HLT 407

KIN 416 W 3C 0.5  
**Neuromuscular Integration**  
An examination of the neural processes involved in the maintenance of posture and the control of movement.  
Prereq: KIN 201 or PSYCH 261 or consent of instructor

KIN 420 W 3C 0.5  
**Occupational Biomechanics**  
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 analyse low back loading during manual lifting, the design of helmets, shoes and office chairs.  
Prereq: KIN 425 (may be taken concurrently) or consent of instructor

KIN 425 W 3C, 2L 0.5  
**Biomechanics of Human Movement**  
The quantitative measurement and analysis of the movement of the human musculo skeletal system. Multisegment dynamic movements will be studied using existing computer programs, with emphasis on kinematics, kinetics and energetics, as well as the use of EMG in the assessment of the control of the movement. Examples are presented from pathological, normal and athletic movement.  
Prereq: KIN 321

KIN 426 F 3C, 2L 0.5  
**Biophysical Signal Processing and Control Systems**  
Basic electricity and electronics required for the understanding of bioelectric recording and electrophysiology. Application of signal processing to biophysical signals encountered in kinesiology. Mathematical modelling of passive and active systems and the control systems (cardiac, respiratory, neuromuscular) associated with human movement.  
Prereq: KIN 321, KIN 300, KIN 357 or consent of instructor

KIN 431 F, W, S 0.5  
**Research Proposal**  
An independent paper in the form of a research proposal on an approved topic. The topic may include survey, field, laboratory, theoretical, or applied research, program evaluation, mathematical modelling, fitness appraisal, etc. The format is to be determined with the supervisor and may be in chapters or in journal style.  
Prereq: Fourth year Honours Kinesiology

KIN 431A Biomechanics  
KIN 431B Biochemistry  
KIN 431C Work Physiology  
KIN 431E Psycho Motor Behaviour  
KIN 431G Sociology of Sport and Physical Activity  
KIN 431J Psychology of Human Movement  
KIN 431K Sports Medicine  
KIN 431M Anatomy  
KIN 431N Movement Disorders  
KIN 431O Motor Control  
KIN 431P Nutrition  
KIN 431Q Gerontology  
KIN 432 F, W, S 0.5  
**Research Project**  
An independent research project on an approved topic, supervised by a faculty member. This is the completion of the research proposed in KIN 431. The format is to be determined with the supervisor and may be in chapters or in journal style.  
Prereq: KIN 431  
It is strongly recommended that students planning graduate studies take KIN 431 and KIN 432.

KIN 432A Biomechanics  
KIN 432B Biochemistry  
KIN 432C Work Physiology  
KIN 432E Psycho Motor Behaviour  
KIN 432G Sociology of Sport and Physical Activity  
KIN 432J Psychology of Human Movement  
KIN 432K Sports Medicine
KIN 432M Anatomy
KIN 432N Movement Disorders
KIN 432O Motor Control
KIN 432P Nutrition
KIN 432Q Gerontology

KIN 433 F,W,S 0.5
Senior Essay
An extensive critical review of the literature on an approved topic. The topics will be broader in scope than those associated with specific research proposals.
Prerequisite: Fourth year Honours KIN students

KIN 433A Biomechanics
KIN 433B Biochemistry
KIN 433C Work Physiology
KIN 433E Psycho Motor Behaviour
KIN 433G Sociology of Sport and Physical Activity
KIN 433J Psychology of Human movement
KIN 433K Sports Medicine
KIN 433M Anatomy
KIN 433N Movement Disorders
KIN 433P Motor Control
KIN 433Q Nutrition
KIN 433Q Gerontology

KIN 452 F,S 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.
Prerequisite: KIN 252 or REC 203 or SOC 348

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.
Prerequisite: 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.
Prerequisite: One of PSYCH 206, 207, or KIN 356

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.
Prerequisite: 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.
Prerequisite: Consent of department

KIN 472A Biomechanics
KIN 472C/D Work Physiology
KIN 472E/F Psycho-Motor Behaviour
KIN 472G Social Sciences: Sociology
KIN 472H Social Sciences: Psychology
KIN 472K Sports Medicine
KIN 472M Teaching
KIN 472N Coaching
KIN 472O Anatomy

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 and an athletic therapist.
Prerequisite: KIN students only. Must have at least A- in KIN 200 and 340, first aid and athletic injury experience, and consent of instructor

KIN 492A/B F,W 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 cardiorespiratory implications of exercise and behaviour modification.
Prerequisite: KIN 300, 407, 349, and experience with high risk patients, plus consent of instructor.
Courses may be taken concurrently.

Courses NOT OFFERED 1988-89

KIN 402 Hydrospaced, Altitude and Aerospace Physiology
Course Descriptions

Management Sciences

M SCI 311 F,W 3C 0.5
Organizational Behaviour 2
Macro theories of organization and organizational processes are discussed. The first half of the course examines the development of organizational theories. The second half discusses organizational processes such as conflict and communication control. Throughout, an effort is made to relate course material to organizational structures.
Prereq: M SCI 211

M SCI 331 F,W,S 3C 0.5
Operations Research 1
The Operations Research approach to problem solving. Deterministic mathematical programming including linear programming, transportation methods, assignment problems, network methods, and dynamic programming. Elements of deterministic inventory models.
Prereq: M SCI 211 or equivalent

M SCI 431 W 3C 0.5
Operations Research 2
Classification of stochastic processes. Recurrent events including birth and death processes, and branching processes. Waiting line models and applications. Markov processes and decision problems. Applications include inventory control, reliability, equipment replacement, maintenance, design of service facilities, etc.
Prereq: M SCI 211 or equivalent and M SCI 331

M SCI 452 W 2C,1T 0.5
Behavioural Decision Analysis
This course concerns decision making processes within organizations at the individual and group levels. Topics include goals and the measurement of utility; decisions without probabilities and uncertainty reduction; incentives and contributions, and multiple-criteria methods.
Prereq: M SCI 251 or equivalent

Mathematics

Faculty of Mathematics

Dean of the Faculty of Mathematics
J.G. Kauffmann, BSc (Toronto), MA, PhD (Waterloo)

Associate Dean, Graduate Studies
L.B. Richmond, BSc, MSc (Manitoba), PhD (Alberta)

Associate Dean, Undergraduate Studies
V.A. Dyck, BMath, MMath (Waterloo)

Associate Dean, Computing; Director, Mathematics Faculty Computing Facility
J.W. Wong, BSc, MS, PhD (California-Los Angeles)

Assistant Dean for External Programs
R.G. Dunkley, BA (Western Ontario)

Associate Professor, Faculty of Mathematics, Director of Undergraduate Affairs
P.C. Brinkley, BA (McMaster), MA (Waterloo)

Director, Statistical Consulting Service
K.S. Brown, BMath, PhD (Waterloo)

Director, University of Waterloo Institute for Computer Research
J.I. Munro, BA (New Brunswick), MSc (British Columbia), PhD (Toronto)

Director, Institute for Improvement in Quality and Productivity
J.C. Young, BASc (Toronto), MSc (Waterloo), PhD (Edinburgh)

Lecturers, Faculty of Mathematics
L.E. Davidson, BSc (Toronto)
B.A. Ferguson, BMath (Waterloo)
R.G. Soons, BA (Western Ontario), MMath (Waterloo)

Special Lecturer and Resident Counsel in Mathematics and Engineering
R.G.R. Lawrence, QC
DEPARTMENT OF APPLIED MATHEMATICS

Professor and Chairman of the Department
B. Forte, PhD, DSc (Pisa) Habil (Rome)

Professor, Associate Chairman, Graduate Officer
J. Wainwright, BSc (Natal), PhD (South Africa). Recipient of the Distinguished Teacher Award

Assistant Professor and Associate Chairman, Undergraduate Affairs
B.J. Marshman, BSc, MSc, PhD (Waterloo)

Professors
R.H. Bartels, 4 BS, MS (Michigan), PhD (Stanford)
J. Cizek, 1 RND (Charles University, Prague), CSc (Czecho-Slovak Academy of Sciences, Prague)
C.B. Collins, BSc (London), PhD (Cambridge)
H.F. Davis, SB, SM, PhD (Massachusetts Institute of Technology)
S.G. Davison, 2 BSc, MSc, PhD, DSc (Manchester), FInstP
G.M.L. Gladwell, 3 BSc, PhD, DSc (London)
F.O. Goodman, 2 BSc, PhD, DSc (London), FInstP, FAIP
W.H. Hu, 3 BSc (Peking), PhD, DSc (Southampton)
G.J. Lastman, BASc, MA (British Columbia), PhD (Texas)
F.R. McCourt, 4 BSc, MSc, PhD (British Columbia)
I.J. McGee, BASc (Toronto), MSc (Waterloo), PhD (Yale)
M.A. McKiernan, BS, MA (Loyola), PhD (IT)
R.G. McLennan, BSc, MSc (Queen's), PhD (Cambridge)
J. Palud, 1 RND (Charles University, Prague), CSc (Czechoslovak Academy of Sciences, Prague)
P.J. Ponzo, BASc, MA (Toronto), PhD (Illinois)
C. Rogers, BA (Oxford), MED (Toronto), MSc, PhD (Nottingham), FIMA FInstP
R.B. Simpson, 4 BSc, MA, MS (Toronto), PhD (Maryland)

Associate Professors
C.F.A. Beaumont, BA (McMaster), MA (Toronto)
P.A. Forsyth, 4 BSc (Western Ontario), MSc (Australian National), PhD (Western Ontario)
J. Froese, BA (Manitoba), MA (Queen's), PhD (British Columbia)
K.O. Geddes, 4 BA (Saskatchewan), MSc, PhD (Toronto)
S.P. Lipshitz, 2 BSc (Natal), MSc (South Africa), PhD (Witwatersrand)
W.K. Liu, 3 BSc, MS, PhD (Illinois)
W.F. Shadwick, 2 BSc, MSc (Western Ontario), PhD (London), NSERC University Research Fellow
G. Tenli, Laurea (Rome), MSc, PhD (Toronto)
R.A. Wentzel, BSc (Acadia), MSc, PhD (Western Ontario)

Assistant Professors
M.C. Chadichim, lic.phy. (Buenos Aires), PhD (Cambridge)
D. Siegel, BA (U.C.L.A.), PhD (Stanford)
M.E. Snyder, BSc (Western Ontario), MSc (Waterloo)
V.M. Zaidan, BSc (Beirut), MA (Dalhousie), PhD (British Columbia)

Research Assistant Professors
N. Kamran, lic.math. (Brussels), PhD (Waterloo), NSERC University Research Fellow
E.R. Vrscay, BSc, MMath, PhD (Waterloo), NSERC University Research Fellow

Adjunct Faculty
W.F. Ames, MS (Wisconsin)
J. Carminati, BSc (Victoria), MSc (Melbourne), PhD (Victoria)
D.G. Crighton, BA, MA (Cambridge), PhD (London)
M.A. Donelan, PhD (British Columbia)
W.F. Langford, PhD (California)
J.D. Lawson, 4 BASc (Toronto), MSc, PhD (Waterloo), FIMA (on leave)
H. Rund, PhD (Cape Town), Habilitation (Freiburg)

Faculty Members of Applied Mathematics holding cross appointments to:
1Chemistry
2Physics
3Mechanical Engineering

Faculty Members holding cross appointments to Applied Mathematics from:
4Computer Science
5Civil Engineering
6Chemistry
7Pure Mathematics
8Physics

DEPARTMENT OF COMBINATORICS AND OPTIMIZATION

Associate Professor and Chairman of the Department
P.J. Schellenberg, BSc, MA, PhD (Waterloo)

Professor, Associate Dean, Graduate Studies, Faculty of Mathematics
L.B. Richmond, BSc, MSc (Manitoba), PhD (Alberta)

Lecturer, Assistant Dean for External Programs
R.G. Dunkley, BA (Western Ontario)

Professor and Associate Chairman for Graduate Affairs
D.M. Jackson, BA, MA, PhD (Cambridge)

Professor and Associate Chairman for Undergraduate Affairs
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Professor Emeritus
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M.J. Best, BM, MMath (Waterloo), MSc, PhD (Califomia-Berkeley)
J.A. Bondy, BA, DPhil (Oxford)
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L.J. Cummings, 2 BSc (Roosevelt), MSc (de Paul), PhD (British Columbia)
J. Edmondson, BA (George Washington), MS (Maryland)
C.D. Godsil, BSc, MSc, PhD (Melbourne)
R.C. Mullin, 1 BA (Western Ontario), MA, PhD (Waterloo)
W.R. Pulleyblank, 1 BA, MSc (Calgary), PhD (Waterloo)
R.C. Read, BA, MA (Cambridge), PhD (London)
S.A. Vranstone, BM, MMath, PhD (Waterloo)

Associate Professors
F. Barahona, Ing (Chile), Dr Ing (Grenoble)
C.J. Colbourn, 1 BSc (Toronto), MMath (Waterloo), PhD (Toronto)
I.P. Goulden, BMath, MMath, PhD (Waterloo), NSERC University Research Fellow
L.J. Dickey, 2 BSc, MA (Arizona), PhD (Wisconsin)
C.E. Haff, BS (Stanford), PhD (Waterloo)
R.A. Honsberger, BA (Toronto), MA (Waterloo)
DEPARTMENT OF COMPUTER SCIENCE

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Professor, Vice President, Academic and Provost

J.A. George, BSc, MSc (Alberta), PhD (Stanford)

Professor, Dean of Computing and Communications

J.W. Graham, BA, MA (Toronto), Recipient of the Distinguished Teacher Award

Associate Professor, Associate Dean, Undergraduate Studies, Faculty of Mathematics

V.A. Dyck, BMath, MMath (Waterloo)

Associate Professor and Associate Chairman for Graduate Studies

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Associate Professor and Associate Chairman for Undergraduate Studies

D.J. Taylor, BSc (Saskatchewan), MMath, PhD (Waterloo)

Professors

R.H. Bartle,1 BSc, MS (Michigan), PhD (Stanford)

K.S. Booth, BS (California Inst. Tech.), MA, PhD (California-Berkeley)

A.R. Conn,2 BSc (Imperial College), MSc (London), PhD (Waterloo)

D.D. Cowan, BSc (Toronto), MSc, PhD (Waterloo)

K. Culik, MSc, RND (Prague), PhD (Czechoslovak Academy of Sciences) (on leave)

M.I. Elmasy,3 BSc, EE (Iraci), MSc, PhD (Ottawa)

G.H. Gonnet, CPR U (Uruguay), MMath, PhD (Waterloo)

P.-A. Larson, BEEon, MBA, PhD (Abo Swedish University)

J.J. Morris, BSc (Leicester), PhD (St. Andrews), FIMA (on leave)

R.C. Mullin,2 BA (Western Ontario), MA, PhD (Waterloo)

J.J. Munro, BA (New Brunswick), MSc (British Columbia), PhD (Toronto)

W.R. Pulleyblank,5 BA, MSc (Calgary), PhD (Waterloo)

R.B. Simpson,1 BSc, MASC (Toronto), PhD (Maryland)

S.A. Vanstone, BMath, MMath, PhD (Waterloo) J

J.W. Wong,2 BS, MS, PhD (California-Los Angeles)

D. Wood, BSc, PhD (Leeds)

Associate Professors

F.J. Burkowski, BSc, MMath, PhD (Waterloo)

S. Christodoulakis, BSc (Athens), MSc (Queen's), PhD (Toronto)

C.J. Colbourn,5 BSc (Toronto), MMath (Waterloo), PhD (Toronto)

G.V. Cormack, BSc, MSc, PhD (Manitoba)

L.J. Dickey,6 BSc, MA (Arizona), PhD (Wisconsin)

P.A. Forsyth,1 BSc (Western Ontario), MSc (Australian National), PhD (Western Ontario)

K.O. Geddes,1 BA (Saskatchewan), MSc, PhD (Toronto)

R.N. Goldman, BS (MIT), MA, PhD (Johns Hopkins)

F. Mavaddat,2 BSc (Tehran), Diploma-Graduate Studies (Netherlands), PhD, DIC (Imperial College)

F.W. Tompa, ScB, ScM (Brown), PhD (Toronto)

Assistant Professors

J.P. Black, BSc (Calgary), Dipl d'Ing (Grenoble), PhD (Waterloo)

P.A. Buhr, BSc, MSc, PhD (Manitoba)

J.F. Buss, BS (California Inst. Tech.), PhD (MIT)

E.F. Chan, BSc, MSc, PhD (Toronto)

R. Cohen, BA (McGill), MSc, PhD (Toronto)

J.H. Johnson, BMath, MMath, PhD (Waterloo)

A. Lubiw, BSc (Toronto), MMath (Waterloo), PhD (Toronto)

J.K. Pach, RND (Prague), PhD (Waterloo)

D.L. Poole, BSc (Reading), PhD (Australian National)

B.A. Reed,2 BSc, PhD (McGill)

W.L. Seward, BSc (Victoria), MSc, PhD (Toronto)

W.P. Tang, BS (Fu Dan), PhD (Stanford)

J.H. Vellinga, BA (Western Ontario), MA (Waterloo) (Part-time)

G.E. Weddell, BSc, MSc (British Columbia), PhD (Toronto)

Adjunct Faculty

R. Aielunas, BMath (Waterloo), MSc, PhD (Toronto)

B.A. Barsky, BSc (McGill), MS (Cornell), PhD (Utah)

W.B. Cowan, BSc (Waterloo), PhD (McGill)

P.H. Dirksen, BSc, MA (Waterloo)

S. Fenton, BES, MA (Waterloo)

W.M. Gentleman, BSc (McGill), MA, PhD (Princeton)

R.G. Goebel, BSc (Regina), MSc (Alberta), PhD (British Columbia)

J.D. Lawson,1 BASc (Toronto), MSc, PhD (Waterloo), FIMA (on leave)

E.G. Manning, BSc, MSc (Waterloo), PhD (Illinois)

M.H. van Emden, MEng (Delft), PhD
DEPARTMENT OF PURE MATHEMATICS

Professor and Chairman of the Department
F. Zorzitto, BSc (Windsor), MSc, PhD (Queen's)

Professor and Associate Chairman for Graduate Affairs
K.R. Davidson, BMath (Waterloo), PhD (Berkeley)

Associate Professor and Associate Chairman for Undergraduate Affairs
L.J. Dickey, BSc, MA (Arizona), PhD (Wisconsin)

Distinguished Professor
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Professors
J.A. Baker, BA, MA (Saskatchewan), PhD (Waterloo)
S. Burris, BSc, MA, PhD (Oklahoma)
G.E. Cross, BA, MA (Dalhousie), PhD (British Columbia)
L.J. Cummings, BSc (Roosevelt), MSc (de Paul), PhD (British Columbia)
D.Z. Djokovic, BSc, PhD (Belgrade)
D.A. Higgs, BSc(Hons) (Windsor), MA (Cambridge), PhD (McMaster)
P. Hoffman, BA (Toronto), PhD (Manchester)
P. Kannappan, BSc(Hons) (Annamalai), PhD (Washington)
J.W. Lawrence, BSc(Hons) (Carleton), MSc (McGill), PhD (Carleton)
C.T. Ng, BSc (Chinese University of Hong Kong), MMath, PhD (Waterloo)
R.A. Staal, BA, MA, PhD (Toronto)
C.L. Stewart, BSc (British Columbia), MSc (McGill), PhD (Cambridge)
F.C.Y. Tang, BSc (Hong Kong), MS (South Carolina), PhD (Illinois)

Associate Professors
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A. Kern-Lawson, BA (Toronto), MA (Chicago), PhD (McMaster)
E. Moskal, BA (Toronto), PhD (Illinois)
D.G. Mowat, CR, BA (Western), MA (St. Louis), PhD (Waterloo) J
W.F. Shadwick, BSc, MSc (Western Ontario), PhD (London), NSERC University Research Fellow
DEPARTMENT OF STATISTICS AND ACTUARIAL SCIENCE

Professor and Chairman of the Department
J.D. Kalbfleisch, BSc, MMath, PhD (Waterloo)

Professor, Dean of the Faculty of Mathematics
J.G. Kalbfleisch, BSc (Toronto), MA, PhD (Waterloo)

Associate Professor, Associate Chairman, Statistics, Undergraduate Affairs
G.W. Bennett, BSc, BA, PhD (Adelaide)

Associate Professor, Associate Chairman, Actuarial Science
R.L. Brown, BMath (Waterloo), FSA, FCIA, ACAS

Associate Professor, Associate Chairman, Graduate Studies
D.E. Matthews, BA, MA (Western Ontario), PhD (London), DIC

Professors
B. Abraham, BSc (Kerala), MSc (Guelph), PhD (Wisconsin)
P.P. Boyle, PhD (Trinity College, Dublin), FCIA, FIA
W.H. Cherry, BSc, PhD (Melbourne)
V.T. Farewell, BMath, MMath (Waterloo), PhD (London)
W.F. Forbes, BSc, PhD, DSc (London), DIC, ARCS
V.P. Godambe, MSc (Bombay), PhD (London)
K.W. Hipel, BASc, MASc, PhD (Waterloo)
J.F. Lawless, BSc, MSc, PhD (Waterloo)
D.L. McLeish, BSc (Queens), MSc (Toronto), PhD (McGill)
H.H. Panjer, BA, MA, PhD (Western Ontario), FSA, FCIA
P.M. Reilly, UE, BASc (Toronto), DIC, PhD (London), FEng, Recipient of the Distinguished Teacher Award
K.R. Shah, BA, MA (Bombay), PhD (Indian Statistical Institute)
D.A. Sprott, BA, MA, PhD (Toronto), FRSC, FRPS
M.E. Thompson, BSc (Toronto), MSc, PhD (Illinois)
C.F.J. Wu, GM/NSSRC Industrial Chair in Quality and Productivity, BSc (Taipei, Taiwan), PhD (California)

Associate Professors
W.H. Atkin, BA (Toronto), EA, FSA, FCIA
M.A. Bennett, BA (Nottingham), FSA, FCIA
A.U. Brender, BSc (McGill), MA, PhD (California-Berkeley), FSA, FCIA
K.S. Brown, BMath, PhD (Waterloo)
R.J. MacKay, BSc (Waterloo), MSc, PhD (Toronto)
F.G. Reynolds, BSc, MSc (Manitoba), EA, FSA, FCIA
W.S. Rickert, BSc, PhD (Waterloo)
J.C. Robinson, BASc, MASC, PhD (Waterloo)
C.G. Small, BSc (Regina), MSc (Alberta), PhD (Cambridge)
W.J. Welch, BSc (Loughborough), MSc, PhD (London)
J.B. Whitney, BA, MA (Western Ontario), PhD (Toronto)
J.C. Young, BASc (Toronto), MSc (Waterloo), PhD (Edinburgh)

Assistant Professors
C.D. Cutler, BSc (Winnipeg), MSc, PhD (Carleton)
R.W. Oldford, BMath (Waterloo), MSc, PhD (Toronto)
K.P. Sharp, BA (Cambridge), MA (California-Berkeley), FCIA, FIA
C.A. Struthers, BMath, MMMath, PhD (Waterloo)
G.E. Willmot, BMath, MMMath, PhD (Waterloo)

Adjunct Faculty
G.B. Chaplin, BA (Cambridge), MSc, PhD (Oxford)
Sir D.R. Cox, FRs, PhD (Cambridge)
D.A.S. Fraser, BA, MA (Toronto), MA, PhD (Princeton)
J.M. Gani, BSc (London), PhD (Australian National), DSc (London)
H. Ramlau-Hansen, MA, PhD (Copenhagen)

Lecturer
C. Springer, BSc, MSc (McGill)

Faculty Members of Statistics and Actuarial Science holding cross appointments to:
1. Recreation and Leisure Studies and Sociology
2. Psychology
3. Health Studies
4. School of Accountancy and Sociology

Faculty Members holding cross and/or joint appointments to Statistics and Actuarial Science from:
5. Health Studies
6. School of Accountancy
7. Chemical Engineering

J refers to faculty members whose primary association is with St. Jerome’s College

DIVISION OF MATHEMATICS FOR INDUSTRY AND COMMERCE

Director
P.A. Larson, Department of Computer Science

Regular Members, Mathematics
F. Barahona, Department of Combinatorics and Optimization
C.F.A. Beaumont, Department of Applied Mathematics
R.G. Dunkley, Department of Combinatorics and Optimization
C.E. Haft, Department of Combinatorics and Optimization
P.J. Ponzo, Department of Applied Mathematics
W.R. Pulleyblank, Department of Combinatorics and Optimization
J.B. Whitney, Department of Statistics and Actuarial Science
H. Wolkowicz, Department of Combinatorics and Optimization

Regular Members, University
D.W. Conrath, Department of Management Sciences
J.R. Hanna, School of Accountancy
R.A. Klawitter, Co-operative Education and Career Services
W.M. Lemon, School of Accountancy
M.J. Magazine, Department of Management Sciences
FACULTY OF MATHEMATICS

Introductory Notes

1. Courses with the following prefixes are offered by the Faculty of Mathematics: ACTSC (Actuarial Science); AM (Applied Mathematics), C&O (Combinatorics and Optimization), CS (Computer Science), MATH (non-departmental Faculty courses), MTHEL (Mathematics Elective), PMATH (Pure Mathematics), STAT (Statistics). The course descriptions which follow appear in ascending order by course number within these groups. Unless otherwise indicated with the course description, and provided space is available (see Section 5.3 on page 13:26), these courses are normally open to students in any UW faculty, subject to stated prerequisite requirements (see Section 5.4 on page 13:26).

2. A number of mathematics courses are offered at three different levels for BMath degree credit to accommodate the wide variety of students interested in such courses. The most challenging level, Advanced Honours, is intended for exceptionally gifted students in an Honours program. The second level, Honours, is intended for all Honours students not taking the Advanced Honours courses. The third level, General, is intended for students registered in a General or Pass program. In some instances, there are also other versions of such courses designed for students in faculties other than Mathematics.

Advanced Honours courses may always be substituted in lieu of the corresponding Honours courses to satisfy Honours BMath degree requirements. Similarly, either level of Honours course may always be substituted in lieu of the corresponding General course to satisfy General or Pass BMath degree requirements.

3. Courses offered by the Faculty of Mathematics which have been designed with the academic needs and backgrounds of students in other faculties in mind are identified by a note following the course description. Courses in this category include: CS 100, 102, 117; 212, 316; MATH 103, 104, 106, 110A/B, 111A/B, 113A/B, 114, 115A/B, 210, 211, 212, 213A/B, 215, 216; STAT 202, 204, 304, 311.

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Prerequisites involving these core courses will normally be given in terms of the lowest hierarchy level acceptable (e.g. Prereq: MATH 230B implies that MATH 240B is also acceptable but MATH 220B is not).
Actuarial Science

Course Descriptions

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 222 W 3C 0.5
Contingencies
An introduction to the mathematical basis underlying insurance and other types of financial programs including uncertain future events and discounting. Prereq: ACTSC 221 or 231
Antireq: ACTSC 232
ACTSC 222 cannot be counted for credit toward a BMath Honours Actuarial Science degree.

ACTSC 231 F,W,S 3C 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 1303
Antireq: ACTSC 221

ACTSC 232 F,W,S 3C 0.5
Introduction to Life Contingencies
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. Multiple decrement theory. Prereq: ACTSC 231, MTHSL 305A, STAT 230
Antireq: ACTSC 222

ACTSC 331 F,S 3C 0.5
Life Contingencies - Single Lives
Net annual premiums and net level premium reserves. The effect of expenses. The determination of gross premiums, modified reserves, and non-forfeiture options. Prereq: ACTSC 222

ACTSC 332 W 3C 0.5
Life Contingencies - Multiple Lives
Joint Life, last survivor probabilities, insurance and annuities. Stable and stationary populations. Introduction to pension mathematics. Prereq: ACTSC 232

ACTSC 335 F 3C 0.5
OR Applications in Actuarial Sciences
Problem formulation and solution techniques in linear programming. Project scheduling with applications in insurance. Introduction to dynamic and integer programming. Prereq: MATH 230A
Coreq: ACTSC 232
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 or consent of instructor

ACTSC 431 F,S 3C 0.5
Risk Theory 1
Coreq: STAT 333

ACTSC 432 W 3C 0.5
Risk Theory 2

ACTSC 433 F,S 3C 0.5
Construction of Life Tables/Survival Models
Methods of analysis of data to produce raw rates for mortality, morbidity and other tables. Prereq: ACTSC 232 or consent of instructor

ACTSC 435 W 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 or consent of instructor

ACTSC 451 W 3C 0.5
Selection of Risks 1
The effects of medical and non-medical risk factors on bodily systems are explored to determine the amount and incidence of additional morbidity and mortality. Techniques for expressing the increased risk in premiums and reserves are investigated. Coreq: MTHSL 305A, ACTSC 331

ACTSC 453 F,S 3C 0.5
Basic Pension Mathematics
Theory and practice of pension plan funding. Assumptions, basic actuarial functions and population theory applied to private pensions. Concepts of Normal Costs, Supplemental Liability, Unfunded Liability arising from individual Accrued Benefits and Projected Benefit cost methods. Prereq: ACTSC 332 or consent of instructor

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 or consent of instructor

ACTSC 455 W 3C 0.5
Analysis of Financial Statements
Topics in insurance financial reporting including assets, liabilities, surplus, amortization of gains, the Canadian method of actuarial reserves, investment and currency reserves, and the analysis of gains and losses. Prereq: ACTSC 331 or consent of instructor
Not offered in Winter 1989

ACTSC 463 F 3C 0.5
Topics in Casualty Insurance 1
Topics in casualty insurance chosen from areas such as coverages, rate-making and underwriting. Prereq: ACTSC 232

COURSES NOT OFFERED 1988-89
ACTSC 223 Group Life and Health Insurance
ACTSC 337 Finite Differences
ACTSC 391 Topics in Actuarial Mathematics
ACTSC 441 Advanced Topics in Actuarial Mathematics
ACTSC 452 Selection of Risks 2
ACTSC 456 Taxation of Life Insurance
ACTSC 468 Insurance Law
Applied Mathematics

Course Descriptions

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 260 F,W 3C 0.5
Mathematical 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 130B
Antireq: MATH 215, MATH 216

AM 270 F,W 3C 0.5
Modelling with Systems of Ordinary Differential Equations and Dimensional Analysis
Prereq: MATH 230A, or consent of instructor

AM 280 F,W 3C 0.5
Fundamental Principles in Applied Mathematics
Prereq: AM 270, and MATH 240A (or MATH 230A and consent of instructor)

AM 340 W 3C 0.5
Applications of Mathematics
Difference equations. Laplace transforms applied to discrete and continuous mathematical models taken from ecology, biology, economics and other fields.
Prereq: MATH 220B or consent of instructor

AM 362 F,S 3C 0.5
Elementary Differential Geometry and Tensor Analysis
Curves in Euclidean 3-Space (E³) and the Serret-Frenet formulae; surfaces in E³ and their intrinsic geometry. Gaussian curvature and the Gauss-Bonnet theorem. Co-ordinate 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: MATH 230B or consent of instructor
Cross-listed as PMATH 365

AM 365 W 3C 0.5
Introduction to Continuum Mechanics
Prereq: MATH 230B and AM 371, or consent of instructor
Coreq: MATH 332B (or PMATH 352)

AM 371 F,S 3C 0.5
Partial Differential Equations of Applied Mathematics
First order partial differential equations and characteristic curves; classification of linear second order partial differential equations; the Cauchy initial value problem; the Dirichlet problem. Solution of the heat equation, wave equation, and Laplace’s equation by separation of variables; Fourier series; propagation of waves; the maximum principle for harmonic functions.
Prereq: AM 270 and MATH 230B, or consent of instructor

AM 372 W 3C 0.5
Introduction to General Relativity
Flat space-time and Lorentz transformations, relativistic mechanics, Maxwell’s equations; curved space-time and the Einstein field equations, the Schwarzschild solution and some experimental tests of general relativity; the weak field limit; introduction to black holes and cosmology.
Prereq: AM 362/PMATH 365 or consent of instructor
Antireq: AM 364

AM 380A F,S 3C 0.5
Introduction to Information Theory with Applications
Variable length coding. The Shannon entropy as measure of uncertainty and expected information. Minimal average length coding; the Shannon entropy as lower bound. Source entropy, Channels, Transmission, Capacity. Applications to problem solving, information transmission, logics, science, linguistics and communications (TV, music, etc.). Determination of practical measures of information.
Prereq: Consent of Instructor
Cross-listed as PMATH 380A

AM 380B W 3C 0.5
Information Theory with Applications
Prereq: Consent of Instructor
Cross-listed as PMATH 380B
AM 381 F.S 3C 0.5
Ordinary Differential Equations 1
Existence and uniqueness theorems; higher order and systems of equations; series solutions and special functions. Laplace transforms. Eigenvalues and eigenfunction expansions; applications to mathematical physics. Sturm's comparison, separation and oscillation theorems.
Prereq: MATH 230B

AM 399 F 0.5
Reading Course

AM 391 W 3C 0.5
Ordinary Differential Equations 2
Prereq: AM 381

AM 395 F 3C 0.5
Mechanics
Prereq: MATH 230B or consent of instructor

AM 399 W 0.5
Reading Course

AM 444 W 3C 0.5
Applications of Algebra
A survey of undergraduate mathematics with emphasis on the unifying effect of algebraic concepts. This is a cross-disciplinary course; theorems of modern algebra are related to topics chosen mainly from advanced calculus and differential geometry.
Prereq: MATH 234B

AM 462 F 3C 0.5
Measure and Integration
The theory of measure and the Lebesgue integral.
Prereq: PMATH 331 or 351A
Cross-listed as PMATH 451

AM 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: AM 362 or consent of instructor
Cross-listed as PMATH 463

AM 464 W 3C 0.5
Topics in General Relativity
Basic ideas of relativistic cosmology (Friedmann-Robertson-Walker universes, observational status of cosmological theories, black hole theory (the Schwarzschild and Kerr solutions, their event horizons and singularities, gravitational collapse, observable properties of black holes), and an introduction to gravitational waves. Other topics of current interest may be discussed.
Prereq: AM 362 and 372, or consent of instructor

AM 465A F 3C 0.5
Quantum Mechanics 1
Prereq: Consent of instructor

AM 465B W 3C 0.5
Quantum Mechanics 2
Prereq: AM 465A

AM 466 F 3C 0.5
Fluid Mechanics 1
Fundamental equations of inviscid fluids, compressibility, vorticity, two and three-dimensional irrotational, incompressible flow. Blasius' theorem, Joukowski hypothesis. Water Wave Motion.
Prereq: AM 365

AM 468 F 3C 0.5
Topics in Applied Mathematics
A selection of special topics given by members of the Applied Mathematics Department.
Prereq: Consent of instructor

AM 471 W 3C 0.5
Partial Differential Equations of Applied Mathematics 1
Elliptic equations: uniqueness theorems, Green's functions and boundary value problems, potential theory, applications to electrodynamics and fluid mechanics, finite differences. Hyperbolic equations: Cauchy's problem, characteristics, Riemann's methods, wave equation, applications to electrodynamics and fluid mechanics, finite differences.
Prereq: AM 371, 381 and 391, or consent of instructor
Antireq: MATH 215, MATH 216

AM 481 F 3C 0.5
Partial Differential Equations of Applied Mathematics 2
Parabolic equations: uniqueness theorems, Green's functions and boundary value problems, finite differences. Additional selected topics may include: Cauchy-Kowalewski Theorem, Hamilton-Jacobi Theory, maximum principles, formulation of well-posed problems, hyperbolic systems.
Prereq: AM 481A
16:98  Course Descriptions
Mathematics:
Applied Mathematics
Combinatorics and Optimization

AM 482  F  3C  0.5
Calculus of Variations
Prereq: MATH 230B or consent of instructor

AM 485  F  3C  0.5
Electromagnetism
Applications of Maxwell's equations. Introduction to wave guides and antennae.
Prereq: PHYS 253 or consent of instructor

AM 486  F  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 488  W  3C  0.5
Control Theory
Dynamical systems, controllability and observability, minimization of functions and functionals, optimal control, Pontryagin's Maximum Principle.
Prereq: Consent of instructor

AM 489  F  0.5
Reading Course

AM 495  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 365

AM 499  W  0.5
Reading Course

COURSES NOT OFFERED 1988-89
AM 364  Special Relativity
AM 430  Applications of Mathematics
AM 440  Applications of Mathematics
AM 461  Non-Linear Differential Equations

Combinatorics and Optimization

Course Descriptions

Introductory Notes
1. The following courses are offered in conjunction with the Division of Mathematics for Industry and Commerce: C&O 350, 351, 367, 370, 452 and 454.
2. More detailed course descriptions and course outlines are available in the C&O Undergraduate Handbook.

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.
Antireq: C&O 230
C&O 220 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 130B, 134B
Antireq: C&O 220
Also offered at St. Jerome's College in Fall Term.

C&O 350  F,W,S  3C  0.5
Introduction to Optimization
Prereq: MATH 130B, 134B
Students may not enrol in C&O 270 if they have previously completed, or are concurrently enrolled in, C&O 350 or 367.

C&O 351  F,W,S  3C  0.5
Network Flow Theory
Prereq: C&O 350

Coding Theory
A first course in error-correcting codes. Linear block codes, Hamming-Gooy codes and multiple error-correcting BCH codes are studied. Various encoding and decoding schemes are considered.
Prereq: MATH 224B
Offered at St. Jerome's College.

C&O 342  F,S  3C  0.5
Graph Theory 1
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, MATH 224A

C&O 343  W  3C  0.5
Graph Theory 2
Prereq: C&O 342

C&O 350  F,W,S  3C  0.5
Linear Programming
Prereq: MATH 224A
Antireq: ACTSC 335

C&O 351  F,W,S  3C  0.5
Network Flow Theory
Prereq: C&O 350
C&O 367 F,W 3C 0.5

Nonlinear Programming
Vector calculus with applications to Newton’s method and method of steepest descent. One-dimensional optimization. Introduction to constrained optimization, including the elements of Kuhn-Tucker theory and Lagrange multipliers.

Prereq: MATH 220A, 224A

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 130B, 134A/B. (MATH 220B, 224B are recommended.)

Although the mathematics for this course is technically elementary, the course is intended for third and fourth-year students, and the mathematical maturity of a senior student will be assumed.

C&O 382 2C 0.5

Combinatorial Geometry
An introduction to the combinatorial aspects of the real plane. Main topics covered are the enumeration of various combinatorial objects in the plane, Sylvester’s Triangle Problem, Pick’s Theorem, partitioning the interior of a rectangle into squares of different sizes, an introduction to the theory of convex sets in the plane, Helly’s theorem and certain ramifications will be explored.

Prereq: MATH 130B, 134A/B

Although the mathematics for this course is technically elementary, the course is intended for third and fourth-year students, and the mathematical maturity of a senior student will be assumed.

C&O 434 F 2C 0.5

Combinatorial Design
Topics covered include error correcting codes, resolvable designs, affine designs, weighing matrices, and their interaction.

Prereq: MATH 324

C&O 437 W 3C 0.5

Cryptology and Communications Security
Conventional or single key cryptology from the Caesar cipher to the U.S. Data Encryption Standard. Public or two key cryptology. Applications include secrecy/privacy, user or message authentication, financial transactions security.

Prereq: MATH 234A and STAT 230, or permission of instructor

C&O 438 F 3C 0.5

Combinatorial Computing
A course covering a number of 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

C&O 439 2C 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 2C 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 450 F 2C 0.5

Combinatorial Optimization

Prereq: C&O 351

C&O 452 W 2C 0.5

Integer Programming
A study of several techniques for solving integer (linear) programming problems. Cutting planes, implicit enumeration, branch-and-bound. Introduction to Boolean and pseudo-Boolean programming. Applications to problems of optimum routing, site location, set covering and packing, logic and lattice theory.

Prereq: C&O 351

C&O 454 F,S 3C 0.5

Scheduling

Prereq: C&O 351 or 370

C&O 456 W,S 3C 0.5

Game Theory
An introduction to the analysis, through appropriate mathematical models, of competitive situations such as those arising in social, economic, political or military conflict. Emphasis is placed on the theory of two-person games.

Prereq: C&O 360

C&O 458 F 3C 0.5

Numerical Linear Programming
Methods for the minimization and maximization of piecewise linear functions and linear functions subject to linear constraints, with applications to linear programming and data fitting. Emphasis is on algorithms, numerical considerations and software implementation.

Prereq: One of CS 372, CS 375, C&O 350, or CS 337, and consent of instructor. CS 374 is recommended. Cross-listed as CS 473

C&O 459 2C 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 464 W 2C 0.5

Quadratic Programming
A detailed presentation of optimality conditions and effective algorithms for the solution of a quadratic programming problem. All concepts are developed as natural extensions of their counterparts in linear programming. Applications from portfolio analysis, engineering plasticity, regression, pattern recognition.

Prereq: C&O 350
**Course Descriptions**

**Mathematics:**

**Computer Science**

**Continuous Optimization**

**Prereq:** C&O 350, 367

**History of Mathematics 1**
Topics include: famous construction problems, Mascheroni's theorem, amicable pairs, perfect numbers and related numbers; Pythagorean triples; some of Archimedes' great accomplishments: squaring the parabola; estimation of pi; Archimedes' "Method", the volume of the sphere; inscribed regular polygons.

**Prereq:** MATH 130B, 134A/B. (MATH 220B, 224B are recommended.)

Although the mathematics for this course is technically elementary, the course is intended for third and fourth-year students, and the mathematical maturity of a senior student will be assumed.

**History of Mathematics 2**
A continuation of C&O 480 (History of Mathematics 1), but may also be taken independently. Topics include: the Fibonacci sequence; prime numbers; Fermat's last theorem; Gaussian integers; Euler's formula and regular solids; famous problems in geometry.

**Prereq:** MATH 130B, 134A/B. (MATH 220B, 224B are recommended.)

Although the mathematics for this course is technically elementary, the course is intended for third and fourth-year students, and the mathematical maturity of a senior student will be assumed.

**Reading in Combinatorics and Optimization**
**Prereq:** Consent of department

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**Course Descriptions**

**Computer Science**

**Courses not offered in the current academic year are listed at the end of this section.**

**Introductory Notes**

1. The Department of Computer Science has two distinct streams of courses, one for students who have been admitted to a Computer Science Major program, and another especially designed for non-specialists who wish to become sophisticated computer users. Within this context, Computer Science Major programs include Honours Computer Science, Honours Co-op Computer Science with Electrical Engineering Electives, Honours Co-op Computer Science-Information Systems Option, Honours Computer Science/Business Administration, Honours Computer Science/Chartered Accountancy, Honours Computer Science/Management Accounting, and all Joint and Double Honours BMath programs involving Computer Science as one of the majors.

**CS 131 and 132, required in all BMath programs, are 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 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 first obtain a written recommendation from their Faculty Advisor and then consult a Computer Science Advisor.

2. The Computer Science Department is experiencing demand for its courses beyond available resources. Thus, accessibility to Computer Science courses cannot be guaranteed to all students. Every effort will be made to accommodate those students who preregister during published University preregistration periods. While priority will be given to these preregistrants, admission to specific courses cannot be guaranteed and course substitutions may be required to satisfy degree requirements.

3. Regular students will not normally be permitted to enrol in Computer Science courses during the Spring term. (See section 5.3 on page 1326.) 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 to arrange an appropriate selection of courses.) For courses that are over-subscribed, however, priority for registration will normally be given to students registered full-time in a degree program.

4. Limits on the number of CS courses students may take concurrently will be published at preregistration time. Normally, all students in first and second year may preregister for at most one CS course per term, and students other than Computer Science Majors may preregister for at most two CS courses per term in third and fourth year.

5. Computer Science courses may not normally comprise more than one-third of a student's total credits accumulated at the University of Waterloo.

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. More detailed course descriptions and course outlines are available upon request from the Computer Science Department. Students in faculties other than Mathematics should take particular note of the following courses: CS 100, 102, 212, 230, 316.

8. For the purposes of satisfying prerequisites for non-specialist
courses, the second entry in each of the following course pairings may normally be substituted for the first entry of that pairing: (CS 230 and 242), (CS 334 and 340), and (CS 335 and 350/354).

9. The prerequisite phrase "x-year standing" means that a student must be registered in year x or higher.

10. The following courses are offered in conjunction with the Division of Mathematics for Industry and Commerce: CS 330, 432, 438, 446, 448, and 482.

CS 100 F.W.S 2C:2L 0.5
Introduction to Computer Usage
An introduction to universally applicable computer services. Hands-on experience with common software and hardware, supported by examples of applications and social implications chosen from many disciplines. Topics include: electronic mail, word processing, spreadsheets, record management, and hardware and software concepts.
Antireq: CS 131, 132
CS 100 cannot be counted for credit toward a BMath degree.

CS 102 F.W.S 3C:2L 0.5
Introduction to Computer Programming
Fundamental techniques of algorithm design and program development. 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 aggregation, functions, and subroutines.
Antireq: Computer literacy (e.g. CS 100 or extensive high school computing)
Antireq: CS 131, 132
Divisions of the course will be application-oriented: CS 102 COM (commerce), CS 102 SCI (sciences), CS 102 HUM (humanities). Not all divisions will be offered each term.
CS 102 cannot be counted for credit toward a BMath degree.

CS 131 F.W.S 2C:1T:3L 0.5
Principles of Computer Science I
An introduction to the use of computers in problem solving, including an overview of computer science, introduction to algorithms and structured programming, correctness and efficiency, file and data base management, communications and networks. Labs will emphasize hands-on exposure to modern applications software and to the use and development of appropriate software tools.
Antireq: Full-time degree registration in the Faculty of Mathematics
Antireq: CS 100, 140, 180, 212, 234, 235, 240, 250
Also offered at St. Jerome's College in the Fall term

CS 132 F.W.S 2C:1T:3L 0.5
Principles of Computer Science II
An introduction to data representation and numerical problem solving, including an overview of programming systems and machine architectures, linked lists, hashing techniques, dynamic storage allocation, techniques for zero-finding and area-finding, solving linear equations, simulation and decidability. Labs will emphasize hands-on exposure to the use and development of appropriate software tools.
Antireq: CS 131 and full-time degree registration in the Faculty of Mathematics
Antireq: CS 100, 102, 140, 180, 212, 234, 235, 240, 250
Also offered at St. Jerome's College in the Winter term

CS 212 F.W.S 3C 0.5
Programming Principles and Practice
High-level languages, including their specification and translation. Structured programming, use of data structures, including lists and trees. Recursion, sorting, introduction to computational complexity and correctness.
Antireq: CS 131, 132, 234, 240, 241, 242
CS 212 cannot be counted for credit toward a BMath degree.

CS 234 F.W.S 2C:2T 0.5
Programming Principles and Practice
To develop a sophisticated user-oriented understanding of software. A disciplined approach to program design. The need for and use of various control structures and data structures. Features of several high-level languages; techniques for their effective use. Specific topics include: structured programming, linked-list processing, recursion, string processing, tree processing and language development.
Antireq: Full-time degree registration in the Faculty of Mathematics
Antireq: CS 100, 140, 180
Antireq: CS 131, 132, 212, 240, 241, 242
The final offering will be Spring, 1989

CS 240 F.W.S 2C:2T 0.5
Programming Principles, Languages, and Techniques
To develop a thorough understanding of software as needed for program design. The need for and use of various control structures and data structures. Features of several high-level languages, techniques for their effective use. Specific topics include structured programming, linked-list processing, recursion, string processing, tree processing and language development.
Antireq: Full-time degree registration in the Faculty of Mathematics
Antireq: CS 100, 140, 180
Antireq: CS 131, 132, 212, 240, 241, 242
The final offering will be Spring, 1989

CS 241 F.W 2C:1T 0.5
Principles of Computer Science III
The relationship between high-level languages and the computer architecture that underlies their implementation, including basic machine architecture, assemblers, specification and translation of programming languages, linkers and loaders, block-structured languages, parameter passing mechanisms, and comparison of programming languages.
Antireq: CS 132 and an all-inclusive cumulative Math average of at least 60%
Antireq: CS 212, 230, 234, 240, 240, 250

CS 290 F.W 3C 0.5
Introduction to Computers and Computer Systems
Antireq: CS 132, 212
Antireq: CS 117, 235, 241, 242, 250, EL E 222
Course Descriptions
Mathematics:
Computer Science

CS 242  F.W.S.  2C;1T  0.5
Principles of Computer Science IV
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 manage-
ment, 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 117, 212, 230, 234, 235, 240, 250

CS 250  F,W.  3C;1T  0.5
Fundamentals of Computers and
Computer Systems
To give a thorough introduction to what
goes on inside a computer, of machine
organization, and of machine and
assembly-language programming. To
introduce students to computer software
designed to assist user programs.
Specific topics include: addressing
modes, subroutines, and macros, micro-
computer architecture, and operating
system components.
Prereq: CS 140 and second-year
standing in a Computer Science Major
program
Antireq: CS 117, 131, 132, 230, 235,
241, 242, EL E 222
The final offering will be Fall, 1988

CS 316  W  3C;1L  0.5
Introduction to Statistical Problem
Solving by Computer
This is an applications oriented course
which prepares the nonmathematically
student to use the computer as a
research tool. Topics include aids for
statistical analysis and the preparation of
documents such as reports and theses.
The course provides sufficient back-
ground for application to other problems
specific to the individual’s field.
Prereq: One statistics course and
computer literacy (e.g. CS 100 or
high school computing), or consent of
instructor
CS 316 cannot be counted for credit
toward a BMATH degree.
Cross-listed as REC 372

CS 330  F.W.S  3C  0.5
Introduction to Business Systems
A study of application software systems
in the business environment. Topics
include data models of business func-
tions, file and data base systems, and
integrated accounting systems. Students
modify an integrated accounting system
and also work with a selection of
commercially available software systems.
Prereq: One of CS 102, 132, 140, 180,
or equivalent, and a knowledge of
accounting (e.g. ACC 101 or ACC
121/122)
CS 330 cannot be counted for credit
toward a BMATH Honours Computer
Science degree.

CS 334  F.S  3C  0.5
Data Types and Structures
Top-down design of data structures.
Using representation-independent data
types. Introduction to commonly used
data types, including lists, sets,
mapping, and trees. Selection of data
representation.
Prereq: CS 230 or 234, and third-year
standing
Antireq: CS 340
CS 334 cannot be counted for credit
toward a BMATH Honours Computer
Science degree.

CS 335  W  3C  0.5
Computing Systems
A study of those hardware and software
components comprising a computing
system, with an emphasis on the role of
operating systems in the support of
programming activities. Topics include:
computer architecture; input/output;
operating systems; linkers, loaders, and
libraries.
Prereq: CS 230 or (CS 234 and 235),
and third-year standing
Antireq: CS 350
CS 335 cannot be counted for credit
toward a BMATH Honours Computer
Science degree.

CS 337  W  3C  0.5
Introduction to Numerical Analysis
Pitfalls in computation; solution of linear
algebraic equations; polynomial interpo-
lation; least squares; numerical integra-
tion and differentiation. The intent is to
expose students to the theory behind
modern algorithms for solving mathe-
matical problems.
Prereq: CS 132 or 140, MATH 130B,
134B and third-year standing
MATH 230B, 234A are recommended
Antireq: CS 372, 374, 375
CS 337 cannot be counted for credit
toward a BMATH Honours Computer
Science degree.

CS 340  F.W.S  3C  0.5
Data Structures
Levels of data description and their role
in the design of structures. Design of
data representations for primary and
secondary store. Introduction to the anal-
ysis of algorithms.
Prereq: CS 240 or 242, C&O 230, and
third-year standing in a Computer
Science Major program
Antireq: CS 334

CS 350  F,W.  3C  0.5
Machine Structures
The intent is to give a basic under-
standing of what goes on inside a
computer, of machine architecture, and
of some fundamental operating system
services. Topics include: detailed intro-
to hardware; representation of
memory, central processor,
addressing schemes; input/output;
linking and loading.
Prereq: One of CS 242, CS 250, EL E
222, and third-year standing in a
Computer Science Major program
CS 358 or EL E 333 is strongly recom-
manded
Antireq: CS 335

CS 364  F,W.  3C  0.5
Software Systems
A study of those software components
comprising a computing system, with an
emphasis on the management of hard-
ware resources and the support of
multiple processes. Topics include: oper-
ating system services; file systems;
linkers, loaders and libraries; monitors
and debuggers; interrupt handling; crit-
ical sections; process communication
and synchronization.
Prereq: CS 340 and third-year standing
in a Computer Science Major program
CS 350 is recommended as a corequi-
site.

CS 358  F,W,S  3C  0.5
Digital Networks
Combinational networks. Integrated
circuit modules. Boolean algebras.
Boolean functions, expressions and their
simplification. Asynchronous sequential
networks. Latches and flipflops. Synchron-
ous operations. Analysis and synthesis
of synchronous sequential networks.
Sequential integrated-circuit modules;
shift registers, counters, memories.
Prereq: One of CS 242, CS 250, EL E
222, and third-year standing 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. Unsolvability problems and their relevance to the semantics of programming. Concepts of computational complexity including algorithm optimality.
Prereq: CS 240 or 242, MATH 234B, and third-year standing

CS 372 F.W,S 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 132 or 140, MATH 230B, 234A
Antireq: CS 337, 375

CS 374 F.W,S 3C 0.5
Introduction to Scientific Computation: Numerical Approximation
Prereq: CS 132 or 140, MATH 234A/B
Antireq: CS 337, 375

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 230 or 234, and a CS half-credit labelled CS 330 or higher, and third-year standing
CS 335 is a recommended corequisite.
CS 430 cannot be counted for credit toward a BMath Honours Computer Science degree.

CS 432 F.S 3C 0.5
Business Systems Analysis
Prereq: CS 334 or 438, and third-year standing
Antireq: CS 434, 482
CS 432 cannot be counted for credit toward a BMath Honours Computer Science degree.

CS 435 W 3C 0.5
Topics in Computing Systems
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; queueing theory fundamentals; 2-D graphics; advanced software and hardware architectures; computer selection.
Prereq: CS 335 and third-year standing
CS 435 cannot be counted for credit toward a BMath Honours Computer Science degree.

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: CS 334 or 438, STAT 220, and third-year standing
Antireq: CS 457
CS 437 cannot be counted for credit toward a BMath Honours Computer Science degree.

CS 438 F.W,S 3C 0.5
Computer Applications in Business: Data Bases
A user-oriented approach to the management of large collections of data. Methods used for the storage, selection and presentation of data. Common database management systems.
Prereq: One of CS 230, 234, 330 and third-year standing
Antireq: CS 448
CS 438 cannot be counted for credit toward a BMath Honours Computer Science Degree.

CS 443 F.S 3C 0.5
Functional and Logic Programming
Introduction to the concepts of functional programming and logic, including programming by specification, programming without side effects and the use of non-standard control structures. Fundamentals of logic, calculus, model theoretical semantics and proof procedures. Exposure to languages like PROLOG, LISP, HOPE, FP and NIAL.
Prereq: CS 340 and fourth year standing in a Computer Science Major program

CS 444 W 3C 0.5
Compiler Construction
Prereq: CS 340, 360 and fourth-year standing in a Computer Science Major program

CS 446 F.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 240 or 242, and fourth-year standing in a Computer Science Major program
CS 354 is a recommended prerequisite.

CS 448 F.W,S 3C 0.5
Introduction to Database Management
The course introduces the student to the techniques that have been developed for processing very large collections of data. The requirement that data be held on secondary storage (disks and tapes) has an enormous impact on the design of algorithms to access that data.
Prereq: CS 340 and fourth-year standing in a Computer Science Major program
Antireq: CS 438
CS 450 F,S 3C 0.5

Computer Architecture
The course is intended to prepare the student to choose a suitable computer for a given application. Review of combina-
tional and sequential logic circuits. Discussion of "building block" - central processing units, stores, input/output systems, and bus structures. Case studies of machines.
Prereq: CS 350, one of CS 356, CS 369, EL E 329, and fourth-year standing in a Computer Science Major program

CS 452 F,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 fourth-year standing in a Computer Science Major program
CS 350 is recommended

CS 454 F,S 3C 0.5

Distributed Systems
A basic introduction to modern, loosely-coupled distributed systems, including fairly comprehensive presentation of one or more example systems, discussions of software and hardware architecture, and theoretical treatment of some fundamental algorithms.
Prereq: CS 354 and fourth-year standing in a Computer Science Major program
CS 350 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: STAT 231, 333, CS 240 or 242, and fourth-year standing in a Computer Science Major program
Antireq: CS 437

CS 458 F,S 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 358 or 369, and forth-year standing in a Computer Science Major program
CS 350 is recommended

CS 462 F 3C 0.5

Formal Languages and Parsing
Prereq: CS 360 and fourth-year standing

CS 464 W 3C 0.5

Computability and Recursive Function Theory
Models of the computational process as reflected by computers, linguistic systems, functional specifications, transformational systems, formal logic, etc. Equivalence of these models. Computationally complexity for specific models and abstractions fitting all models. Formal reducibilities between computational problems, and the complexity of these reducibilities.
Prereq: CS 360 and fourth-year standing

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 and fourth-year standing
CS 360 is recommended

CS 468 W 3C 0.5

Program Verification
Methods of program verification. Implications for structured programming. Inductive reasoning about recursive programs and recursively defined data structures.
Prereq: CS 360 and fourth-year standing

CS 472 W 3C 0.5

Numerical Linear Algebra
Prereq: CS 372 or 375, or CS 337 and consent of instructor
CS 374 is recommended

CS 473 F 3C 0.5

Numerical Linear Programming
Methods for the minimization and maximization of piecewise linear functions and linear functions subject to linear constraints, with applications to linear programming and data fitting. Emphasis is on algorithms, numerical considerations and software implementation.
Prereq: One of CS 372, CS 375, CSE 359, or CS 337, and consent of instructor
Cross-listed as CSE 458
CS 374 is recommended

CS 474 S 3C 0.5

Numerical Approximation
Prereq: CS 374 or 375, or CS 337 and MATH 3229 and consent of instructor
CS 372 is recommended

CS 476 F 3C 0.5

Numerical Solution of Differential and Integral Equations
Initial value problems; existence and uniqueness of solutions, one step methods, multistep methods, stability, error analysis. Boundary value problems; shooting and discretization methods, implementation problems especially for non-linear equations; Integral equations; correspondence to ordinary differential equations, initial value and boundary value problems, solution techniques.
Prereq: CS 374, or CS 337 and consent of instructor
CS 372 is recommended
CS 478 W 3C 0.5
Numerical Solution of Partial Differential Equations
Pre-req: CS 374, or CS 337 and consent of instructor.
CS 372 is recommended

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.
Pre-req: CS 340 and fourth-year standing in a Computer Science Major program
Coreq: CS 448
Antireq: CS 432, 434

CS 486 F,W,S 3C 0.5
Introduction to Artificial Intelligence
Pre-req: CS 240 or 242, and fourth-year standing 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.
Pre-req: CS 240 or 242, PMATH 334 (or consent of instructor), and fourth-year standing

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.
Pre-req: CS 340, MATH 234A and fourth-year standing 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-req: CS 340 and fourth-year standing

CS 498 0.5
Advanced Topics in Computer Science
See the Course Offerings List for topics available.
Pre-req: Fourth-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.

COURSES NOT OFFERED 1988-89

CS 117 Computers and Microcomputers: Principles of Operation and Programming
CS 434 Computer Auditing
CS 442 Comparative Programming Languages
CS 458 Data Communications

Mathematics

Course Descriptions

Courses not offered in the current academic year are listed at the end of this section.

Introductory Note
Students in faculties other than Engineering should consult their faculty advisor regarding how term courses with 0.625 credit weight are counted for degree credit purposes.

MATH 000 F,W 1C 0.0
Co-op Orientation
MATH 000 is a non-credit orientation course for new Co-op Math students.

MATH 010 F,W,S 0.0
Non-Credit Night Lab
All students enrolled in one or more of MATH 130A/B, 134A/B, 140A/B, 144A/B, and CS 131, 132 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 103 F 3C,1T 0.5
Introductory Algebra (For students in Arts/Social Sciences)
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.
Pre-req: Grade 12 Mathematics, or the equivalent
Not open to students in the Faculty of Mathematics or to students who have credit in Grade 13 Algebra.
Students who have credit in both Grade 13 Calculus and Relations and Functions must obtain permission from the instructor to take MATH 103
MATH 104 W 3C,1T 0.5
Introductory Calculus (For students in Arts/Social Sciences)
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 the equivalent
Not open to students in the Faculty of Mathematics or to students who have credit in Grade 13 Calculus.

MATH 106 F 3C,1T 0.5
Mathematics (For Kinesiology Students)
Algebraic functions and their graphs; exponential and logarithmic functions; elementary differential and integral calculus; applications and problems associated with kinesiology.
Not open to students in the Faculty of Mathematics.
Antireq: MATH 110A, 113A, 115A, 130A, 140A

MATH 110A F 3C,2T 0.625
Calculus Ia (For Engineering Students)
Functions, continuity and derivatives; Trig functions; Related rates, Curve sketching. Exponential and log functions. Integration, Techniques of Integration. Applications to area and volume problems.
Prereq: Grade 13 Calculus
Not open to students in the Faculty of Mathematics.
Antireq: MATH 106, 113A, 115A, 130A, 140A

MATH 110B W,S 3C,2T 0.5
Calculus Ib (For Engineering Students)
Prereq: MATH 110A
Not open to students in the Faculty of Mathematics.
Antireq: MATH 113B, 115B, 130B, 140B

MATH 111A F 3C,1T 0.5
Algebra (For Arts and Science Students)
Elementary number theory, number systems, mathematical induction, binomial theorem, complex numbers, polynomials.
Prereq: Grade 13 Algebra is recommended but not required
Not open to students in the Faculty of Mathematics.
Antireq: MATH 134A, 144A

MATH 111B W,S 3C,1T 0.5
Linear Algebra and Solid Geometry (For Arts and Science Students)
Determinants, vectors, matrices, elementary solid geometry, systems of linear equations.
Prereq: Grade 13 Algebra is recommended but not required
Not open to students in the Faculty of Mathematics.
Antireq: MATH 114, 134B, 144B

MATH 113A F 3C,2T 0.5
Calculus (For Arts and Science Students)
The derivative, differentiation, higher order derivatives, implicit functions, differentials, applications of the derivative. The definite integral, Differentiation and integration of the logarithmic exponential and trigonometric functions.
Prereq: Grade 13 Calculus
Not open to students in the Faculty of Mathematics.
Antireq: MATH 106, 110A, 113A, 130A, 140A

MATH 113B W 3C,2T 0.5
Calculus (For Arts and Science Students)
Prereq: MATH 115A
Not open to students in the Faculty of Mathematics.
Antireq: MATH 110B, 113B, 130B, 140B

MATH 1130 A,F,W,S 3C,1T 0.5
Calculus
Functions and limits, differentiation of trigonometric, logarithmic and exponential functions, the chain rule, Rolle’s theorem, the mean value theorem, extreme value theorem, applications of the derivative, the differential, the definite integral, fundamental theorem of calculus.
Prereq: Grade 13 Calculus
Antireq: MATH 106, 110A, 113A, 130A, 140A
Also offered at St. Jerome’s College in the Fall term.

MATH 1130 B,F,W,S 3C,1T 0.5
Calculus
Techniques of integration, applications of the integral, indeterminate forms, Taylor’s theorem, convergence of sequences and series, power series.
Prereq: MATH 130A
Antireq: MATH 110B, 113B, 115B, 140B
Also offered at St. Jerome’s College in the Winter term.

MATH 114 F 3C,2T 0.625
Algebra and Vector Geometry (For Engineering Students)
Prereq: Grade 13 Algebra
Not open to students in the Faculty of Mathematics.
Antireq: MATH 111B, 134B, 144B

MATH 115A F 3C,2T 0.5
Calculus (For Co-op Physics and Chemistry)
Real numbers, functions, trig functions. Limits. The derivative, differentiation, higher order derivatives, implicit functions, differentials, applications of the derivative. The definite integral, Antidifferentiation. Logarithms and exponential functions, hyperbolic and inverse hyperbolic functions.
Prereq: Grade 13 Calculus
Not open to students in the Faculty of Mathematics.
Antireq: MATH 106, 110A, 113A, 130A, 140A

MATH 115B W,S 3C,2T 0.5
Calculus (For Co-op Physics and Chemistry)
Prereq: MATH 115A
Not open to students in the Faculty of Mathematics.
Antireq: MATH 110B, 113B, 130B, 140B

MATH 130A F,W,S 3C,1T 0.5
Calculus
Basic set theory, cardinality, elementary number theory, number systems, polynomials.
Prereq: Grade 13 Algebra
Antireq: MATH 111A, 144A
Also offered at St. Jerome’s College in the Fall term.
MATH 134B F,W,S 3C,1T 0.5
Linear Algebra
Systems of equations, vector spaces, matrices, determinants, geometric applications.
Prereq: Grade 13 Algebra (MATH 134A is recommended, but not required).
Antireq: MATH 111B, 114, 144B
Also offered at St. Jerome's College in the Winter term.

MATH 140A F 3C 0.5
Calculus
MATH 140A is an advanced-level, enriched version of MATH 130A.
Prereq: Grade 13 Calculus and a Grade 13 Math. Average of at least 85% (or permission of instructor).
Antireq: MATH 106, 110A, 113A, 115A, 130A

MATH 140B W,S 3C 0.5
Calculus
MATH 140B is an advanced-level, enriched version of MATH 130B.
Prereq: MATH 140A (or permission of instructor)
Antireq: MATH 110B, 113B, 115B, 130B

MATH 144A F 3C 0.5
Algebra
MATH 144A is an advanced-level, enriched version of MATH 134A.
Prereq: Grade 13 Algebra and a Grade 13 Math. Average of at least 85% (or permission of instructor).
Antireq: MATH 111A, 134A

MATH 144B W,S 3C 0.5
Linear Algebra
MATH 144B is an advanced-level, enriched version of MATH 134B.
Prereq: MATH 144A (or permission of instructor)
Antireq: MATH 111B, 114, 134B

MATH 210 F,W 3C 0.5
Calculus 2 (For Chemical Engineers)
Partial differentiation, the gradient, multiple integrals with applications, line and surface integrals, divergence and curl, theorems of Green and Stokes. Applications to physical problems.
Prereq: MATH 103B
Not open to students in the Faculty of Mathematics.

MATH 211 F,W 3C,1T 0.5
Advanced Calculus for Electrical Engineers 1
Fourier series; Ordinary differential equations; Laplace transform; applications to linear electrical systems.
Prereq: MATH 110B
Not open to students in the Faculty of Mathematics.
Cross-listed as EL E 205
Antireq: MATH 213A, 220A, 230A, 240A

MATH 212 F,S 3C,1T 0.5
Advanced Calculus for Electrical Engineers 2
Prereq: MATH 211
Not open to students in the Faculty of Mathematics.
Cross-listed as EL E 206
Antireq: MATH 210, 213B, 220B, 230B, 240B

MATH 213A F 3C 0.5
Calculus 2 (For Science Students)
Infinite series. Partial derivatives, chain rule, total differential, Taylor's theorem, extreme values.
Prereq: MATH 113B or 115B, and MATH 111B, or equivalent
Not open to students in the Faculty of Mathematics.
Antireq: MATH 211, 220A, 230A, 240A

MATH 213B W,S 3C 0.5
Calculus 2 (For Science Students)
Prereq: MATH 213A or 220A, or equivalent
Not open to students in the Faculty of Mathematics.
Antireq: MATH 210, 212, 220B, 230B, 240B

MATH 215 F,W 3C 0.5
Differential Equations (For Chemistry Students)
Prereq: MATH 113B or 115B, or equivalent
Not open to students in the Faculty of Mathematics.
Antireq: AM 260, MATH 216

MATH 216 F,S 3C 0.5
Differential Equations (For Physics or Chemical Engineering students)
Prereq: One of MATH 110B, 113B, 115B, or equivalent
Not open to students in the Faculty of Mathematics.
Antireq: AM 260, MATH 215

MATH 220A F 3C,1T 0.5
Advanced Calculus
Differential calculus for functions of several variables.
Prereq: MATH 130B
Coreq: MATH 134B
Antireq: MATH 211, 213A, 230A, 240A
Not open to Honours Mathematics students.

MATH 220B W 3C,1T 0.5
Advanced Calculus
Prereq: MATH 220A
Antireq: MATH 210, 212, 213B, 230B, 240B
Not open to Honours Mathematics students.

MATH 224A F 3C 0.5
Linear Algebra 2
Linear transformations, eigenvalues, characteristic polynomials, inner products.
Prereq: MATH 134B
Antireq: MATH 234A, 244A
Not open to Honours Mathematics students.

MATH 224B W 3C 0.5
Abstract Algebra 1
Elementary group and field theory and other topics in algebra.
Prereq: MATH 134A, 224A
Antireq: MATH 234B, 244B
Not open to Honours Mathematics students.

MATH 230A F,W,S 3C,1T 0.5
Advanced Calculus
Differential calculus of functions of several variables; limits and continuity, partial derivatives, differentiability, chain rule, Taylor's formula, extreme values, mappings and Jacobians.
Prereq: MATH 130B
Coreq: MATH 134B
Antireq: MATH 211, 213A, 220A, 240A
Also offered at St. Jerome's College in the Fall term.
MATH 230B  F.W.S  3C,1T  0.5
Advanced Calculus
Integral calculus of functions of several variables; multiple integrals, iterated inte-
grals; change of variables, applications to area and volume calculations. Line
integrals, Green’s Theorem and path independence. Sequences and series of
functions; uniform convergence and power series.
Prereq: MATH 230A
Antireq: MATH 210, 212, 213B, 220B,
240B
Also offered at St. Jerome’s College in the Winter term.
MATH 234A  F,W,S  3C  0.5
Linear Algebra 2
Linear transformations, eigenvalues, characteristic polynomials, inner prod-
ocuts.
Prereq: MATH 134B
Antireq: MATH 224A, 244A
Also offered at St. Jerome’s College in the Fall term.
MATH 240B  F,W,S  3C  0.5
Abstract Algebra 1
Groups, fields and other topics in abstract algebra.
Prereq: MATH 134A, 234A
Antireq: MATH 224B, 244B
Also offered at St. Jerome’s College in the Winter term.
MATH 240A  F,W  3C  0.5
Advanced Calculus
MATH 240A is an advanced level, enriched version of MATH 230A.
Prereq: MATH 140B (or permission of instructor)
Antireq: MATH 211, 213A, 220A, 230A
MATH 240B  F,W,S  3C  0.5
Advanced Calculus
MATH 240B is an advanced-level, enriched version of MATH 230B.
Prereq: MATH 240A (or permission of instructor)
Antireq: MATH 210, 212, 213B, 220B,
230B
MATH 244A  F  3C  0.5
Linear Algebra 2
MATH 244A is an advanced-level, enriched version of MATH 234A.
Prereq: MATH 144B (or permission of instructor)
Antireq: MATH 224A, 234A
MATH 244B  W,S  3C  0.5
Abstract Algebra 1
MATH 244B is an advanced-level, enriched version of MATH 234B.
Prereq: MATH 144A/B (or permission of instructor)
Antireq: MATH 224B, 234B
MATH 322A  F  3C  0.5
Introduction to Real Analysis
Sequences and series, functions and continuity. Laplace transforms, Fourier
series, applications.
Prereq: MATH 220A (MATH 220B is recommended)
Antireq: PMATH 331, 351A
Not open to Honours Mathematics students.
MATH 322B  W  3C  0.5
Introduction to Complex Variable Theory
Complex numbers, continuity, differenti-
ability, analyticity of functions; the
Cauchy-Riemann equations; solutions of
Laplace’s equation, conformal mapping by
elementary functions, and applications;
the Cauchy and allied theorems;
Taylor and Laurent expansions, uniform
convergence and power series; the
residue calculus, and applications. The
emphasis will be on applications.
Prereq: MATH 220B
Antireq: MATH 320B, PMATH 322
Not open to Honours Mathematics students.
MATH 324  F  3C  0.5
Abstract Algebra 2
Topics in abstract algebra: groups, rings,
fields and applications.
Prereq: MATH 224B
Antireq: PMATH 334, 344
Not open to Honours Mathematics students.
MATH 334B  W,S  3C  0.5
An Introduction to Complex Variable Theory
Complex numbers, continuity, differenti-
ability, analyticity of functions; the
Cauchy-Riemann equations; solution of
Laplace’s equation, conformal mapping by
elementary functions, and applications;
the Cauchy and allied theorems;
Taylor and Laurent expansions, uniform
convergence and power series; the
residue calculus, and applications.
Prereq: MATH 220B
Antireq: MATH 332B, PMATH 322
MATH 326A  F  3C  0.5
Elementary Differential Equations
MATH 226B Elementary Differential Equations II
MATH 226C Elementary Differential Equations III

Mathematics Electives

Course Descriptions

Courses not offered in the current academic year are listed at the end of
this section.

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 electives.

MTHEL 100  F,W,S  2C  0.5
Commercial and Business Law for
Mathematics Students
The Judicial Process, Contract Law,
Agency, Bankruptcy, Negotiable Instru-
ments, Law of Banking, Insurance Law,
Partnership Law, Company Law, Torts,
Real Estate Law.

MTHEL 102  W,S  3C  0.5
Uses and Abuses of Statistics
This course provides an appreciation of
how to correctly use statistical argu-
ments in a wide variety of applications.
Topics include descriptive statistics,
sample surveys, experimental design,
index numbers, regression models.

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, extracurri-
cular activities, the relationship between
elementary and secondary school mathemat-
ics, audio-visual materials.
This course is normally open only to
students in the Co-op Math/Teaching
Option.
Prereq: Consent of instructor.

MTHEL 305A  F,W  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.
Course Descriptions

Mathematics

Pure Mathematics

Introductory Note
More detailed course descriptions and course outlines are available upon request from the Pure Mathematics Department.

PMATH 331 F,W 3C 0.5

Real Variables
Topology of R^n, continuity, norms, metrics, completeness, Fourier series, and applications, for example, to O.D.E.'s, the heat problem, optimal approximation, the isoperimetric inequality.
Pre req: MATH 230B
For students in programs outside of Pure Mathematics.
Antireq: MATH 322A, PMATH 351A
Not available for credit to students in Honours Pure Mathematics Programs.

PMATH 334 F,S 3C 0.5

Abstract Algebra
Groups, rings, fields and applications.
Pre req: MATH 234B
PMATH 344 may be substituted for 334 whenever this is a requirement in an Honours program.
Antireq: MATH 324, PMATH 334

PMATH 351A F,S 3C 0.5

Real Analysis I
Metric spaces, compactness, completeness, continuity, convergence, integration, function spaces.
Pre req: MATH 230B
PMATH 351A may be substituted for 331 whenever this is a requirement in an Honours program.
Antireq: MATH 322A, PMATH 331

PMATH 351B W 3C 0.5

Real Analysis II
Applications of PMATH 351A concepts to Fourier series, differential equations and other topics.
Pre req: PMATH 351A

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.
Pre req: MATH 230B
PMATH 352 may be substituted for MATH 332B whenever this is a requirement in an Honours program.
Antireq: MATH 322B, 332B

PMATH 360 S 3C 0.5

Geometry
An introduction to affine, projective and non-Euclidean forms of geometry. Conic sections in the projective plane. Inversion in circles.
Pre req: MATH 224B
Will be of interest to all math students.

PMATH 365 F,S 3C 0.5

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 to tensors in Relativity and Continuum Mechanics.
Pre req: MATH 230B or consent of instructor
Cross-listed as AM 362

PMATH 367 W 3C 0.5

Set Theory and General Topology
Intuitive set theory, metric spaces, point set topology.
Pre req: MATH 230A

PMATH 380A 3C 0.5

Introduction to Information Theory with Applications
Pre req: Consent of instructor
Cross-listed as AM 380A

PMATH 380B 3C 0.5

Information Theory with Applications
Pre req: Consent of instructor
Cross-listed as AM 380B

PMATH 399

Readings in Pure Mathematics

PMATH 430A F,W,S 3C 0.5

Introduction to Mathematical Logic
A broad introduction to Mathematical Logic. The logic of sentences: truth-functions and axiomatic approaches (e.g. Natural Deduction and Gentzen sequences). A brief introduction to the logic of predicates and to the foundations of mathematics.
Will be of interest to all math students.
Antireq: PMATH 432A

PMATH 430B 3C 0.5

Introduction to Mathematical Logic
Continuation of PMATH 430A. Gödel's incompleteness theorem (in outline). Logicism, intuitionism, formalism. Selected topics (some of intuitionistic logic, modal logic, the representation theorem for Boolean Algebras normally are treated).
Pre req: PMATH 430A
Will be of interest to all math students.
Antireq: PMATH 432B

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.
Pre req: MATH 224B
Will be of interest to all math students.
Antireq: PMATH 440
Mathematics: Pure Mathematics

PMATH 432 F 3C 0.5
Mathematical Logic
First order languages and theories.
Prereq: PMATH 430A
PMATH 432 is more specialized and presented at a more advanced level than PMATH 430A.

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: MATH 332B (or PMATH 352)
Prereq: PMATH 340
Next offered in Winter 1999, and each alternate Winter thereafter.

PMATH 441 W 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 1989, and each alternate Winter thereafter.

PMATH 443 C 0.5
Linear Algebra
Continuation of linear algebra. Main topics: representations of endomorphisms, structure of bilinear forms, multilinear products.
Prereq: MATH 234A
Not offered every year.

PMATH 445 F 3C 0.5
Ring Theory
Continuation of the theory of rings and modules.
Prereq: PMATH 334 or 344
Next offered in Fall 1998.

PMATH 446 W 3C 0.5
Group Theory
Permutations, Cayley Theorem, Sylow Theorem, Jordan-Hölder Theorem, nilpotent and solvable groups, direct and semidirect products, tree groups.
Prereq: PMATH 334 or 344

PMATH 447 F 3C 0.5
Field Theory
Field extensions and Galois theory.
Prereq: PMATH 334 or 344

PMATH 451 F 3C 0.5
Measure and Integration
Lebesgue measure and integral for the real line, general measure and integration theory, convergence theorems, Fubini’s theorem, absolute continuity, Radon Nikodym theorem, L^p-spaces.
Prereq: PMATH 331 or 351A, or consent of instructor
Cross-listed as AM 462

PMATH 452 W 3C 0.5
Topics in Complex Analysis
The Riemann mapping theorem and several topics such as analytic continuation, harmonic functions, elliptic functions, entire functions, univalent functions, special functions.
Prereq: PMATH 352

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 351B or consent of instructor
Cross-listed as AM 472

PMATH 463 C 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
Cross-listed as AM 463

PMATH 465 F 3C 0.5
Topics in Differential Geometry
Grassman algebras, differential forms, Lie derivatives, isometries, Killing vector fields, applications to continuum mechanics, differentiable manifolds and applications of differential forms to physics.
Prereq: AM 362/PMATH 365 or consent of instructor
Cross-listed as AM 474

PMATH 467 3C 0.5
Topology
Topics from algebraic, combinatorial and geometric topology.
Prereq: MATH 234B, PMATH 367

PMATH 470 3C 0.5
Functional Equations
Cauchy’s, Picard’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

Statistics

Course Descriptions

Courses not offered in the current academic year are listed at the end of this section.

Introductory Notes

1. The following courses are offered in conjunction with the Division of Mathematics for Industry and Commerce:
   STAT 331, 332, 333, 335, 371, 443

2. More detailed course descriptions and course outlines are available in the Statistics Undergraduate Studies Handbook.

STAT 202 F 3C, 1L 0.5
Elementary Statistics for Biologists
Elementary probability, populations, samples and distributions with biological examples. Methods for data summary and presentation including an introduction to interactive programming. Estimation, hypothesis testing, two-sample techniques and paired comparisons. Contingency tables.
For Science students only.

STAT 204 F 3C, 1L 0.5
Statistics for the Physical Sciences
For Science students only.

STAT 220 F 3C, 1T 0.5
Introduction to Statistical Methods
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 130B
Not open to Honours Mathematics students.
Prereq: STAT 230, 240
STAT 221 W 3C,1T 0.5
Introduction to Statistical Methods 2
Chance models (applied to measurement error and genetics); tests of significance
(one- and two-sample z- and t-tests); simple linear regression (including analysis
of variance and parameter estimation); survey sampling (including estimation
of means, totals and proportions in simple random sampling).
Prereq: STAT 220
Not open to Honours Mathematics students.
Antireq: STAT 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 130B
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 230A, STAT 230
Antireq: STAT 221, 241
Also offered at St. Jerome’s College in the Winter term.

STAT 240 F,W 3C 0.5
Probability
STAT 240 is an advanced-level enriched version of STAT 230.
Prereq: MATH 130B
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 230A, STAT 230
Antireq: STAT 221, 223

STAT 304 W 2C,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 3C 0.5
Regression and Sampling Methods for Accounting
Review of tests of significance, confidence intervals, and properties of the
normal distribution. Normal linear models. Elementary sampling theory.
Prereq: A one-term course in statistics or probability
Open only to students in Honours Arts Accounting Programs.

STAT 321 W 3C 0.5
Applied Regression Analysis
least squares. Non-normal models.
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
Random variables and distribution theory. Functions of random variables. Limiting
distributions. Hypothesis testing. Estimation and large sample theory.
Prereq: MATH 230B, STAT 231

STAT 331 F,W,S 3C 0.5
Applied Linear Models
Variable selection. Extensions to weighted least squares and non-normal
models.
Prereq: MATH 230A, 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 231 or the equivalent
Antireq: STAT 322

STAT 333 F,W,S 3C 0.5
Applied Probability
Review of basic probability. Generating functions. Theory of recurrent events.
Markov chains, Markov processes, and their applications.
Prereq: STAT 230

STAT 335 W 3C 0.5
Statistical Process Control
Philosophy of process control. Control charts and their application. Acceptance
sampling. Sequential methods in process control. Assessing the cost of quality.
Introduction to experimental design.
Prereq: One of STAT 231, M SCI 251, M E 202, 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. Confounding and fractional replication. Selected topics.
Prereq: STAT 331 or consent of instructor

STAT 431 W 3C 0.5
Applications of Regression Models
Review of the normal linear model; response surface methodology; non-linear normal models; linear models for binary data and cross-classification; log linear models for contingency tables; selected topics.
Prereq: STAT 331

STAT 433 F 3C 0.5
Stochastic Processes
Point processes. Renewal theory. Stationary processes. Selected topics.
Prereq: STAT 333 or consent of instructor

STAT 440 F 3C 0.5
Statistical Computing
Problems associated with the analysis of stochastic systems and statistical data
by computer; simulation techniques, numerical algorithms, programming for
statistical problems and statistical packages.
Prereq: STAT 331

STAT 443 W 3C 0.5
Forecasting
Model building. Multiple regression and forecasting. Exponential smoothing. Box-
Jenkins models. Smoothing of seasonal data.
Prereq: STAT 331 or consent of instructor
STAT 450 W 3 C 0.5
Estimation and Hypothesis Testing
Discussion of general inference problems under the headings of point and interval estimation, hypothesis testing and decision theory, large sample normal likelihoods, maximum likelihood estimation, theory of UMV estimation, least squares, Neyman-Pearson theory of hypothesis testing.
Prereq: STAT 330

STAT 464 0.5
Topics in Probability Theory
Prereq: STAT 333 or consent of instructor.
May not be offered 1988-89.

STAT 466 0.5
Topics in Statistics 1
Prereq: STAT 330, 331 or consent of instructor.
May not be offered 1988-89.

COURSES NOT OFFERED 1988-89

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

Department of Mechanical Engineering

Professor, Chairman of the Department
H.W. Kerr, BA, MSc, PhD (Toronto), PEng

Professor, Associate Chairman Graduate Studies
R.J. Pick, BSc (British Columbia), MSc (Imperial College), PhD (Waterloo), PEng

Professor, Associate Chairman Undergraduate Studies
H.F. Sullivan, BSc (Waterloo), AM, PhD (Princeton), PEng

Professor, Director, Office of Research Administration
E.L. Holmes, BSc (Bristol), MSc, PhD (Toronto), PEng

Professor Emeritus
H.H.E. Leipholtz, Dipl Eng, Dr Ing, Docent Habil (Stuttgart), DEng (Waterloo), DEng (Carleton), PEng

FRSC, Recipient of the Distinguished Teacher Award

Professors
K.G. Adams, BSc (Queen's), MSc, PhD (Waterloo), PEng
G.C. Andrews, BASc, MASC (British Columbia), PhD (Waterloo), PEng
G.M. Bragg, BASc (Toronto), PhD (Cambridge), PEng
E. Brunette, 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) (Bihar), PhD (Waterloo), PEng
D. French, BSc (Aston), CEng, PEng
K.G.T. Hollands, BASc (Toronto), PhD (McGill), PEng
J.H.G. Howard, BSc (Queen's), MSc, PhD (Birmingham), PEng
W.H. Hu, BSc (Peking), PhD, DSc (Southampton)
H.R. Martin, BSc, MSc (Queen's Belfast), PhD (Nottingham), DSc (Queen's Belfast), PEng
P. Niessen, BSc (McMaster), MASC, PhD (Toronto), PEng
K.R. Piekarski, Dipl Ing (London), PhD (Cambridge), PEng, (Retired)*
A. Puntmee, BSc, PhD (Nottingham), PEng, CEng, RM
G.D. Raitibly, BE, MSc (Western Ontario), PhD (Minnesota), PEng, Recipient of the Distinguished Teacher Award
J.A. Schey, Dipl Ing, CSC (Budapest), Dr. Ing. h.c. (Stuttgart), PEng
G.E. Schneider, BASc, MASC, PhD (Waterloo)
P.R. Slawson, BASc, MASC, PhD (Waterloo), PEng
Y.A. Stepanenko, (Moscow Inst. Machine Tool Eng'), PhD (Engineering Research Inst., Moscow)
A.B. Strong, BASc (Waterloo), MSc (London), PhD (Waterloo), PEng
M.M. Yovanovich, BSc (Queen's), MS (Buffalo), ME, ScD (Massachusetts Institute of Technology)

Associate Professors
G.A. Davidson, BASc, PhD (Toronto), PEng
A.M. Hale, BSc, MA (New Brunswick), BASc (Toronto), MASC, PhD (Waterloo), PEng

Assistant Professors
S. Bedi, BSc, ITT, Kanpur, MASC (British Columbia), PhD (Victoria)
J.A. Hussino, BSc, PhD (Trinity College, Dublin)
F.M. Ismail, BSc, MSc (Alexandria), PhD (McMaster)
J.B. Medley, BASc, MASC (Waterloo), PhD (Leeds), PEng

M. Renksizbulut, BSc (Robert College), MSc (Middle East Technical), PhD (Northwestern), PEng
G.D. Stubley, BASc (Waterloo), MSc (Stanford), PhD (Waterloo), PEng
R.A. Varin, MSc, PhD (Warsaw Technical)
D.C. Weckman, BASc, MASC, PhD (Waterloo), PEng

Research Assistant Professors
A.P. Bruner, BASc, ME, PhD (Toronto), PEng
A. Sobiesiak, MSc, DfTechSc (Warsaw Tech)

Adjunct Faculty
C.J. Beigesinger, BASc, MASC, PhD (Toronto), PEng
T.A. Brustowski, BASc (Toronto), AM, PhD (Princeton), PEng
R. Hoff, BASc, MASC, PhD (Vanderbilt), NSERC University Research Fellow, PEng
R.G.R. Lawrence, QC
U.H. Mohaupt, BASc, MASC, PhD (Waterloo), PEng
B.E. Thompson, BASc (Waterloo), PhD (Imperial College)

Faculty Members holding cross appointments to Mechanical Engineering from:
1. Applied Mathematics
2. Civil Engineering

*Also has Adjunct Appointment

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.

Course Descriptions
M.E 126 W S 2C, 4L 0.5
Engineering Concepts 2
A continuation of GEN E 115 with applications of graphics, measurement and other analytic principles applied to introductory problems in the various disciplines of Mechanical engineering; an introduction to engineering design methods as applied to Mechanical Engineering and including specification development, information-gathering, concept formulation, feasibility analysis and report writing.
Prereq: GEN E 115
M E 200 F.W. 3C, 1T 0.5
Introduction to Mechanical Engineering 1
Discussion of Structure of Mechanical Engineering curriculum, operation of Department, Faculty, University, technical societies.

M E 201 F.W. 3C, 1T 0.5
Advanced Calculus
Infinite series; Tests for absolute, conditional, uniform convergence; power series; series expansions; differentiation and integration; Part II: Differentiation; total derivatives; estimation of errors; chain rule; geometry; maxima and minima; Taylor series; Jacobians. Multiple integration; areas, centroids, moments of inertia, centres of gravity. Vector analysis; geometry; divergence, curl, Laplacian; integral theorems.

M E 202 F.W. 3C, 1T 0.5
Statistics for Engineers
Equivalent to M SCI 251.

M E 203 F.S. 3C, 1T 0.5
Ordinary Differential Equations

M E 212 F.W. 3C, 1T 0.5
Dynamics

M E 215 F.S. 3C, 3L 0.5
Structure and Properties of Materials

M E 219 F.W. 2C, 1D, 1T 0.5
Mechanics of Deformable Solids 1
Concept of equilibrium, force analysis of structures and structural components, equilibrium of deformable bodies, stress and strain concepts, stress-strain relationships, stress analysis of prismatic members in axial, shearing, torsional and flexural deformations, shear force and bending moment diagrams.

M E 220 F.S. 2C, 1D, 1T 0.5
Mechanics of Deformable Solids 2
A general treatment of the behaviour of structural components from the study of stress and strain in solids. Topics include superposition, energy theorems, theories of failure, elastic and inelastic analysis of symmetrical bending, torsion of circular members, columns and stability, and virtual work.

M E 250 F.S. 3C, 1T 0.5
Thermodynamics 1

M E 262 F.S. 3C, 2T, 3L
Introduction to Microprocessors and Digital Logic
Number systems, codes and coding, minimization techniques applied to design of logic systems. Component specifications. Discussion of microprocessors, memory and I/O logic elements. Microcomputer structure and operation. I/O modes and interfacing. Machine language and Assembler programming. Design and application of digital systems for data collection and control of pneumatic hydraulic and machine systems. Laboratory work includes the use of microcomputers.

M E 300 F.W, S 1C. 0.0
Introduction to Mechanical Engineering 2
Technical specialties in Mechanical Engineering, discussion of options, curriculum, seminars and technical topics in the various options.

M E 304 W.S. 3C, 1T 0.5
Numerical Analysis
A survey of numerical procedures with emphasis upon computer implementation. In particular, the following topics are covered: interpolation, curve fitting, solution of non-linear equations, numerical integration, numerical solution of ordinary differential equations, matrix algebra and solution of systems of linear equations, and problems in the solution of partial differential equations.

M E 305 W.S. 3C, 1T 0.5
Partial Differential Equations

M E 321 W.S. 3C, 1L 0.5
Kinematics and Dynamics of Machines

M E 322 F.W. 3C, 1T, 1L 0.5
Mechanical Design 1
Analysis and synthesis of machine elements. Factors affecting working stresses, fatigue, creep and impact considerations. Design of shafting, springs, screws, clutches, brakes and gears.

M E 320 W.S. 3C, 3L 0.5
Control of Properties of Materials
Course Descriptions

Mechanical Engineering

M E 340 F W 3C 1T 1L 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 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 2T 1L 0.5
**Heat Transfer 1**
Introduction to heat transfer mechanisms. The formulation and solution of steady and transient heat conduction. Radiant heat transfer including exchange laws and view factors. Introductory convective heat transfer.

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 2T 1L 0.5
**Introduction to Control Systems**

M E 362 F W 3C 1T 1L 0.5
**Fluid Mechanics 2**
Basic equations of two-dimensional flow, potential flow, exact viscous solutions, introduction to lubrication, boundary layers, and introduction to turbulence. Turbomachinery fundamentals and applications. Selected advanced topics.

M E 370 F W 3C 3L 0.5
**Mechanical Engineering Laboratory**
Experiments and supporting lectures to introduce the techniques of measurement used in such areas of Mechanical Engineering as controls, fluid mechanics, manufacturing processes, and solid mechanics. Students will work in groups and formal laboratory reports will be required.

M E 400 F W S 1C 0.5
**Introduction to Mechanical Engineering 3**
Research frontiers in Mechanical Engineering, specific discussion of research done at Waterloo, seminars by members of research group.

M E 401 F W 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.

M E 402 W 2C 2T 0.5
**Patenting for Engineers**
An overview of intellectual property: copyright, industrial design, trade marks, trade names, and trade secrets. Ownership of intellectual property, invention optimization. Patenting: history, legal context, infringement, searching, writing and understanding patent claims, preparing patent drawings, patent application preparation, submitting the application to the Canadian or United States patent offices, dealing with the examiner, foreign patents. Selling and licencing technology. Litigation.

M E 423 F S 3C 1T 0.5
**Mechanical Design 2**
A continuation of the M E 322 course in analysis and synthesis of machinery, including advanced analysis of machine elements such as clutches, brakes, couplings, journal bearings and gears. Advanced machine design concepts such as reliability, optimization and techniques for stimulating innovative design. A synthesis project involving the machine elements studied is usually included.

M E 432 F S 3C 0.5
**Physical Metallurgy of Deformation and Fracture**
Microscopic origins of elastic and inelastic behaviour. Plastic flow at low and high temperatures with emphasis on the microscopic mechanisms and their application to engineering design. Deformation mechanism maps. Types of fracture and micromechanism fracture maps. Application of fracture mechanics. Fatigue and cyclic hardening behaviour. Environmental effects.

M E 435 F S 3C 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, ironcarbon 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 1L 0.5
**Automation and Robotics**
The principles of automatic machinery and computer controlled industrial processes. Introduction of automation to the workplace and its impact on production, costs and labour. Computer modelling of the production process. Review of robot types, their characteristics and sensor technology related to their use. Industrial process control, the use of computers and programmable controllers in industrial environments. Case studies in automatic machine design, component feeders and parts handling.
M E 448 F.W 3C:2T 0.5 
Production Engineering: Design of Manufacturing Systems
The interaction and relationship of manufacture to the factory organization. Product design and development, planning and control of production. Principles of mass and flow production. Machine loading and line balancing. Design analysis and evaluation techniques of plant layout and materials handling systems as basic components of a manufacturing facility and system.
Equivalent to M SCI 432

M E 452 W 3C 0.5
Energy Transfer in Buildings
Thermodynamic properties of moist air; psychrometric charts; humidity measurements; direct water contact processes; heating and cooling of moist air by extended surface coils; solar radiation; heating and cooling loads on buildings; effects of the thermal environment; air conditioning and calculations.

M E 456 F.S 3C 0.5
Heat Transfer 2
Selected topics in heat transfer fundamentals and applications. Topics to be covered include the fundamentals of convection with analytical solutions to simple laminar flow problems and approximate solutions to turbulent flow problems based on analogies between momentum and heat transfer. Also, covered is radiative 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 463 F.W 3C 0.5
Tribology 1
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.

M E 469 F.S 3C 0.5
Introduction to the Environmental Sciences

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.

M E 527 W 3C 0.5
Mechanics of Deformable Solids 3

M E 531 F.S 3C 0.5
Physical Metallurgy of Structures and Transformations

M E 533 W 3C 0.5
Composite Materials

M E 534 F.S 3C 0.5
Non-metallic Materials

M E 541 W 3C:1L 0.5
Deformation Processes

M E 542 W.S 3C 0.5
Machine Tool Analysis
M E 543 W 3C 0.5
**Metal Casting Processes**
The principles of static and continuous casting processes including sand, investment, die and various continuous casting techniques. Review of heat transfer, fluid flow and solidification theory as it applies to casting. Gating, runner, sprue and riser design in static castings. Origin of various casting defects including hot tears, distortion, solidification shrinkage and residual stresses.

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 548 F,W 3C,4L 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, pre-mixed 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, read and test their own finite element code through individual subroutines 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, isentropic flow of a perfect gas normal and oblique shocks; 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**

M E 568 W 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, stratified flow, radioactive plumes, particulate dispersion instrumentation (micrometeorological), air pollution control techniques and equipment monitoring instrumentation.
Course Descriptions

Middle East Studies

Course Descriptions

Middle East Studies courses and approved courses are listed in Chapter 15.

MES 290 F.W. 0.5
Introduction to the Middle East
An interdisciplinary introduction to the Middle East, its geography, history, culture, religious and political diversity.

MES 302 F.W. 0.5
Directed Studies in the Middle East
This is an independent, directed studies project on a Middle East topic. Each student will select an appropriate advisor, agree on a topic, obtain approval from the MES Director of the Program, and work with the advisor. Prereq: Third or fourth-year standing and at least five courses from the Approved List of MES Courses.

Music

Course Descriptions

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. Neither MUSIC 150 nor MUSIC 151 may be taken for credit if MUSIC 100 is taken for credit. However, MUSIC 150 and MUSIC 151 together may serve in lieu of MUSIC 100 as prerequisite for upper-level Music courses.

MUSIC 101 F.W.S 2L 0.25
Music Ensemble
The study of selected music literature through rehearsals and performance of the Music Department's ensembles: University Choir, Chapel Choir, Chamber Choir, Concert Band, Stage Band, Orchestra. Regular attendance at rehearsals and performances is required. Offered on a credit/fail basis. For musical reasons, admission to any particular ensemble is at the discretion of the director.

Gisela Depkat, Cello
Lynn Gangbar, Classical Guitar
Douglas Haas, Kantor (Stuttgart); Hespertouch
Carolyn Hagedorn, Flute
Kenneth Hull, ARCT (Toronto), BA (Waterloo), BMus, MMus (Western Ontario), MFA (Princeton); Piano
Lilian Kilanski, BMus (Wilfrid Laurier), Dip in Opera Perf (Toronto); Voice
Carol Lavell, BMus (Toronto); French Horn
Peter Marcess, Trombone
James Mason, BM (Shenendoah Conservatory), MM (Catholic U., Washington); Oboe
Jane Noyes, Tuba
Douglas Pullen, Saxophone
Victor Sawa, BM (McGill), MM (New England Conservatory, Boston); Clarinet
John Tickner, Trumpet
Dianne Werner, BMus (Toronto); Art Dip (Western Ontario); Piano
Michael Wood, Percussion
MUSIC 102  F.W,S  2L  0.25  
**Music Ensemble**
See MUSIC 101 for course description.

MUSIC 111  F,W,S  3C,1L  0.5  
**Fundamentals of Music Theory**
An introduction to the primary skills of music practice emphasizing the reading and writing of musical notation. Students will learn elementary keyboard, listening, and sight-singing skills. For students with minimal musical background. Does not fulfill music major or minor requirements.

MUSIC 125  F  3C  0.5  
**Popular Music and Culture**
An examination of the styles, forms and development of twentieth-century popular music. The social, commercial and technological aspects of popular music are considered.

MUSIC 200  W  3C  0.5  
**The Symphony**
A survey of the great symphonies from Haydn to Stravinsky, through lectures and listening. A portion of the course will be devoted to works being performed by the Kitchener-Waterloo Symphony Orchestra during the term.
Prereq: None, but MUSIC 100 is recommended. The ability to read music notation is not required.

MUSIC 201  F,W,S  2L  0.25  
**Music Ensemble**
See MUSIC 101 for course description.

MUSIC 202  F,W,S  2L  0.25  
**Music Ensemble**
See MUSIC 101 for course description.

MUSIC 231  W  3C  0.5  
**Psychology of Music**
The study of music from a behavioural science perspective. Topics include auditory and musical perception, music cognition, musical aptitudes and abilities, learning and pedagogy, creativity and aesthetic experience, emotive human responses, and the social psychology of musical activities.
Prereq: MUSIC 100 and PSYCH 101 or consent of instructor

MUSIC 250  F,W,S  3C,1L  0.5  
**Music Theory 1 (Medieval and Renaissance)**
The study of scales, melody, two-part counterpoint, and basic harmonic concepts emphasizing the Middle Ages and Renaissance. Ear-training and sight-singing lab sessions will cover diatonic, melodic and simple two-part exercises.
Prereq: A basic knowledge of scales, triads, and musical notation.

MUSIC 251  W  3C,1L  0.5  
**Music Theory 2 (Baroque and Classical)**
The study of four-part homophonic and contrapuntal music, of diatonic and simple chromatic harmonies, and of elementary forms, emphasizing Baroque and Classical music. Ear-training and sight-singing lab sessions will cover four-part diatonic exercises.
Prereq: MUSIC 250 or consent of instructor

MUSIC 264  F  3C  0.5  
**Vocal Literature**
A study of the music written for solo voice from the 17th century to the present.
Prereq: MUSIC 100 or consent of instructor

MUSIC 266  F,W,S  std  0.5  
**Music Studio**
Individual instruction in Voice, Piano, Organ, Classical Guitar and orchestral instruments. This course is available only to Music majors and minors.
Prereq: Royal Conservatory Grade VIII level and audition with Music Faculty
Studio Fee

MUSIC 267  F,W,S  std  0.5  
**Music Studio**
See MUSIC 266 for course description.
Prereq: MUSIC 266 and consent of Music Faculty
Studio Fee.

MUSIC 272  S  3C  0.5  
**Traditional Folk Music of Canada**
A study of the traditional folk music of Canada of both native and immigrant peoples, including traditional instruments, collectors, the ballad in Canada, chanson de Québec, the songs commemorating the great events of Canada's history, and songs of work and pleasure.

MUSIC 274  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 275  S  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 301  F,W,S  2L  0.25  
**Music Ensemble**
See MUSIC 101 for course description.

MUSIC 302  F,W,S  2L  0.25  
**Music Ensemble**
See MUSIC 101 for course description.

MUSIC 332  F  3C  0.5  
**Musical Aesthetics and Criticism**
Explores questions about the nature of musical expression, making musical value judgements, whether music has a moral character, the relationship between the composer's life and work. Expressive, symbolic, structural and linguistic approaches to musical meaning will be examined.
Prereq: Consent of instructor

MUSIC 353  F  3C  0.5  
**Music of the Romantic Period (19th Century)**
The study of the music of the 19th century by means of lectures, seminars, reading, and listening to recordings and live performances. Representative composers include Beethoven, Schubert, Chopin, Tchaikovsky, Verdi, and Wagner.
Prereq: MUSIC 100 or consent of instructor

MUSIC 354  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 movements. The course will include seminars, lectures, listening and analysis.
Prereq: MUSIC 100 or consent of instructor

MUSIC 356A/356B  S  0.5/0.5  
**Music and Culture in Vienna**
A spring seminar to be taught in Vienna and environs. The course includes daily lectures and attendance of music performances during the Vienna Music Festival, as well as tours of places relating to the culture of Vienna.
Prereq: MUSIC 100 or consent of instructor

MUSIC 366  F,W,S  std  0.5  
**Music Studio**
See MUSIC 266 for course description.
Prereq: MUSIC 267 and consent of Music Faculty
Studio Fee.

MUSIC 367  F,W,S  std  0.5  
**Music Studio**
See MUSIC 266 for course description.
Prereq: MUSIC 366 and consent of Music Faculty
Studio Fee.
MUSIC 370 F 3C,1L 0.5
Music Theory 3 (19th Century)
The study of the harmonic, melodic and
formal aspects of 19th century music.
Ear-training and sight-singing lab
sessions will cover chromatic chord
progressions and modulatory melodies.
Prereq: MUSIC 251 or consent of instructor

MUSIC 371 W 3C,1L 0.5
Music Theory 4 (20th Century)
The study of the compositional aspects
of 20th century music, including
extended tonality, atonality, 12-tone
writing, neo-classical idioms, and
contemporary compositional procedures.
Lab sessions will cover non-tonal melodic
reading and complex chord structures.
Prereq: MUSIC 370

MUSIC 372 W 3C 0.5
Choral Music, Repertoire and
Techniques 1
A study of conducting techniques,
rehearsal techniques, rehearsal proce-
dures and score analysis.
Prereq: MUSIC 100 and 250/251 or
consent of instructor

MUSIC 375 S 3C 0.5
Electroacoustic Music
The study of electroacoustic music
through composition, analysis, and
listening. This course also surveys the
history of electroacoustic music and the
development of techniques and tech-
nology. Practical electronic studio experi-
ence is included.
Prereq: Consent of instructor
Studio fee

MUSIC 380 F,W 0.5
Directed Study in Music
Prereq: Advanced standing in music
and consent of instructor

MUSIC 381 F,W 0.5
Directed Study in Music
Prereq: Advanced standing in music
and consent of instructor

MUSIC 390 F,W 3C 0.5
Special Topics in Music 1
Study of a limited field under tutorial
guidance.
Prereq: MUSIC 100 and consent of
instructor

MUSIC 391 F,W 3C 0.5
Special Topics in Music 2
Study of a limited field under tutorial
guidance.
Prereq: MUSIC 100 and consent of
instructor

MUSIC 466 F,W std 0.5
Music Studio
See MUSIC 266 for course description.
Prereq: MUSIC 367 and consent of
Music Faculty
Studio Fee

MUSIC 467 F,W std 0.5
Music Studio
A continuation of Music Studio. A recital
is required.
Prereq: MUSIC 466 and consent of
Music Faculty
Studio Fee

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 inter-
est of the students and instructor(s).

COURSES NOT OFFERED 1988-89
MUSIC 150 Survey of Music History 1
MUSIC 151 Survey of Music History 2
MUSIC 221 Women and Music
MUSIC 241 Principles of Music Therapy
MUSIC 253 Medieval and Renaissance
Music
MUSIC 254 Baroque and Classical Music
MUSIC 265 Piano Literature
MUSIC 273 Traditional Folk Music
MUSIC 290 Canadian Music
MUSIC 300 Music of the Church
MUSIC 373 Choral Music, Repertoire
and Techniques 2
MUSIC 374 Composition Seminar

School of Optometry

Professor, Director of School, Associate
Dean of Science for Optometry
J.G. Sivak, LScO (Montreal), MS
(Indiana), PhD (Cornell), OD (Pennsyl-
vania College of Optometry), FAAO

Professor, Associate Director
A.P. Cullen, Dip Opt (City University-
London), MSc (Saskatchewan), OD
(Pennsylvania College of Optometry),
PhD (City University-London), FAAO,
FBICO, DCLP

Assistant Professor, Graduate Officer
M.J. Doughty, BSc (London), MSc, PhD
(Warwick)

Lecturer, Undergraduate Officer
B.E. Robinson, OD (Waterloo), MPH
(Washington), FAAO

Assistant Professor, Admissions Officer
M.M. Spafford, OD, MSc (Waterloo)

Professor Emeritus
E.J. Fisher, BA, MA (Toronto), DSc (Penn-
sylvania College of Optometry),
FAAO*

Professors
W.K. Adrian, Dipl-ing, Dr-ing (TH Danms-
tadt), Dr habil, apl Professor (Karl-
ruehe)
W.M. Lyle, OD (College of Optometry of
Ontario) MS, PhD (Indiana), FAAO,
(Retired)*

A.R. Rempe, BFA (Manitoba), OD
(College of Optometry of Ontario), MS,
PhD (Indiana), FAAO,
Recipient of the Distinguished Teacher
Award

G.C. Woo, OD (College of Optometry of
Ontario), MS, PhD (Indiana), LOSc
(Melbourne), FVCO, FAAO, Dipl,V. (on
leave)

M.E. Woodruff, OD (College of Opto-
metry of Ontario), PhD (Indiana), FAAO

Associate Professors
R.D. Beauchamp, BA (McMaster), MA,
PhD (Brown)
M.G.E. Callender, BSc (Sir George
Williams), OD (College of Optometry of
Ontario), MSc (Waterloo), MPhil
(Aston), FAAO

J.V. Lovasik, BSc (McGill), OD, MSc, PhD
(Waterloo), FAAO

D.A. Ranney, BA, MD (Toronto), FRCS
(England)
R.D. Seim, BA (Queen’s), PhD
(Waterloo)

Assistant Professors
B.R. Chou, BSc (Toronto), OD, MSc
(Waterloo), FAAO
J.G. Flanagan, BSc (Optom), PhD (Aston)
MBCO
J.K. Hovis, OD, MS (Ohio State), PhD
(Indiana)
J.G. Strong, OD, MSc (Waterloo), Chief of Clinics

Research Assistant Professor
M.C. Campbell, BSc (Toronto), MSc
(Waterloo), PhD (ANU), FAAO, NSERC
University Research Fellow

Adjunct Faculty
L. Baker, OD (College of Optometry of Ontario), FAAO
E.L. Buchner, OD (College of Optometry of Ontario)
S. Hoffman, MD, DPH (Toronto)
R.G.R. Lawrence, Q.C.
T. Liu, BSc Med (Hons), MB, BS
(Sydney), FRACR, FRCP (C)
M.J. Samek, OD (College of Optometry of Ontario), MSc (Waterloo)
B. Schumacher, MD (Toronto)

Lecturer
W.R. Bobier, BSc (Queens), OD, MSc
(Waterloo)

Clinical Faculty
D.B. Buck, OD (College of Optometry of Ontario), FAAO
D. Form, Dip Optom (S.A.), M Optom
(NSW), FAAO
P. Hynach, OD (Waterloo)
C. Maytas, OD (Waterloo)
R. Pace, OD (Waterloo), FAAO
A.D. Plotkin, BS (Adelphi), BS, OD (Pennsylvania College of Optometry)
K.M. Robertson, OD, MSc (Waterloo), FAAO
L. Sorbara, OD (Waterloo)
R. Tarici, OD (Waterloo)
R.C. Trevino, BA (Maryland), OD (Illinois College of Optometry)
R. Wiggins, BS, OD (Indiana), FAAO

Senior Demonstrator
D.J.H. Thompson, BA (Waterloo)

Faculty Members of Optometry holding cross appointments to:
"Biology
Systems Design Engineering

Faculty Members holding cross appointments to Optometry from:
"Kinesiology
"Psychology

*Also has Adjunct appointment

Clinical Faculty – Part-time (1987-88)
M. Acs, BSc (Toronto), OD (Waterloo)
W.B. Andrews, BA, OD (Waterloo), FAAO
W.R. Andrews, OD (College of Optometry of Ontario)
J. Bender, OD (Waterloo)
L. Berman, OD (Waterloo)
A. Bernardi, BSc, OD (Waterloo)
D.R. Bock, OD (Waterloo)
R.R. Bock, OD (College of Optometry of Ontario)
A. Briston, OD (College of Optometry of Ontario)
L. Calder, OD (Waterloo)
R. Chen, OD (College of Optometry of Ontario)
K. Chhatwal, OD (Waterloo)
D. Currie, OD (Waterloo)
J.L. Dippel, OD (Waterloo)
P. Devenny, BSc, OD (Waterloo)
E. Duraing, OD (Waterloo)
G. Gies, OD (Waterloo)
D.R. Goemans, OD (Waterloo)
G.A. Grant, OD (College of Optometry of Ontario), FAAO
K. Hadley, OD (Waterloo)
E. Irving, OD (Waterloo)
L. Kuhn, OD (Waterloo)
S. Leet, OD (Waterloo)
B. Levy, Dip Optom (S.A.), OD (California-Berkeley), MSc (Waterloo), FAAO
D. Lutz, OD (Waterloo)
J. Miltello, OD (Waterloo)
R.E. Miller, BSc (Toronto), OD (Waterloo)
K. Muth, OD (Waterloo)
J. Newman, OD (Waterloo)
B. Pierce, BSc, OD (Waterloo)
M. Pollock, OD (Waterloo)
R.J. Scheid, OD (Waterloo)
P. Shaw, OD (Waterloo)
M. Sher, OD (Waterloo)
C. Spieg, OD (Waterloo)
S. Tait, OD (Waterloo)
V. Timpano, OD (Waterloo)
J. Toyonaga, OD (Waterloo)
J.S. Walcott, OD (Waterloo)
J. Wilkinson, BSc (University of Kent at Canterbury), OD (Waterloo)
R.L. Wilson, OD (Waterloo)

Stage Descriptions

Introductory Note
Students in other disciplines may register for Optometry courses only upon the approval of the Director of the School of Optometry.

OPTOM 100 F 2C 0.5
History and Orientation
A brief history of the profession and the development of visual science; a consideration of legal and organizational development of optometry; the role of professional associations. The role and scope of optometry and its relationship to other professions and the community.

OPTOM 104 F 3C, 3L 0.5
Anatomy of the Eye and Associated Structures
The gross, microscopic and ultra structure of ocular tissues. The embryology and comparative anatomy of the eye will be emphasized. The relationship of the eye to the vascular supply of the head and the nervous system will be studied. This course is credited only upon completion of OPTOM 114.

OPTOM 105 F 3C, 1T 0.5
General Pathology
Basic disease processes, including inflammation, degeneration, neoplasia; pathogenic microbiology and related diseases; immunity and hypersensitivity; disease caused by physical agents; diseases of the organ systems.

OPTOM 106 F 3C, 3L, 1T 0.5
Geometrical Optics
Reflection and refraction, image formation, optical properties of plane and curved surfaces, prisms and thin lenses. Thick lens theory and lens systems. Ray construction. Optical and ophthalmic instruments.

OPTOM 109 F 2C, 1T 0.5
Light and Illumination
Principles of radiometry and photometry; illumination and related factors involved in the design and control of visual environment in relationship to the human visual system; lighting surveys.

OPTOM 111 W 3C, 3L 0.5
Physiological Optics

OPTOM 114 W 3C, 2L 0.5
Anatomy of the Eye and Associated Structures
A continuation of OPTOM 104

Prereq: OPTOM 104
OPTOM 115 W 4C,1T 0.5  General Pathology
A continuation of 105.
Prereq: OPTOM 105

OPTOM 116 W 3C,4L 0.5  Ophthalmic Optics 1
Properties of optical glass and plastic, single vision lenses and prisms, lens combinations. Optics of contact lenses and clinical instruments. Ophthalmic laboratory procedures.
Prereq: OPTOM 106

OPTOM 241 F 3C,3L 0.5  Physiological Optics
Ocular motility; Kinematics of eye movements, muscle actions, measurements of eye movements, lenses of eye movements, innervational systems subserving eye movements, clinical application.
Prereq: OPTOM 111

OPTOM 242 F 3C,3L 0.5  Clinical Optometry
Lectures and laboratories on clinical techniques for examination of the optical properties of the eye.
Prereq: OPTOM 111

OPTOM 244 F 3C,2L 0.5  Neurophysiology of Vision
The neural processing of colour, brightness, movement and form by the retina, lateral geniculate, cortex, superior colliculus and other brain centres. Neural mechanisms underlying binocular depth perception, the accommodative response and eye movement.
Prereq: OPTOM 104/114

OPTOM 245 F 3C 0.5  Ocular Pathology
Signs, symptoms, clinical detection of primary and secondary ocular disease; instruments; record keeping, patient counselling, referral procedures; management of ocular emergencies; primary health care responsibilities.
Prereq: OPTOM 103/115

OPTOM 246 F 3C,4L 0.5  Ophthalmic Optics 2
Prereq: OPTOM 114

OPTOM 251 W 3C,3L 0.5  Physiological Optics
Prereq: OPTOM 241

OPTOM 252 W 3C,3L 0.5  Clinical Optometry
Clinical techniques for the examination of the binocular relations of the nonstrabismic patient, with particular emphasis on the study of the relationship between accommodation and convergence. Techniques of phorometry, prism vergence tests, binocular vision examination tests, retinoscopy, and monocular and binocular cross cylinder tests.
Prereq: OPTOM 241/242

OPTOM 254 W 2C,2L 0.5  Physiology of The Eye and Ocular Adnexa
The physiology of the smooth muscles of the eye, the extraocular striate muscles, the lacrimal apparatus, the cornea, the iris, the lens, the ciliary body and the vitreous body. Production and drainage of aqueous and related influences on intraocular pressure. The vascular supply of the eye.
Prereq: OPTOM 104

OPTOM 255 W 3C,2L 0.5  Ocular Pathology
A continuation of 245
Prereq: OPTOM 245

OPTOM 261 F 3C,3L 0.5  Physiological Optics

OPTOM 274 W 2C 0.5  Genetics for Optometrists
A brief review of Mendelian genetics, and the molecular basis of modern genetics. Inherited conditions of particular interest, e.g. colour vision, albinism, aniridia, refractive error, retinoblastoma. Genetic counselling, and the detection of carriers.
Prereq: OPTOM 245

OPTOM 242 F 3C,2L 0.5  Clinical Optometry: Case Analysis
Methods of analyzing clinical data emphasizing differential diagnosis, scientific control of psycho-physical measurements, prognosis, recommended therapies, and the clinical applications of the visual sciences.
Prereq: OPTOM 252

OPTOM 244 F 2C 0.5  Sensory Physiology
Peripheral and central nervous system pathways. The skin senses, pain and adaptation to pain, especially as they relate to cornea. The vestibular sense and its influence on eye movements, muscle sensory organs, including those in extraocular muscles, audition, olfaction, taste, visceral sensations and the origin of headaches.

OPTOM 236 F 2C,4L 0.5  Ophthalmic Optics 3

OPTOM 237 F 3C,2L 0.5  Optometric Specialties: Contact Lenses
A series of lectures and laboratories on the principles and procedures of prescribing and fitting contact lenses.

OPTOM 348A/B F, W 8 Clinic 0.5/0.5  Optometry Clinic
Students are assigned to various areas within the clinic where, under direct clinical faculty supervision, they participate in the provision of optometric services to clinic patients. In addition to primary care, they are exposed to the provision of contact lens, binocular vision, ocular health and optical services.
Prereq: OPTOM 242, 252

OPTOM 350 W 4C 0.5  Optometrical Jurisprudence and Practice Management
Legal aspects of practising optometry in Canada. Practice management, financial management, interprofessional relations, office design, optometric assistants, professional associations.
OPTOM 351 W 3C, 3L 0.5
Physiological Optics
Prequ: OPTOM 261

OPTOM 352 W 3C, 2L 0.5
Clinical Optometry: Strabismus and Orthoptics
Detection and evaluation of sensory and motor characteristics of vision in strabismus. Classifications, diagnosis, prognosis, modes of therapy for strabismus and amblyopia.
Prequ: OPTOM 242, 252, 342

OPTOM 353 W 2C 0.5
Optometric Communication
A series of lectures and role-playing exercises designed to enhance the student’s skills in verbal and written communication with patients and other professionals.

OPTOM 357 W 2C, 2L 0.5
Optometric Specialties
A. Low Vision. A series of lectures and labs demonstrating the optometric assessment and management of low vision patients. Optical characteristics of various aids will be included (2/3 term).
B. Aniseikonia. The theory, assessment and treatment of aniseikonia is outlined (1/3 term).
Prequ: OPTOM 342

OPTOM 364 F 4C, 1L 0.5
Ocular Pharmacology
Principles of drug action on the eye. Drug absorption, distribution and elimination. Action of drugs on nerve transmission. Action of drugs applied topically to the eye and administered systemically on ocular physiology and vision - including wanted and unwanted effects. Application of proprietary preparations to the eye including contact lens products.
Prequ: OPTOM 245, 255

OPTOM 372 W 2C 0.5
Pediatric Optometry
Special aspects of the management of vision problems of infants and young children.
Prequ: OPTOM 242, 252

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.
Prequ: Successful completion of Year Three

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.
Prequ: 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, electro-diagnostic, 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. These exams may be considered by the Council of the College of Optometrists of Ontario to constitute part of the Ontario licensure requirements.
Prequ: OPTOM 348 A/B, 418

OPTOM 451 W 3L 0.5
Optometry Research Project
A continuation of 441. An elective may be chosen as an alternative to OPTOM 451.
Prequ: 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 optometric 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.
Prequ: OPTOM 342, 352, PSYCH 101

OPTOM 459 W 4C 0.5
Environmental Vision
Aspects of prevention of accidents and injury to the visual system. The production of efficient and comfortable vision at work and recreation.

OPTOM 468 F Clinic 0.5
Vision Care Projects
Reports covering spring/summer practicum are submitted by all optometry students. These will be carefully evaluated for clinical content and writing ability.
Prequ: 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.
Peace and Conflict Studies

Associate Professor, Chairman of the PACS Faculty Group
C.G. Brunk, BA (Wheaton), MA, PhD (Northwestern) G

Director of the Program
R.J.R. Mathies, BA (Waterloo), MSc (Guelph), EdD (Toronto) G

Lecturer, Undergraduate Officer
T.R. Yoder Neufeld, BA (Manitoba), MDiv (Harvard) G

Members of the Peace and Conflict Studies Faculty Group

Professors
K. Westhues, BA (Conception), MA, PhD (Vanderbilt)

Associate Professors
D.A. Deivics, BA, PhD (Washington), Recipient of the Distinguished Teacher Award
J.G. Holmes, BA, MA (Carleton), PhD (North Carolina)
S. Kumar, BSc, MSc (Punjab), MA, PhD (Toronto)
M. Malone, BA (University College, Dublin, Ireland), BED (Victoria University of Manchester School of Education), MA, PhD (Toronto) J
M.F. McDonald, BA (Toronto), MA, PhD (Pittsburgh)
R.J. Sawatsky, BA (Bethel), MA (Minnesota), MA, PhD (Princeton) G

Assistant Professors
W.B. Moul, BA, MA, PhD (British Columbia)
M. Smyth, BA (Toronto), MA, PhD (York) R
C.A. Snyder, BA (Waterloo), MA, PhD (McMaster), G
H. Froese Tiessen, BA (Winnipeg), MA, PhD (Alberta), G

Institute of Peace and Conflict Studies

Director
R.J.R. Mathies, BA (Waterloo), MSc (Guelph), EdD (Toronto) G

Research Associate
E.E. Regehr, BA (Waterloo), Funded by Project Ploughshares G

Course Descriptions

A) 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
Special emphasis on the means of conflict resolution or management. Included are critical assessments of negotiation, arbitration, confrontation, litigation, violence and nonviolent resistance, and other models of conflict resolution.

PACS 301A-F 3S 0.5
Special Topics in Peace and Conflict Studies 1
A seminar course investigating special issues related to peace and conflict. The content of this and PACS 302 will vary from year to year as specialists in various aspects of these issues are invited to teach the courses.

PACS 302A-F W 3S 0.5
Special Topics in Peace and Conflict Studies 2
Same as 301 above.

B) INTERDISCIPLINARY PACS COURSES

PACS 230 F 3S 0.5
The Politics of Nonviolence
An examination of the possibilities of a nonviolent approach to resolving human conflict with special emphasis on the nature and uses of power, the nature of the nation state and the problem of relating a personal ideal to the realities of communal life.

PACS 250 F 3S 0.5
The Nuclear Crisis
A team-taught analysis of the characteristics, capabilities and environmental implications of nuclear weapons; of historical and contemporary origins of the arms race and disarmament efforts; and of psychological and philosophical issues related to the arms race, deterrence and disarmament.

PACS 271 F 3S 0.5
Introduction to Peace Research 1
A study of current research in the developing field of "peace research" including studies of personality and aggression, international tension, causes and predictability of war, United Nations voting patterns, disarmament studies and peace activism.

PACS 272 W 3S 0.5
Introduction to Peace Research 2
A continuation of PACS 271, above.

PACS 350 3S 0.5
Canada and the Nuclear Crisis
An examination of Canadian Public Policy responses to nuclear weapons. Including Canadian participation in weapons production, Canadian membership in a nuclear alliance and other defence agreements, and Canadian initiatives in arms control and disarmament.

PACS 390A/B 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.
Course Descriptions

PACS 368/399  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.

Department of Philosophy

Associate Professor, Chairman of the Department
B.P. Hendley, BA (Marquette), MA, PhD (Tate). (on leave)

Professor, Acting Chairman
L.L. Haworth, BA (Rollins), MA, PhD (Illinois)

Professor, Associate Dean, Graduate Affairs, Faculty of Arts
R.A. George, MA, PhD (Michigan State)

Associate Professor, Associate Chairman and Graduate Advisor
R.H. Holmes, BA, MA (Montana), PhD (Washington)

Associate Professor, Associate Chairman and Undergraduate Advisor
J.W. Van Evra, BA (Valparaiso), MA, PhD (Michigan State)

Professors
E.J. Ashworth, BA, MA (Cambridge), PhD (Bryn Mawr)
J.R. Home, BA, MA (Western Ontario), BTh (Huron), PhD (Columbia)
J.S. Minas, BA (Wayne), PhD (Illinois) (on leave)
J.F. Narveson, BA (Chicago), MA, PhD (Harvard)
D.D. Roberts, BA (Roosevelt), MA, PhD (Illinois)
B.H. Suits, BA, MA (Chicago), PhD (Illinois), Recipient of the Distinguished Teacher Award

Associate Professors
W.R. Abbott, BA (Kenyon), PhD (Ohio State)
C.G. Brunk, BA (Wheaton), MA, PhD (Northwestern), G
G.T. Campbell, BA (Western Ontario), PhL, PhD (Laval), J, Recipient of the Distinguished Teacher Award
F. Centore, BSc (Cambridge), MA (Maryland), PhD (St. John's) J
D.T. DeMarco, BS (Stonehill, Mass.), MA, PhD (St. John's) J
A. Kerr-Lawson, BA (Toronto), MA (Chicago), PhD (McMaster)
M.F. McDonald, BA (Toronto), MA, PhD (Pittsburgh)
A.C. Minas, BA, MA, PhD (Harvard)

Assistant Professors
J.A. Novak, BA (DePaul), PhD (Notre Dame)
J. Wubring, BA (Swarthmore), MA, PhD (Yale)

Faculty members holding joint appointments to Philosophy from:
Pure Mathematics
G refers to faculty members at Conrad Grebel College
J refers to faculty members at St. Jerome’s College

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 preregistration time.

2. Any two term courses in philosophy can be used to satisfy the Group A(i) requirements.

3. Courses suffixed with *J are administered by St. Jerome’s College.

PHL 100J  F  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?

PHL 101X F,W,S  3C  0.5
Introduction to Philosophy
A general introduction, designed to provide the student with an understanding of the major problems of classical and contemporary philosophy.

PHL 102A  F,W  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.
PHL 102B F.W 3C 0.5
Introduction to Social and Political Philosophy
An introduction to basic concepts and principles in classic and contemporary social and political philosophy. Differences on basic questions are examined, with applications to such issues as capital punishment, welfare provisions, taxation, natural resource ownership, and terrorism.

PHL 200B W 3C 0.5
Great Works of Western Philosophy: Part 2
Outstanding works from the early modern and contemporary periods.

Either PHL 200A or PHL 200B may be taken separately.

PHL 200J 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.

PHL 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.

PHL 202 F,W 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, parenthesis, abortion, pornography, rape.

PHL 205J 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.

PHL 206J W 3C 0.5
Philosophy of Science
A philosophical study of the approaches to the natural world used by contemporary physical science. The nature and the value of the experimental method in the writings of scientists past and present will be examined.

PHL 207 3C 0.5
Science, Technology, and Society
Alternative philosophical perspectives on problems raised by scientific and technological developments including moral issues (e.g. privacy and datagathering, "clean" vs. "dirty" energy). Also an examination of the nature and scope of scientific and technical knowledge as it bears on the responsibilities of scientists and engineers.

PHL 209 F 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).

PHL 210J W 3C 0.5
Philosophy of Man
What is Man? What is man's place among other creatures? Is man an accident of evolution? What are the major views on man as a species? How are love and sex aspects of man's life?

PHL 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?

PHL 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.

PHL 218J F 3C 0.5
Ethical Theory
A normative approach, employing several of the classic Western traditions of rational thought, to general ethics. The various schools of ethical thought will be discussed.

PHL 219J W 3C 0.5
Practical Ethics
This course will discuss the applications of general ethics to more specific areas of human endeavor. Among the topics discussed will be abortion, contraception, sex, obscenity, violence, drugs, egoism, dishonesty, and various forms of human exploitation.

PHL 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 W 3C 0.5
Mankind and Nature
A philosophical study of the relationship
between mankind and nature: historical
and current philosophies of the natural
world, including the place and responsi-
bilities of human beings; problems of
everal imbalance and collapse.

PHIL 226 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 modifica-
tion and psychotherapy), human experi-
mentation (including "informed consent"
and fetal research) and genetic engi-
neering.

PHIL 230J F 3C 0.5
God and Philosophy
An investigation of several aspects
concerning the meaning and existence
of God. Is God-talk possible? Can faith
and reason be reconciled? Is religious
experience a meaningful argument? A
wide range of different views will be
considered.

PHIL 236 W 3C 0.5
Magic, Mysticism, and the Occult
A critical philosophical discussion of
reports of several kinds of extraordinary
experiences, such as magic, extra-sen-
sory perception, mysticism, and divina-
tion will lead us to discussion of such
concepts as insanity, irrationality, the
supernatural, and the miraculous.

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 exis-
tence of God.

PHIL 241 F,W,S 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 consis-
tency, completeness and compactness,
will be investigated.
Prereq: PHIL 140 or consent of
the instructor.

PHIL 242 W 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 obliga-
tion, 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 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-
likeliness, the grounds for scientific con-
firmation, and the debate between ration-
alism and empiricism in science.

PHIL 265 F 3C 0.5
The Existentialist Experience
An introduction to the existentialist view
of man using both literary and philosop-
ical texts from such authors as Kierke-
gaard, Unamuno, Nietzsche, Ortega y
Gasset, Cusus, Sartre, Heidegger and
others.

PHIL 300X W 3C 0.5
Sources of Twentieth-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 301J W 3C 0.5
The Western Philosophical Tradition
(1600 to present)
Descartes to Existentialism.
Prereq: Second-year standing.

PHIL 302 W 3C 0.5
Modern Feminism
A critical examination of contemporary
feminist thought in philosophy, focusing
on topics of current concern to feminist
writers and to the class.
Prereq: Consent of instructor

PHIL 311 F 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 W 3C 0.5
Philosophy of Education 2
An introduction to current work in the
field. Issues to be considered may include:
the desirability and content of a
core curriculum, methods of moral devel-
oment, 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 philo-
sophical ethics of moral issues arising in
professional engineering practice. Issues
include the social responsibility of engi-
neers, 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 writ-
ings of such people as Moore, Hare and
Warrick.
Prereq: PHIL 221 recommended

PHIL 327A 3C 0.5
Philosophy of Law: Part 1
An investigation of alternative views of
law and legal reasoning forms the core
of this course. Law's relations to morality,
social practice, and politics are consid-
ered. Important legal judgments as well
as leading philosophers of law will be
considered.
This is a required course for the Legal
Studies Option.
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. Topics such as liberty, responsibility and liability, punishment, rights and possessions are considered.  
Prereq: PHIL 327A or consent of the instructor

PHIL 328 W 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

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 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 W 3C 0.5  
Philosophy of the Formal Sciences  
A study of philosophical problems concerning mathematics. Topics discussed include formalism, intuitionism, the mathematical paradoxes, and other topics in foundations and metamathematics.  
Prereq: At least second-year standing or consent of instructor

PHIL 362 W 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 360 F 3C 0.5  
History of Ancient Philosophy 1  
From the beginnings to Plato.  
Prereq: One term course in Philosophy or consent of instructor  
Cross-listed as CLAS 361

PHIL 361 W 3C 0.5  
History of Ancient Philosophy 2  
From Aristotle to the close of classical antiquity.  
Prereq: One term course in Philosophy or consent of instructor  
Cross-listed as CLAS 362

PHIL 362 3C 0.5  
Medieval Philosophy 1  
The early period to the 13th century. Among those considered will be: Augustine, Boethius, Anselm and Abelard.  
Prereq: One term course in Philosophy or consent of instructor

PHIL 363 3C 0.5  
Medieval Philosophy 2  
The later period from the 13th century. Among those considered will be: Bonaventure, Aquinas, Scotus, and Ockham.  
Prereq: One term course in Philosophy or consent of instructor

PHIL 364 F 3C 0.5  
History of Modern Philosophy 1  
Earlier period beginning with Descartes.  
Prereq: One term course in Philosophy or consent of instructor

PHIL 365 W 3C 0.5  
History of Modern Philosophy 2  
Later period including Hume and Kant.  
Prereq: One term course in Philosophy or consent of instructor

PHIL 366 3C 0.5  
19th Century Philosophy  
The 19th century Philosophers covered may include Hegel, Mill, Schopenhauer, James and Kierkegaard.  
Prereq: One term course in Philosophy or consent of instructor

PHIL 387 W 3C 0.5  
20th Century Philosophy  
A study of major themes of 20th century philosophy through representative works of Russell, Moore, Carnap, Wittgenstein, Husserl and others.  
Prereq: One term course in Philosophy or consent of instructor

PHIL 395J/397J F W 0.5 each  
Special Topics/Directed Readings  
A series of readings and/or seminars on one or two topics or thinkers, with periodic reports and discussions.  
Prereq: Consent of instructor and permission of College Discipline Co-ordinator

PHIL 420/421 3C 0.5  
Studies in Ethics  
Special topics in ethics, as announced by the Department.  
Prereq: At least one term course in ethics

PHIL 422 F 3C 0.5  
Political Philosophy 1  
A detailed discussion of contemporary theories.  
Prereq: At least one term course in ethics

PHIL 423 3C 0.5  
Political Philosophy 2  
A detailed discussion of contemporary theories.  
Prereq: At least one term course in ethics

PHIL 435/436 3C 0.5  
Studies in Philosophy of Religion  
A study of a particular philosopher or problem, as announced by the Department.  
Prereq: Consent of instructor

PHIL 440A/B  
Logical Theory  
A rigorous and general development of the propositional and predicate calculus within which alternative calculi are examined. Study of such concepts as completeness, consistency, extensionality, and modality from both formal and philosophical points of view. Intended primarily for those interested in philosophical issues connected with logic.  
Prereq: At least one term course in formal logic, or consent of instructor

PHIL 440A F 3C 0.5  
Logical Theory  
The first part of PHIL 440.
PHIL 440B W 3C 0.5
Logical Theory
the second part of PHIL 440U.

PHIL 441/442 3C 0.5
Studies in Logic
Special topics in logic, as announced by the Department.
Prereq: At least one of: PHIL 241, 242, 440A, 440B, P MATH 430A

PHIL 450J F 3C 0.5
Being and Existence
An advanced course for the serious student, delving into the notions of reality, being, essence, existence, analogy, etc. The techniques of linguistic analysis will be employed. Also, the very possibility of any kind of metaphysics will be discussed.
Prereq: Third-year standing or consent of instructor

PHIL 451J W 3C 0.5
The Thomistic Tradition in Philosophy
An examination of the work of Thomas Aquinas, his philosophical relation to his times, and the revival of Thomism in the modern era.
Prereq: 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.
Prereq: Consent of instructor

PHIL 456 3C 0.5
Metaphysics 2: Cosmology
Metaphysical problems in the areas of space, time and motion.
Prereq: Consent of instructor

PHIL 460 3C 0.5
Philosophy of Language
Issues in the philosophy of language, such as synonymy, propositions, meaning, semantics, reference.
Prereq: At least two term courses in philosophy or consent of instructor

PHIL 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.
Prereq: At least two term courses in philosophy or consent of instructor

PHIL 465 3C 0.5
Existential Philosophy
An in-depth study of the thought of a major figure such as Kierkegaard, Unamuno, Nietzsche, Heidegger, Sartre, Camus, Marcell, Jaspers, Ortega y Gasset.
Prereq: Consent of instructor

PHIL 470 3C 0.5
Phenomenology
A critical examination of the issues and methods of phenomenology, including the attempts to understand the uses and 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.
Prereq: Two term courses in Philosophy or consent of instructor

PHIL 471-484 3C 0.5
Special Subjects
One or more term courses will be offered at different times, as announced by the Department.
Prereq: Consent of instructor

PHIL 496J-497J F,W 0.5 each
Special Topics/Directed Readings
A series of readings and/or seminars on 1 or 2 topics or thinkers, with periodic reports and discussions.
Prereq: Consent of instructor and permission of College Discipline Co-ordinator

PHIL 498A-N F,W,S R 0.5
Directed Reading in Special Areas
Prereq: Consent of instructor

PHIL 498A/B 0.5/0.5
Senior Seminar and Honours Essay
All senior honors students attend this seminar in which a selection of major philosophical problems is discussed. They will also prepare a senior essay and discuss it with the group. A letter grade for PHIL 498A will be submitted only after the completion of PHIL 499B or PHIL 499J.

PHIL 499J F,W 0.5
Tutorial and Honours Essay
Students wishing to enrol in 499J should consult the St. Jerome's College Discipline Co-ordinator.
Prereq: PHIL 499A

COURSES NOT OFFERED 1988-89
PHIL 120J Philosophy of Life and Death
PHIL 130J Philosophy of Discontent
PHIL 204J Philosophy and Culture
PHIL 250J Issues in Higher Education
PHIL 300J The Western Philosophical Tradition (to 1600)

PHIL 318J Philosophy of the Family
PHIL 333J Contemporary Philosophical Problems in Art
PHIL 418J Ethics and Society

Department of Physics

Professor, Chairman of the Department
J. Grindlay, BSc (Glasgow), DPhil (Oxford)

Associate Professor, Associate Chairman of the Department
D. Hemmings, BSc, PhD (Bristol)

Professor, Dean of the Faculty of Science
D.E. Brodie, BSc, MSc, PhD (McMaster)

Associate Professor, Associate Dean, Undergraduate Studies, Faculty of Science
H.M. Morrison, BSc, PhD (Edinburgh)

Professor, Director (GWG)
I.R. Dagg, BSc (Manitoba), MS (Pennsylvania State), PhD (Toronto)

Professor, Graduate Advisor
R.A. Moore, BSc, MSc (McMaster), PhD (Alberta)

Associate Professor, Graduate Advisor
J.K. Brandon, BSc, PhD (McMaster), MA (Cambridge)

Professor, Undergraduate Advisor
J.A. Cowan, BSc (Manitoba), MA, PhD (Toronto)

Associate Professor, Undergraduate Advisor
K.A. Woolner, BSc (London)

Professor Emeritus
W.B. Pearson,6 DFC, MA, DSc (Oxford), DSc (Waterloo), FRSC, FCIC, (Retired)*

Professors
A. Anderson, MA, DPhil (Oxford)
R.A. Aziz, BA, MA, PhD (Toronto)
D.A. Bakos, MA (Bratislava), MA, PhD (Toronto), (Retired)*
F.W. Boswell, BA, MA, PhD (Toronto)
S.G. Davison,4 PhD, DSc (Manchester)
M.P. Fitzgerald, BSc, MSc (Toronto), PhD (Case)
F.O. Goodman,4 BSc, PhD, DSc (London), FInstP, FAP
Course Descriptions

Physics

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 (including Co-op) students in Years 2, 3, and 4, to receive information concerning the Physics Department and to hear invited speakers.

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.

Prereq: MATH 106
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 instruments used in Kinesiology.

Prereq: PHYS 103
For Kinesiology students.
Lab alternate weeks, optional tutorial.

PHYS 111 F 3C,1T 0.5

Physics for the Life Sciences 1
An introduction to physics for students intending to concentrate their further studies in biology, medicine or dentistry; includes particle kinematics and dynamics, energy and momentum conservation, gravitation, rotational mechanics, fluid mechanics, elasticity and oscillations.

PHYS 111L F 3L 0.25

Physics for the Life Sciences 1 Laboratory
For students taking PHYS 111.
Lab alternate weeks.

T.E. Gough, BSc, PhD (Leicester)
J.P. Greenhouse, BSc, MSc (British Columbia), PhD (California), Recipient of the Distinguished Teacher Award
H.R. Isero, BSc (Ottawa), MSc, PhD (McMaster)
J. Kruza, BASc (Waterloo), PhD (Western Ontario)
J.W. Lee, BSc, PhD (London), FinsP, (Retired)*
J.D. Leslie, BASc (Toronto), MS, PhD (Illinois)
A.D.S. Nagi, BA, BSc, MSc (Panjab), PhD (Delhi)
J.L. Ord, BASc (Toronto), MS, PhD (Illinois)
R.K. Pathria, BSc, MSc, PhD (Delhi), Recipient of the Distinguished Teacher Award
M.M. Pintar, BSc, MSc, PhD (Ljubljana)
L.W. Reeves, BSc, PhD, DSc (Bristol), FRSC, FIOC
J.J. Sloan, BSc, PhD (Queen's)
H.J.T. Smith, BSc, PhD (London)
R.A. Snyder, BSc, PhD (Western Ontario)
S.F. Wang, DSc (Nagoya)

Associate Professors
J.N. Corbett, BASc (Toronto), MSc, PhD (Waterloo)
A.E. Dixon, BSc (Mt. Allison), MSc (Dalhousie), PhD (McMaster)
B.C. Eastman, BSc, MSc (McMaster), PhD (British Columbia)
H.K. Ellerton, BSc (Western Ontario), MA (Toronto)
G.L. Harris, BA (Mount Holyoke College), MA (Wesleyan), PhD (Toronto)
J.R. Lepock, BS, MS (W. Virginia), PhD (Pennsylvania State)
C.C. Lim, BA (DelPau), MA (Nebraska), PhD (Toronto), (Retired)*
P.S. Lipschitz, BSc ( Natal), MSc ( South Africa), PhD (Witwatersrand)
W.K. Liu, BSc, MS, PhD (Illinois), NSERC University Research Fellow
R. Mann, BSc (McMaster), MSc, PhD (Toronto), NSERC University Research Fellow
H. Peemoller, BSc (Winnipeg), MSc (Victoria), PhD (Waterloo), NSERC University Research Fellow
R.H. Penha, BSc (Toronto), PhD (McMaster)
J. Vanderkooy, BEng, PhD (McMaster)
P.S. Wesson, BSc (London), PhD (Cambridge), FRAS, NSERC University Research Fellow

Research Assistant Professor
G. Scholtz, BSc (Simon Fraser), MSc (McMaster), PhD (Simon Fraser), NSERC University Research Fellow

Adjunct Faculty
J.A. Blackburn, BSc (Manitoba), MSc, PhD (Waterloo)
W.E. Harris, BSc, (Alberta), MSc, PhD (Toronto)
J. Lit, BSc, DipEd (Hong Kong), DSc (Laval)
C.J. Moore, BSc, MSc, PhD (Waterloo)
L.A.A. Read, BA, MSc (McMaster), PhD (Waterloo)
G. Scolles, Dottore in Chimica (Genova), LibDoc, FIOC

Senior Demonstrators
A.B. Haner, BSc, MSc (Waterloo)
D.S. McVicar, BSc (Waterloo)
Demonstrator
J.L. Gardner, BSc (Waterloo)
C.R. Jayasundera, BSc (Waterloo)

Faculty Members of Physics holding cross appointments to:

1. Biology
2. Chemistry
3. Applied Mathematics

Faculty Members holding cross appointments to Physics from:

4. Applied Mathematics
5. Earth Sciences

Faculty Members holding joint appointments with:

1. Earth Sciences
2. Chemistry

Also has Adjunct appointment

Course Descriptions

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 112 W 3C,1T 0.5
Physics for the Life Sciences 2
A continuation of PHYS 111; includes wave motion, normal modes of vibration, sound, hearing, temperature, heat, kinetic theory of gases, thermodynamics, electrostatic force and potential, electric current and power, DC circuits, magnetic fields and induction.
Pre req: PHYS 111

PHYS 112L W 3L 0.25
Physics for the Life Sciences 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,2T 0.5
Introductory Physics 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: Ontario Grade 13 Mathematics; Functions and Relations, and Calculus; Ontario Grade 13 Physics recommended.
Science students must take 121L with this course.

PHYS 121L F 3L 0.25
Introductory Physics 1 Laboratory
For students taking PHYS 121.
Lab alternate weeks.

PHYS 122 W,S 3C,2T 0.5
Introductory Physics 2
This course is a continuation of PHYS 121; includes oscillating systems, wave motion, gravitation, fluid mechanics, heat and thermodynamics.
Pre req: PHYS 121
Science students must take 122L with this course.

PHYS 123 F 3C 0.5
Digital Computation
Introduction to hardware and software organization of digital computers. Features of the FORTRAN and BASIC programming languages, structured programming, algorithms applicable to the solution of problems in physics.
For Co-op Physics students or students intending to major in Physics.
Pre req: CS 102

PHYS 125 W,S 3C,2T 0.5
Physics for Engineers
Oscillations; simple harmonic motion. Wave motion, travelling and standing waves; transverse and longitudinal waves, including sound. Geometrical optics; reflection and refraction. Physical optics; interference and diffraction. Quantum physics; quantization of radiation; hydrogen atom.
Pre req: 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.
Pre req: First year physics and calculus
Not for Honours Physics students
Offered by Correspondence only in 1988-89

PHYS 223 W 0.5
Electricity and Magnetism 2
Magnetic fields, induced electromotive forces, magnetic properties of matter, alternating currents, electromagnetic waves.
Pre req: PHYS 222
Not for Honours Physics students
Offered by Correspondence only in 1988-89

PHYS 226 F 2C,1T 0.5
Geometrical Optics
Reflection and refraction at plane and curved surfaces, thin and thick lenses, optical instruments.
Pre req: First year physics and calculus
Not for Honours Physics students
Physics majors must take PHYS 226L with this course.

PHYS 226L F 3L 0.25
Geometrical Optics Laboratory
For students taking PHYS 226.
Lab alternate weeks.

PHYS 234 W,S 3C 0.5
Quantum Physics 1
Pre req: First year physics and calculus, MATH 216

PHYS 246 W 3C,1T 0.5
Physical Optics
Pre req: First year physics and calculus
Coreq: PHYS 246L

PHYS 246L W 3L 0.25
Physical Optics Laboratory
For students taking PHYS 246.
Lab alternate weeks

PHYS 249 F,S 3C 0.5
Introduction to Waves and Diffraction
Pre req: First year physics
Pre req: PHYS 246, PHYS 256, PHYS 259
For students in Honours Chemistry, Regular and Co-operative Applied

PHYS 249L F,S 3L 0.25
Introduction to Waves and Diffraction Laboratory
For students taking PHYS 249
Lab alternate weeks

PHYS 251 W 0.5
The Stellar System
An introduction to the astronomy and astrophysics of objects beyond the solar system for students with a background in (elementary) University Physics and Mathematics.
Pre req: First year physics and calculus
Offered by Correspondence only in 1988-89
Phys 252 F 3C 0.5
 Electricity and Magnetism 1
 Coulomb’s law, electric fields, Gauss’s law, potential, capacitance, properties of dielectrics, current, resistance, electromagnetic force, D.C. circuits, A.C. circuits, instrumentation.
 Prereq: First year physics and calculus
 Recommended for students in Honours programs

Phys 253 W.S 3C 0.5
 Electricity and Magnetism 2
 Magnetic fields, Ampère’s law, induced electromotive forces, magnetic devices, magnetic properties of materials, inductance, Maxwell’s equations, electromagnetic waves.
 Prereq: Phys 252, Math 216
 Coreq: Math 213B
 Physics majors must take Phys 253L with this course

Phys 253L W.S 3L 0.25
 Electricity and Magnetism Laboratory
 For students taking Phys 253.
 Lab alternate weeks.

Phys 256 F 3C 0.5
 Geometric and Physical Optics
 Prereq: First year physics and calculus
 Physics majors must take 256L with this course.
 Recommended for students in Honours programs.

Phys 256L F 3L 0.25
 Optics Laboratory
 For students taking Phys 256.
 Lab alternate weeks.

Phys 259 W.S 3C 0.5
 Crystallography and X-Ray Diffraction
 Space lattices, symmetry, crystal structure, crystal geometry and stereographic projections. Electronic structure of atoms and atomic bonding in solids. Theory of X-ray diffraction, X-ray methods and the reciprocal lattice. Crystal formation, crystal defects and physical properties of crystals.
 Prereq: First year physics and calculus
 Coreq: Phys 259L

Phys 259L W.S 3L 0.25
 Crystallography and X-Ray Diffraction Laboratory
 For students taking Phys 259.
 Lab alternate weeks.

Phys 263 W.S 3C 0.5
 Classical Mechanics 1
 Newtonian dynamics and particles and systems of particles. Free and driven linear oscillations. Lagrangian dynamics and its applications.
 Prereq: First year physics and calculus, Math 216

Phys 275 F 3C 0.5
 Astrophysics 1 - The Solar System
 The Planets, Newtonian gravity and celestial mechanics, the formation of stars and planets, meteorites, asteroids, comets, planetary interiors, planetary surfaces, planetary atmospheres, the origin of life.
 Students with a weak background in Mathematics or Physics might do well to take SCI 238 first. The content and level of the core material of Phys 275 will remain the same. Additional material will change from year to year to keep students abreast of current developments in the subject.

Phys 301 W 3C 0.5
 Physical Techniques for Biologists 1

Phys 324 F 3C 0.5
 Atomic and Nuclear Physics 1
 Fundamentals of modern physics, special theory of relativity, quantization of electromagnetic radiation, wave properties of particles, the hydrogen atom.
 Prereq: Year 2 electricity and optics courses
 Recommended for students in General programs
 Offered by Correspondence in 1988-89

Phys 325 W 3C 0.5
 Atomic and Nuclear Physics 2
 Many electron atoms, atomic and X-ray spectra, nuclear structure, nuclear reactions, molecular and solid state physics.
 Prereq: Phys 324
 Recommended for students in General programs
 Offered by Correspondence only in 1988-89

Phys 352 W 3C 0.5
 Analogue Electronics
 DC and AC circuit theory, p and n materials, pn diodes, junction and FET transistors. Circuit amplifiers and operational amplifiers. Feedback, oscillators and power supplies.
 Prereq: Knowledge of determinants, elementary calculus and elementary electricity
 Coreq: 352L

Phys 352L W 3L 0.25
 Analogue Electronics Laboratory
 For students taking Phys 352.
 Lab alternate weeks.

Phys 353 F.S 3C 0.5
 Digital Electronics
 Logic gates, flip-flops and shift registers. Binary numbers and Boolean algebra. An introduction to microprocessors is discussed based on the 6800. This will include arithmetic logic units, parallel input/output ports, assembly language and a number of examples.
 Prereq: Phys 122
 Coreq: Phys 353L

Phys 353L F.S 3L 0.25
 Digital Electronics Laboratory
 For students taking Phys 353.
 Lab alternate weeks.

Phys 354 F.S 3C 0.5
 Atomic and Molecular Physics
 The Schrödinger equation applied to simple one- and three-dimensional potentials, hydrogen atoms, angular momentum and spin, molecular vibrations and rotations, many-electron atoms, radiation processes.
 Prereq: Phys 263, Math 213A/B
 Antireq: Chem 355

Phys 358 F.S 3C 0.5
 Thermodynamics
 Thermodynamic systems, equation of state, the laws of thermodynamics with applications. Change of phase.
 Prereq: Phys 254, Math 213A/B and 216

Phys 359 W 3C 0.5
 Statistical Mechanics
 Prereq: Phys 358
PHYS 360A F,S 3L 0.25
Intermediate Laboratory
Selected experiments in mechanics, atomic physics, solid state physics, optics and electronics.
Prereq: PHYS 263, MATH 213A/B
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 363 W 3C 0.5
Classical Mechanics
Application of the methods of classical mechanics to central-force motion, rigid body rotation, coupled oscillations and motion in non-inertial frames; survey of Hamiltonian dynamics.
Prereq: PHYS 263, second year calculus
Primarily intended for Honours Physics students.

PHYS 364 F,S 3C 0.5
Mathematical Physics 1
Vector analysis and applications. Vector operators using curvilinear coordinates. Cartesian tensors. Inertia tensor, stress, strain and rate of strain tensors. Applications to elasticity, fluids, electromagnetism and relativity.
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 368 F 2C 0.5
Geophysics 1
Prereq: First year physics and calculus
Cross-listed as EARTH 368

PHYS 369 W 3C 0.5
Geophysics 2
The geology of the ocean basins. Topics in physical oceanography. Physical properties of ocean water, heat budget of the world oceans. Oceanic circulations. Coriolis effects. Some idealized current regimes.
Prereq: First year physics and calculus
Cross-listed as EARTH 369

PHYS 371A F,S 3L 0.25
Intermediate Laboratory
Further experiments in atomic, nuclear and solid state physics, optics and electronics. For honours students who are taking PHYS 360A.
18 hours experiments.

PHYS 371B W 3L 0.25
Intermediate Laboratory
Continuation of 371A. For honours students who are taking PHYS 360B.
18 hours experiments.

PHYS 371C W 3L 0.25
Intermediate Laboratory
Microprocessor Interface Course. A Project laboratory course in which the student will interface some common microcomputers (e.g. PET, VIC20, Apple) to a variety of parallel and serial devices (e.g. terminal, D.V.M.).
Prereq: PHYS 353

PHYS 375 W 3C 0.5
Astrophysics 2 - Stellar Astronomy
 Stellar spectra, spectral classification. Observational techniques, motions of stars, properties of stars, stellar distances, open clusters, globular clusters, stellar populations, gas, dust, the galactic plane, the galactic halo, galactic rotation. Statistical methods. Stellar evolution.
Prereq: PHYS 275 or consent of instructor
The content and level of the core material of PHYS 375 will remain the same. Additional material will change from year to year to keep students abreast of current developments in the subject.

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, thyristors, tunnel diodes, field effect devices, optical devices, etc.
Prereq: PHYS 435

PHYS 434 F 3C 0.5
Introductory Quantum Mechanics
Prereq: PHYS 354, 364, and 365

PHYS 435 F 3C 0.5
Solid State Physics
Introductory concepts in crystal diffraction and the reciprocal lattice. Crystal bonding. Lattice vibrations, thermal properties of insulators, free-electron theory of metals, band theory. Semiconductors.
Prereq: Completion of Year Three Honours Physics

PHYS 437A F,W 0.5
Research Project
A research project in any area of Physics approved by the course coordinators. The student is required to submit a written report and present a summary of the project orally, before the end of the term of registration.
Prereq: Completion of all third year honours physics program requirements and registration in the fourth year of an honours physics program. Students with <70% average in the third year core are advised not to take this course. Enrolment will be limited.
PHYS 437B W P 0.5
Research Project (continued)
A continuation of the project undertaken in Physics 437A. The student is required to submit a written report and present a summary of the project by poster and/or orally before the end of the term of registration.
Pre req: Completion of Physics 437A and approval of the course coordinators

PHYS 441A/B 3C 0.5/0.5
Electromagnetic Theory
A generalized treatment of the basic laws of electricity and magnetism, mathematical techniques for the problems of electrostatics, solution of Maxwell's equations in free space, and the study of plane waves, theory of waveguides and introduction to radiation.
Pre req: PHYS 253, PHYS 364-365
No credit or grade is given for the first term course unless the two term sequence, PHYS 441A/B, is completed.

PHYS 443 W 3C 0.5
Continuum Mechanics
Pre req: PHYS 364-365

PHYS 444 W 3C 0.5
Nuclear and Particle Physics
Pre req: PHYS 455, and PHYS 434

PHYS 445 W 3C 0.5
Modern Optics
Pre req: PHYS 256 and PHYS 354

PHYS 453 W 3C 0.5
Advanced Analogue Electronics
A variety of topics in the operation of systems. Transistors, modern circuit techniques, noise, stability under feedback, information theory, and possible student motivated topics. Includes laboratory demonstrations.
Pre req: PHYS 352/353

PHYS 454 W 3C 0.5
Quantum Mechanics
Pre req: PHYS 434.
PHYS 454 is strongly recommended for students intending to do graduate work.

PHYS 455 F 3C 0.5
Nuclear and Particle Physics
Nuclear structure, interactions of nuclear radiations with matter, radioactive decay, nuclear reactions, nuclear force, elementary particles.
Pre req: PHYS 354

PHYS 464 F 3C 0.5
Mathematical Physics 3
Applications to Physics of the theory of functions of a complex variable.
Pre req: PHYS 364/365

PHYS 465 W 3C 0.5
Mathematical Physics 4
Theory and applications of integral transforms, integral equations and Green's functions. Asymptotic analysis.
Pre req: PHYS 464

PHYS 475 F 3C 0.5
Astrophysics 3 - Extremalactic Astronomy
Ordinary galaxies, dynamics of galaxies, galactic haloes and disks, evolution of galaxies, peculiar galaxies, active galaxies, interacting galaxies, quasars, the Local Group, clusters of galaxies, observational cosmology, theoretical cosmology, the origin of the Universe.
Pre req: PHYS 375 or consent of instructor.
The content and level of the core material of PHYS 475 will remain the same. Additional material will change from year to year to keep students abreast of current developments in the subject.

PHYS 476A-Z
Astrophysics 4 - Special Topics in Astrophysics
A lecture course offered upon demand, and upon availability of instructors in a particular branch of astrophysics.
Pre req: 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 effect, dose-response relationships; cancer radiotherapy (x-rays, electrons, neutrons, protons, negative 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

COURSES NOT OFFERED 1988-89

PHYS 250 The Solar System
PHYS 332 Physical Techniques for Biologists 2
PHYS 442 Structure of Solids
School of Urban and Regional Planning

Associate Professor, Director
L.R.G. Martin, BA (Queen's), MA, MRP., PhD (Syracuse), MCP

Associate Professor, Associate Director, Undergraduate Officer
J. Horton, BA (Wheaton), MA (Northwestern)

Professor, Associate Dean, Graduate Studies, Faculty of Environmental Studies
G.S. Mulaomointi, BSc (Mysore), MSc (Bombay), PhD (Delhi)

Associate Professor, Associate Dean, Computing and Communications, Faculty of Environmental Studies
R.T. Newland, BSc, MSc, PhD (Western Ontario)

Professor, Graduate Officer
D.W. Hoffman, BSA, MSA (Toronto), PhD (Waterloo), (Retired)*

Professors
H.S. Cobolitz, BA Hons (Durham), MRP (North Carolina), RTPI, ACP, FSS, MES
L.O. Gertler, BA (Queen's), MA (Toronto), FCP
K. Izuini, BArch (Manitoba), MCP (Massachusetts Institute of Technology), ARCA, FRAIC, CMAOP (Retired)*
C.K. Knapper, BSc Hons (Sheffield), PhD (Saskatchewan)
R.R. Krueger, BSc, MA (Western Ontario), PhD (Indiana)
J.G. Nelson, BArch (McMaster), MA (Colorado), PhD (Johns Hopkins)
J.B. Theberge, BScA (Guelph), MSc (Toronto), PhD (British Columbia)
D.F. Walker, BSc (London), MA, PhD (Toronto)
S.M. Weaver, BA, MA, PhD (Toronto)

Associate Professors
M.E. Haight, BSc, MSc, PhD (McMaster)
S. Herzog, BArch (Toronto), MRAIC
B. Hyma, BSc, MSc (Madras), MA (Sheffield), PhD (Pittsburgh)
S.C. Lerner, BA (Ohio State), MA (Columbia), Recipient of the Distinguished Teacher Award
N.E.P. Pressman, BArch (McGill), MArch, Urb des (Cornell), Cert USP (Manchester), MCP, ACP, AIU
G.B. Priddle, BSc (Western Ontario), MA, PhD (Clark)
J.E. Robinson, BA (Toronto), MES (York), PhD (Toronto)

W.L. Shainisk, BA, BSW (McGill), MSc, DSW (Western Reserve)
R.C. Suffling, BSc, Hons (Wales), PhD (Guelph)

Assistant Professors
P. Filion, BA, MA (Laval), PhD (Kent)
G.B. Hall, BA, Hons (Otago, New Zealand), MA, PhD (McMaster)
N.M. Lazarowich, BA (Saskatchewan), MA, MCP, PhD (Cincinnati)
B. Moore Miray, BA (McGill), M.urp. (Montreal), PhD (British Columbia)
J.E. Robinson, BSc (Waterloo), MES (York), PhD (Michigan)

Adjunct Faculty
G. Davidson, BA (Toronto), MA (Waterloo), PhD (Western Ontario), MCP, OPP
S. Garrod, BA (McMaster), LLB, MES, (York)

Lecturer
K. Hammond, BLA (Guelph)

Faculty Members of Planning holding cross and/or joint appointments to:
1. Biology
2. Geography
3. Health Studies
4. Environmental Studies
5. Archaeology
6. Environmental Studies
7. Geography
8. Environment and Resource Studies

*Also has Adjunct appointment

Course Descriptions

Courses not offered in the current academic year are listed at the end of this section.

PLAN 100A F 4C.1D 0.5
Introduction to Urban and Regional 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: $20

PLAN 100B W 4C.1D 0.5
Introduction to Urban and Regional Planning Concepts and Techniques 2

Continuation of PLAN 100A.

Prereq: PLAN 100A, Planning students only
Estimated additional cost to student: $20

PLAN 130 W 3C 0.5
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

PLAN 156 F,W 2C.1D 0.5
Introduction to Urban and Regional Planning Concepts

An introduction to contemporary planning ideas for students whose subsequent work might bring them in contact with professional planners. Planning concepts and principles; the development of contemporary planning ideas; the nature, purpose and scope of urban and regional planning; the planning process and decision-making in a democratic society.

Prereq: None
(Not available for credit to planning students). Restricted to first and second year students in other programs.

PLAN 159 F,W 3C 0.5
Graphics for Planning

Basic instruction in graphic techniques used in planning. Emphasis will be placed on the use of graphics for the communication of ideas.

Prereq: Planning students or consent of instructor
Estimated additional cost to student: $20
PLN 230 F 3C 0.5
The Small Group in the Planning Process
This course will focus on small groups in a planning context. Students, as a group, will select the approach to learning which best meets their needs, in consultation with instructor. This may include an examination of the class as a group, observation and analysis of other groups, and/or other approaches to learning. As part of the learning process, students are expected to become familiar with the relevant literature in small group theory and planning, stressing a blend of theory and practice.
Prereq: PLN 130 or consent of instructor
Planning students only

PLN 232 F 4C 0.5
Rural Planning and Development
Advanced analysis of the process followed for rural planning and development in Canada and other selected countries. Problems and their solutions as noted in various jurisdictions are presented. Emphasis is placed on government approaches to planning and development.
Prereq: Second-year Planning students or consent of instructor

PLN 256 W 2C,2whsp 0.5
Planning Surveys and Analyses
Sources of data for planning and their analyses. The course will emphasize the sources, methods of collection and analysis of urban and regional land-use data. Particular attention is paid to the types of land-use information essential to transportation, housing, public facilities and recreation planning. Both lecture and workshop are related to a significant problem of land-use planning in Ontario.
Prereq: PLN 100 or consent of instructor

PLN 256A F 2C,2std 0.5
Environmental Design 1
Design concepts in Urban and Regional Planning illustrated by recent work. Individual and group projects in planning design in urban and regional settings, using graphic, model and verbal presentations.
Prereq: Second year Planning or Environmental Studies students with consent of instructor

PLN 256B W 2C,2std 0.5
Environmental Design 2
Continuation of PLN 256A.
Prereq: PLN 256A

PLN 259 W 2C,2whsp 0.5
Regional Planning and Economic Development
The relationship of economic planning to regional planning. Concepts of economic development and models of regional development planning. Case studies and examples are drawn from federal regional development efforts in Canada and/or from Third World nations. Workshops focus on regional planning and development at both a conceptual and empirical level.
Prereq: One of PLN 100, 156 or consent of instructor

PLN 270 W,S 2C 0.5
Concepts and Ideas in Contemporary Urban Planning
An overview of the modern movements and philosophical roots underlying urban planning and civic design. Philosophies and contributions of those who have significantly influenced modern historical thought. Development of planning trends and ideas in North America and abroad emphasizing relevance to contemporary concerns.
Prereq: Planning students or consent of instructor

PLN 275A/B/C F,W,S 3R 0.5
Readings and Research Planning
Special readings and research on planning topics chosen in consultation with an instructor. This course gives the opportunity for supervised individual reading and study of planning or related topics in which the student is particularly interested.
Prereq: PLN 100 or consent of instructor
Prior to registering for this course, students must arrange with a faculty member to serve as advisor.
The letter designation allows this course to be taken more than once for credit

PLN 300 A F 3wkshp,2std 0.5
Seminar/Workshop Project in Urban and Regional Planning 1
An integrated approach to the analysis of communities; identification and synthesis of factors related to function, structure, environmental context, regional framework, etc., in the preparation of comprehensive development programs. A major project undertaken in small project groups. Project reports summarizing findings are completed and presented at end of term. Field trip related to theme of problems includes follow-up discussion, assignments and preparation of individual research paper.
Prereq: Third-year Planning students only
Estimated additional cost to student: $70

PLN 300B W,S 3wkshp,2std 1.0
Seminar/Workshop Project in Urban and Regional Planning 2
The transformation of analytical concepts of community into planning designs on selected sites. On-site visits, collection and analysis of field data and relevant social, economic, physical and administrative information. Public presentations of analyses, plans and proposals as well as preparation of comprehensive reports.
Prereq: PLN 300A

PLN 301 F,S 4std 0.5
Urban Design
A study of the design of the environment in urban and regional contexts through lectures and studio projects.
Prereq: Planning students or consent of instructor

PLN 307 F 2C,1D 0.5
Social Survey Techniques in Planning
Social research and the planning process; interview and self-administered surveys; questionnaire design; profile data; data processing; sampling, non-survey data collection techniques; practical applications.
Prereq: Second or third year Planning students with ENV S 178; other ENV S students with consent of instructor
Cross-listed as GEOG 307
Students may receive credit for only one of PLN 307 and GEOG 307

PLN 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 278 or consent of instructor
Cross-listed as GEOG 316
Students may receive credit for only one of PLN 316 or GEOG 316
PLAN 318 S 3C 0.5
Spatial Analysis
Advanced quantitative analysis and sampling in a spatial context. A selection of techniques from gravity models, linear programming, nearest neighbour analysis, Markov chain analysis, graph theory, simulations, and trend surface analysis.
Prereq: ES 278
Cross-listed as GEOG 318
Students may receive credit for only one of PLAN 318 and GEOG 318

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 330 W,S 2C,1S 0.5
Urban Social Planning
This course looks at social planning as a way of attacking urban social problems. We will examine the different types of social planning and the relationship between physical and social planning.
Prereq: SOC 101 or consent of instructor

PLAN 344 S 2C 0.5
Recreation Planning
The course will develop and apply the planning process to recreation. The goals, objectives, use/needs, supply, allocation and evaluation of recreation services and programs will be examined for urban and regional areas in Canada, U.S. and countries outside North America. Municipal, provincial and federal recreation planning case studies will be discussed.

PLAN 357 F,W 4C 0.5
Conservation and Resource Management
History of the conservation movement; ecological principles of conservation and resource management. Analysis, use and planning of recreational resources. Section one of this course uses a self-directed learning approach.
Prereq: ENV S 200
Cross-listed as GEOG 357
Estimated additional cost to students: $10. Students may receive credit for only one of PLAN 357 and GEOG 357

PLAN 359 F 3C 0.5
Regional Planning: Program Development and Implementation
An examination of current regional planning programs (objective, policies, strategies and plans), with regard to both their development and implementation in the context of various institutional structures, arrangements and intergovernmental relations. Emphasis will be given to the process of implementing and monitoring programs in different jurisdictional and administrative settings - in Canada (Ontario in particular), the US, UK, and/or the Third World.
Prereq: Planning students or consent of instructor

PLAN 360 W 3C 0.5
Technology in Urban and Regional Planning
The influence of transportation, communications, and water and sewage systems on the form, function and development of cities and regions; the application of this knowledge in urban and regional planning.

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.
Prereq: PLAN 255 or consent of instructor

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 or consent of instructor. Students register on a Letter of Permission. Additional course fee.

PLAN 390 W,S 3C No credit weighting
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,1S 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 council, 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

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 planning students or consent of instructor

PLAN 429 F 3C 0.5
Development Planning: Cross-Cultural Aspects
An examination of the challenges of cross-cultural planning in various societies including those of the Third World. Within a development planning framework, basic concepts of culture, intercultural communication and brokerage will be explored.

PLAN 430 F 3C 0.5
Social Policy Planning
A systems approach to change and development of change strategies by integrating social goals, plans, policies and programs. Case studies are used to measure the quality and performance of plans, policies and programs.
PLAN 435 W 2C,2L,2T 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 256, 357 or consent of instructor

PLAN 454 F 2S 0.5  
Professional Practice in Planning
This course is intended for undergraduate planning students in their final year who will be starting professional practice on graduation. The course discusses professional capability, administrative functions, office organization and similar topics. Concepts and techniques in other courses will be dealt with from the point of view of the practitioner.  
Prereq: Fourth-year planning students or consent of instructor

PLAN 456A F 3C 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 or fourth-year Environmental Studies students with consent of instructor

PLAN 456B W 3C 0.5  
Political and Administrative Processes in Urban and Regional Planning 2
Continuation of PLAN 456A.  
Prereq: PLAN 456A

PLAN 475A/B/C 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

PLAN 480A F 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 man, 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 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 0.5  
Seniors 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 office.  
Prereq: Fourth-year Planning students only  
A letter grade of PLAN 490A will be submitted only after the completion of PLAN 480B.

PLAN 490B W 1.0  
Senior Honours Essay 2
Completion of essay.  
Prereq: PLAN 490A

COURSES NOT OFFERED 1988-89
PLAN 222 Canadian Regional Issues
PLAN 317 Nonparametric Statistics
PLAN 344 Recreation Planning
PLAN 414 Issues in Housing
PLAN 434 Planning with Native Peoples

Department of Political Science

Assistant Professor, Chairman of the Department
T.J. Dowmey, BA (Waterloo), MA, PhD  
(Western Ontario)

Associate Professor, Graduate Officer
A.D. Nelson, AB, AM, PhD (Chicago)

Assistant Professor, Undergraduate Officer
W.B. Moul, BA, MA, PhD (British Columbia)

Professors
I.L. Campbell, BA (Carleton), MSc (London) R  
A. Kapur, BA (Punjab), MA (George Washington), PhD (Carleton)  
J.E. Kersell, BA (Queen's) PhD (London)  
T.H. Quilter, BA (New Zealand), PhD (London)  
J.M. Wilson, BA, MA (Toronto)

Associate Professor
R.J. Williams, BA, MA (McMaster), PhD (Toronto)

Assistant Professors
S.D. Burt, BA, MA (Waterloo), PhD (York)  
A.F. Cooper, BA, MA (Waterloo), DPhil (Oxford)  
T. Korovin, BA, MA (Moscow), MA, PhD (York)  
R.A. Nutton, BA (Bishop's), MA, PhD (Carleton)  
J.A. Teichman, BA, MA, PhD (Toronto)  
R.P. Woolstenhulme, BA, PhD (Alberta)

Adjunct Faculty
G.W. Corby, BA (Wilfrid Laurier), LLB (Western Ontario), LLM (London)  
W.W. Johnston, QC, BA (Memorial), LLB (Queen's)  
W.J. Morrison, QC, BA (Western Ontario), LLB (Osgoode)  
J.E. Surch, BA, MA (Waterloo)

Lecturer
J.S. Jaworsky, BSc (Ottawa), MA (Carleton)

Faculty Member holding cross appointment to Political Science from:
1Social Development Studies
Course Descriptions

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.

P SCI 101A F 0.5
Introduction to Politics 1
An introduction to the nature of politics and the conflict of political ideas within the setting of a liberal democracy. The purpose is a clearer understanding of conservatism, liberalism and socialism.

P SCI 101M 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.

P SCI 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:

P SCI 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.

P SCI 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).

P SCI 102F W 0.5
Politics in the Third World
This course examines worker and peasant political movements and parties in the Third World with emphasis on Latin America and Africa.

P SCI 102K W 0.5
Mass Political Violence
A distinctive social feature of our century is the amount of political violence. Mass-made deaths number approximately one hundred million. This course will describe and evaluate various theories of political violence.

P SCI 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.

P SCI 103N 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.

P SCI 214 2C,JL 0.5
Quantitative Analysis
An introduction to the use of quantitative methods in Political Science. Only rudimentary understanding of mathematics is required.
Prereq: Second-year standing
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.

P SCI 225 F 2C,IT 0.5
The History of Political Theory 1
A survey of the principal ideas of Western political theorists from the earliest times to the 17th century.
Prereq: Second-year standing

P SCI 226 W 2C,IT 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

P SCI 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 in and interaction with the private sector.
Prereq: Second-year standing

P SCI 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, the Mediterranean countries, South Africa and Japan.
Prereq: Second-year standing

P SCI 260 A,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.
No prereq for students in the second year and above.

P SCI 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: P SCI 260A or consent of instructor

P SCI 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.
No prereq for students in the second year and above.

P SCI 268 W 2C,IT 0.5
British Government and Politics
An examination of the uniquely British characteristics of the British political system.
No prereq for students in the second year and above.
P SCI 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 critics. 
No prereq for students in the second year and above.

P SCI 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

P SCI 281 F 2C 0.5
International Politics
This course studies the transformation of the international system stressing East-West, Rich-Poor, and North-South perspectives and interactions. 
No prereq for students in the second year and above.

P SCI 282 W 2C 0.5
Foreign Policy
This course studies the roots of foreign policy behaviour of selected western and non-western (particularly Asian) states. 
Prereq: P SCI 281 or consent of instructor

P SCI 291 F,S 3C 0.5
The Canadian Legal Process
An analysis of the manner in which the Common Law functions, together with an examination of the structure and jurisdiction of the Canadian court systems. 
Taught by a member of the legal profession. 
Prereq: Open to all students in the second year and above

P SCI 292 W,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

P SCI 325 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

P SCI 315 0.5
Research Design in Political Science
Introduction to the logic and limitations of experimental and non-experimental research designs. Selected studies of politics are examined to demonstrate how plausible threats to validity are made less plausible with appropriate design and data analysis. 
Prereq: P SCI 214 or consent of instructor

P SCI 321 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

P SCI 322 W 2L 0.5
Marxism after Marx
A selective study of developments in Marxist theory and political movements after Marx. 
Prereq: None

P SCI 323 0.5
Ancient Political Philosophy
A selective examination of political philosophy during the classical period in Greece. 
Prereq: Consent of the instructor

P SCI 324 0.5
Modern Political Philosophy
A selective examination of political philosophy in the modern period. 
Prereq: Consent of instructor

P SCI 331 F 2C 0.5
Public Administration 1
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: P SCI 260A and 260B or consent of instructor

P SCI 332 W,S 2S 0.5
Public Administration 2
Analysis of problems and issues in the field applying the knowledge gained in P SCI 331. 
Prereq: P SCI 331 or consent of instructor

P SCI 333 W 0.5
Administrative Law
A study of Canadian administrative law including the delegation of political power to various administrative agencies which play a prominent role in controlling contemporary social and economic life. 
The supervisory role of the courts will also be examined. 
Prereq: P SCI 331 or consent of instructor

P SCI 342 W 2C 0.5
Politics in Quebec
A seminar dealing with the political and social development of Quebec. The emphasis will be on the problems and issues of contemporary Quebec. 
Prereq: P SCI 260A and 341 or consent of instructor

P SCI 343 F 2C 0.5
Canadian Municipal Government
A study of the assumptions, structures and performance of municipal government in Canada with reference to metropolitan and regional structural innovations (particularly in Ontario). 
Open to students in the third year and above with at least 1 previous course in Political science.

P SCI 344 W 2C,1T 0.5
The Politics of Local Government
A study of the political process in selected Canadian cities focusing on citizen participation, internal decision-making, leadership, and the allocation of power. 
Prereq: P SCI 343 or consent of instructor

P SCI 350A F 3C 0.5
The Politics of the Developing Areas 1
An introduction to the politics of Asia, Africa and Latin America focusing upon the political roots of poverty in the developing areas. Topics include the impact of world trade, colonization, multinationals and foreign aid. 
No prereq for students in the third year and above.

P SCI 350B W 3C 0.5
The Politics of the Developing Areas 2
An examination of the politics of the developing areas with emphasis on the political behaviour of peasants, the urban poor, organized labour, and the military. 
No prereq for students in the third year and above.

P SCI 361 F 2S 0.5
Federal and Consociational Political Systems
Federal and Consociational Political Systems are examined with emphasis on processes of political integration, patterns of conflict resolution, and the impact of modernization on political development. 
Prereq: Consent of the instructor
P SCI 362A F 0.5
Soviet Government and Politics I
An examination of conceptual frameworks for the study of politics in the
Soviet Union, and the environment and institutions of the Soviet political system.
Prereq: Third-year standing or consent of instructor

P SCI 362B W 0.5
Soviet Government and Politics II
This course examines policy-making and implementation in the Soviet Union, and
the dynamics of change in the Soviet political system.
Prereq: P SCI 362A or consent of instructor

P SCI 363 F 0.5
Canadian Constitutional Law
An introduction to the nature and basic principles of constitutional law. This
course will deal especially with the distribution of powers in the Canadian federal-
and provincial jurisdictions, and its evolution, notably by judicial decision. Leading cases will be exam-
ined.
Prereq: P SCI 260A and 260B or 260A and consent of instructor

P SCI 372 W 0.5
Political Parties and Interest Groups
An examination of the roles of interest groups and political parties in influencing
government policy. The origins, tactics, structures and impact of these two avenues of political participation will be compared. Discussion will focus on
Canadian examples.
Prereq: Third-year standing or consent of instructor

P SCI 375 W 0.5
The Politics of Self-Management
An examination of the participation of citizens in decision making, both at work and in politics. The self-management system of Yugoslavia will be studied in detail.
Prereq: Second year standing or above

P SCI 380A F 0.5
World Politics I
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.
Open only to students in the third year and above.

P SCI 380B W 0.5
World Politics 2
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

P SCI 381 W 0.5
Foreign Policies of South Asian States
The course (1) defines the central issues in each country’s foreign policy; (2) discusses the factors which shape the decision making processes; and (3) evalu-
ates the impact of these policies on regional and international thinking.

P SCI 390-398 0.5
Special Studies
From time to time courses of special study may be added to the program at the
third-year level. Students wishing to take such courses should consult the
Department’s Undergraduate Officer.

P SCI 422 0.5
Conflict of Political Ideas in Canada
A course designed to introduce students to some of the major ideas about politics
democracy which Canadians have developed in the course of this century.
Conservatism, liberalism, socialism, agrarian protest politics, 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.

P SCI 426 0.5
Selected Subjects in Political Philosophy
A selective treatment of basic themes in political philosophy in the modern and
pre-modern times.
Prereq: For third-year Political Science students, but open to others with prereq
of P SCI 225, 226, 323, or 324, or consent of instructor

P SCI 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: P SCI 225, 226, 323, or 324

P SCI 428 F 3S 0.5
State and Economic Life
An analytical and comparative study of the growth of government intervention in the economic process, and of the develop-
ment of the welfare state.
Prereq: Consent of the instructor

P SCI 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: P SCI 260A, 260B, 331 or consent of instructor

P SCI 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 focusing 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

P SCI 434 F 0.5
Comparative Public Administration
A comparative study of public adminis-
tration 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: P SCI 331 or consent of instructor

P SCI 436 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

P SCI 438 F 3S 0.5
Comparative Public Policy: The
Politics of Food
P SCI 438 will introduce the actors and the framework of norms, rules and prac-
tices that control the global food regime. The course will then proceed to deal with selected problems in the politics of food.
Prereq: Consent of the instructor
P SCI 437 W 3S 0.5  
**The Politics of International Resources**  
An examination of the politics of international resources. Attention will be given to the set of issues relating to minerals, water, oceanic fisheries, oil energy, timber and labour.  
Prereq: Consent of the instructor

P SCI 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: P SCI 260A and 260B or 341 or consent of the instructor

P SCI 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: P SCI 260 or 341 or consent of instructor

P SCI 451 F 0.5  
**Comparative Communist Systems: Eastern Europe**  
A comparative examination of political institutions and processes in the communist states of Eastern Europe.  
Prereq: Fourth-year standing or consent of instructor

P SCI 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

P SCI 453 F 3S 0.5  
**Comparative Politics of Latin America**  
The course examines the politics of Latin America focusing 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

P SCI 454 W 3S 0.5  
**Comparative Politics**  
Selected topics in the politics of the Third World.  
Prereq: Fourth-year standing or consent of instructor

P SCI 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

P SCI 462 W 0.5  
**Problems in Canadian Politics 2**  
Selected aspects of Canadian provincial politics.  
Prereq: Fourth-year standing or consent of instructor

P SCI 471 0.5  
**Public Opinion and Propaganda**  
A detailed study of the nature of public opinion and the attempt to control it through propaganda.  
Prereq: Consent of the instructor

P SCI 473 2S 0.5  
**Voting Behaviour**  
Prereq: P SCI 214, 373 or consent of instructor

P SCI 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

P SCI 476 W 0.5  
**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

P SCI 479 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 relationship between the society and the coercive apparatus of the state.  
Prereq: Third- or fourth-year standing

P SCI 481 2S 0.5  
**Research Seminar on World Politics**  
An examination of research on the causes and consequences of interstate warfare.  
Prereq: P SCI 380 or consent of instructor

P SCI 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 to cope with the demands on it; meanings of international and regional power and order.  
Prereq: Fourth-year standing or consent of instructor

P SCI 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

P SCI 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.

P SCI 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 P SCI 499A will be submitted only after the completion of P SCI 499B.

**COURSES NOT OFFERED 1988-89**

P SCI 102C Politics in Action
P SCI 312 Approaches to Survey Analysis in Political Science
P SCI 341 Provincial Politics
P SCI 352 Comparative Legislative Systems
P SCI 375 The Politics of Self-Management
P SCI 424 Contemporary Socialist and Communist Thought
P SCI 475 Research Seminar in Political Behaviour
Department of Psychology

Professor, Chairman of the Department
T.G. Waller, BS, MS (Southern Mississippi), PhD (Vanderbilt)

Professor, Dean of the Faculty of Arts
R.K. Banks, BA, MA, PhD (Toronto)

Associate Professor, Associate Dean for Undergraduate Affairs and Computing, Faculty of Arts
G.A. Griffin, BA (Colgate), MA, PhD (Wisconsin), Recipient of the Distinguished Teacher Award

Professor, Deputy Chairman
M.P. Zanna, BA, PhD (Yale)

Professor, Associate Chairman, Graduate Affairs
M.D. Vogel-Sprott, BA (McMaster), MA, PhD (Toronto)

Professor, Associate Chairman, Undergraduate Affairs
H. Ross, BA (Toronto), PhD (North Carolina)

Professors
K.S. Bowers, BA, PhD (Illinois)
M.P. Bryden, BS (MT), MSC, PhD (McGill)
W.C. Comings, BA (Heidelberg), PhD (Rochester)
D.P. Crowne, BA (Antioch College) EdM (Rochester), PhD (Purdue)
J.A. Dyal, BA (Oklahoma), PhD (Illinois)
C.K. Knappe, BA (Sheffield), PhD (Saskatchewan)
H.M. Lefcourt, BA (Antioch College), MA, PhD (Ohio State)
M.J. Lerner, BA, MA (Ohio State), PhD (New York)
R.G. Martenik, BPE, MA (Alberta), EdD (California)
D. Meichenbaum, AB (City College of New York), MA, PhD (Illinois)
P.M. Minkes, BA (Knox), MA, PhD (Virginia)
S. Reins, MD, SCS (Charles)
M.A. Ross, BA (Toronto), MA, PhD (North Carolina)
P.M. Rowe, BA (Toronto), MA (Dalhousie), PhD (McGill)
K.H. Rubin, BA (McGill), MS, PhD (Penn State)
D.A. Sprott, BA, MA, PhD (Toronto), FSS
R.A. Steffy, BA (Albright), MA, PhD (Illinois)
D.L. Wahlsten, BS (Alma College), PhD (California, Irvine)

Associate Professors
D.M. Amoroso, BA, MA (Toronto), PhD (Waterloo)
J.M. Anglin, BA (Toronto), PhD (Harvard)
K. Bloom, BSc (Loyola), MA, PhD (North Carolina)
P.E. Bowers, BA (Queen's), MA, PhD (Illinois)
T.E. Cadell, BA (British Columbia), MA (Massachusetts), PhD (Wisconsin)
A.J.R. Cameron, BA, MA, PhD (Waterloo)
N. Charless, BSc (McGill), MS, PhD (Carnegie-Mellon)
J.A. Cheyne, BA (Waterloo Lutheran), MA, PhD (Waterloo)
J.M. Cornell, BA, MS, PhD (Washington)
J.G. Holmes, BA, MA (Carleton), PhD (North Carolina)
S. Hymel, BSc, MA, PhD (Illinois)
R.H. Luche, BSc (Fordham), PhD (Waterloo)
G.E. MacKinnon, BA (Queen's), PhD (John Hopkins)
P.J. Naus, BA, PhD (Nijmegen), J
J.E. Orlando, BA (Western Ontario), MA (Detroit), MA, PhD (Michigan), J
R.D. Seim, BA (Queen's), PhD (Waterloo)
J. Theis, BA (Western Ontario), MA (Notre Dame), PhD (Windsor) J
J.A. Van Evra, BA (Valparaiso), MA (Bowling Green), PhD (Michigan State), J
P.E. Wainwright, BSc (Rhodes), MA, PhD (Waterloo)
E.E. Ware, BA, MA (Richmond), PhD (Illinois)
E.Z. Woody, BA (Reed), MS (Oxford), PhD (Duke)

Assistant Professors
D. Besner, BA (Loyola College), MSc (Memorial), PhD (Reading), NSERC University Research Fellow
R.L. Cohen Silver, BA, PhD (Northern Illinois)
P. Jolicoeur, BSc (McGill), PhD (Harvard)
M.M. Moretti, BA (Brock), MA, PhD (Simon Fraser)

Adjunct Faculty
J.R. Adum, BS (Portland State), MA, PhD (Denver)
D.S. Barnes, BA, MD (Western Ontario)
R.J. Dart, BS (Washington), MA, PhD (Waterloo)
B.S. Francis, BS (Urismus), MA, PhD (Arizona)
J.J. Hartford, MD (Toronto)
S.P. Lollis, BSc, MSc (California), PhD (Waterloo)
C.B. Lowney, BA (McGill), MA, PhD (Michigan State)
R.E. Mann, BA, MA, PhD (Waterloo)
S.L. Quan, BA (Waterloo), BEd (Western Ontario), MSc (Guelph)

G. Sumner-Smith, MRCVS, BVSc (Liverpool), FR-CVS, MSc (Guelph)
J.L. Williams BA, MA (Alberta), PhD (Missouri)

Faculty Members of Psychology holding cross appointments to:
1Optometry
2Kinesiology
3Health Studies
4Systems Design Engineering

Faculty Members holding cross appointments to Psychology:
5Environmental Studies
6Kinesiology
7Statistics
8Health Studies

J refers to faculty members at St. Jerome's College
R refers to faculty members at Renison College

Course Descriptions

Introductory Note
See departmental course listing catalogue for specific terms of the various course offerings in 1988-89.

PSYCH 101 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 102A 3C 0.5

Applied Psychology
Applications of Psychological research to contemporary concerns: personnel selection, training and evaluation, management and organizations, human factors engineering, man and environment, consumer behaviour, clinical, counselling and community psychology.

Prereq: PSYCH 101

PSYCH 102B 3C 0.5

Nature, Nurture and Human Behaviour
The role of heredity and environment in the development of intelligence, mental disorders, and criminal behaviour.

Prereq: PSYCH 101
PSYCH 102C 3C 0.5
Culture’s Influence on Behaviour
The role of culture on the development of Perception, Cognition, Learning and Memory; cultural influences on personality and personality disorders, and on conflict and aggression.
Pre req: PSYCH 101

PSYCH 102D 3C 0.5
Psychology of Consciousness
Modes of thinking, emotion, creativity, and altered states of consciousness.
Pre req: PSYCH 101

PSYCH 102E 3C 0.5
Psychological Intervention
Applications of Psychology to human coping problems and growth with emphasis on analyzing critically current treatment methods.
Pre req: PSYCH 101
Offered at St. Jerome’s College.

PSYCH 102F 3C 0.5
Personal Adjustment
Focus on research which investigates the everyday task of coping with ourselves, our environment, and the people we encounter. Topics will focus on the themes of knowing the self, interpersonal relationships, and of the way in which our social and physical environment affects our behaviour.
Pre req: PSYCH 101

PSYCH 102G 3C 0.5
Introduction to Neuroscience
The relation between brain as a substrate and mind as a process is an important scientific and philosophical problem. In this course, those biological aspects of brain function will be discussed which are directly related to the functioning of the human mind.
Pre req: PSYCH 101

PSYCH 102H 3C 0.5
Psychology and the Nuclear Threat
The course will examine the ways in which psychological concepts and theory can be applied to understanding our reactions to nuclear threat and to improving international relations.
Pre req: PSYCH 101

PSYCH 200 3C:1L 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.
Pre req: PSYCH 202 or its equivalent (see overlapping content note, Grading System, Item 6, p. 87) may not receive credit for this course.

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.
Pre req: 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.
Pre req: 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.
Pre req: PSYCH 101
Priority enrolment for Psychology majors.

PSYCH 211 3C 0.5
Developmental Psychology
An examination of the process and factors of human development.
Pre req: PSYCH 101
Priority enrolment for Psychology majors.
Also offered at St. Jerome’s College.

PSYCH 212 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.
Pre req: PSYCH 101
Also offered at St. Jerome’s College.

PSYCH 213 3C 0.5
Exceptional Children
Educational problems associated with mental retardation, emotional disturbances, sensory and physical impairments and intellectual giftedness.
Pre req: PSYCH 101

PSYCH 214 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.
Pre req: PSYCH 211
Also offered at St. Jerome’s College.

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.
Pre req: 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 the life of man. Therapy with dying individuals is reviewed and evaluated.
Pre req: PSYCH 101
Offered at St. Jerome’s College.

PSYCH 231 3C 0.5
Psychology of Religious Experience
Approaches of traditional psychological theories and especially of a modern psychology of consciousness toward phenomena of religious experience, mysticism and meditation are examined. The transcendent phenomena are compared with other altered states of consciousness.
Pre req: PSYCH 101

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.
Pre req: 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
Offered at St. Jerome's College.

PSYCH 253 3C 0.5
Social Psychology
An introduction to the scientific study of social behaviour and social influences on behaviour. Theories and research on such topics as attitude change and persuasion, stereotypes and prejudice, conformity and obedience to authority, altruism, conflict, attraction and love will be introduced.
Students may receive credit for only one of PSYCH 253 or PSYCH 220R.
Prereq: PSYCH 101
Priority enrolment for Psychology majors.
Cross-listed as PSYCH 220R

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 258 3C 0.5
Principles and Evolution of Psychoanalytic Thought
This course expresses the fundamental psychoanalytic vision as articulated by Sigmund Freud, and its relevance to the humanities. The theme is to understand the potentially liberating spirit which is at the root of psychoanalysis.
Prereq: PSYCH 101
Offered at St. Jerome's College.

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
Priority enrolment for Psychology majors.

PSYCH 271 3C 0.5
Animal Behaviour
Survey of mechanisms, development, adaptive value and evaluation of behaviour in non-human animals. Covers ethology, sociobiology and experimental comparative psychology. Emphasis on principles of research with laboratory and wild animals as well as methods of observing behaviour.
Prereq: PSYCH 101 or permission of instructor
Priority enrolment for Psychology majors.

PSYCH 291 3C, 2L 0.5
Basic Research Methods
An introduction to the methods used in psychological research. Methods for observing behaviour and the procedures used to summarize these observations are emphasized.
Prereq: PSYCH 101 and second year Honours standing in Psychology.
See overlapping content note
(Grading Systems, Item 6 on p. 8.7)

PSYCH 292 3C, 1L 0.5
Basic Data Analysis
An introduction to the logic and methods of inferential statistics with emphasis on application in Psychology. Also includes a more detailed treatment of the methods and projects introduced in PSYCH 291.
Prereq: PSYCH 291 and second year Honours standing in Psychology.
See overlapping content note
(Grading Systems, Item 6 on p. 8.7)

PSYCH 305 3C 0.5
Sensory Processes
A consideration of data and theory concerning sensory processes. Topics will include psychophysical methodology, sensory mechanisms, and the neuropsychological basis of perceptions.
Prereq: PSYCH 206

PSYCH 307 3C 0.5
Cognitive Neurology
An introduction to current human experimental neuropsychology. The course will review evidence for brain-behaviour interactions obtained from studies of human brain damage and from investigations of the normal brain. Topics such as the representation of language, hemispheric specialization, memory, spatial ability, dyslexia, movement disorders and affective disorders will be considered.
Prereq: One of PSYCH 206, 207, 261, or KIN 356

PSYCH 310 3C 0.5
Social Development
This course will be concerned with contemporary issues in psychological study of social development. The course will be organized around a few central issues such as those of continuities and discontinuities of development and the relations between social and cognitive development.
Prereq: PSYCH 211

PSYCH 311 3C 0.5
Behaviour and Development of Human Infants
The purposes of this course are to study the behaviour and development of human infants, to gain direct experience with infants, and to examine community attitudes and resources available for infant care.
Prereq: PSYCH 211 or permission of instructor

PSYCH 312 3C 0.5
Learning Disabilities
A critical examination of the concept of learning disability and of current issues in the assessment and remediation of learning problems.
Prereq: PSYCH 211, 212, or 213
Also offered at St. Jerome's College.
Students may receive credit for only one of PSYCH 212 or PSYCH 312

PSYCH 314 3C 0.5
Cognitive Development
A consideration of psychological research and theory concerned with the origins and development of cognition in humans. 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 101

PSYCH 317 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 322A/B  F.W  0.5/0.5  
**Principles and Practice in Early Childhood Education I**

Current principles of teaching preschool-aged children. An emphasis is placed on those curricula which aim to foster social and cognitive development. Topics include: characteristics and needs of children in group-care settings; classroom management; curriculum planning. Students must achieve at least a B grade to remain in the E.C.E. program.

**Prerequisite:** Acceptance into the Early Childhood Education and Care Option

A grade for PSYCH 322A will be submitted only after completion of PSYCH 322B

PSYCH 322A/B  F.W  0.5/0.5  
**Practicum in Early Childhood Education I**

Directed supervision with young children in group settings. This course a total of 200 hours of fieldwork in preschool and daycare settings over two terms. The time will be distributed between regular weekly responsibilities and block placements of full-time work. Students must achieve at least a B grade to remain in the E.C.E. program. Must be taken concurrently with PSYCH 322A/B.

**Prerequisite:** Acceptance into the Early Childhood Education and Care Option (Honours)

A grade for PSYCH 322A will be submitted only after the completion of PSYCH 322B

PSYCH 325A/B  F.W  0.5/0.5  
**Practicum in Early Childhood Education A**

Directed supervision with young children in group settings. These courses require a total of 200 hours of fieldwork in preschool and daycare settings over two terms. The time will be distributed between regular weekly responsibilities and block placements of full-time work. Students must achieve at least a B grade to remain in the E.C.E. Program. Must be taken concurrently with PSYCH 322A/B.

**Prerequisite:** Acceptance into the Early Childhood Education and Care Option (General)

A grade for PSYCH 325A will be submitted only after the completion of PSYCH 325B

PSYCH 333  3C  0.5  
**Industrial/Organizational Psychology**

An introduction to the methods and problems in Industrial Psychology. **Prerequisite:** PSYCH 101

PSYCH 334  3C  0.5  
**Theories of Individual Counselling Psychology**

An introduction to the methods, theories and problems in individual Counselling Psychology.

**Prerequisite:** PSYCH 101

Also offered at Renison College and St. Jerome’s College.

PSYCH 335  3C  0.5  
**Personality and Behaviour Change**

Forms of psychological intervention that produce important changes in the way people think, feel and behave including psychoanalysis, behaviour therapy, brainwashing, cult conversions, deprogramming, hypnosis, biofeedback and meditation.

**Prerequisite:** PSYCH 101

PSYCH 336  3C  0.5  
**Personnel Psychology**

An examination of the following major topics in personnel psychology: employment planning, selection and recruitment, selection techniques, career development, performance appraisal, training programs, labour relations, compensation systems.

**Prerequisite:** PSYCH 333

PSYCH 340  3C  0.5  
**Community Psychology**

Theory and practice are integrated in an attempt to identify and to understand the social factors which inhibit or facilitate healthy development of the individual. The adequacy of existing social structures and institutions in the treatment of various personal problems is assessed.

**Prerequisite:** PSYCH 253

Offered at St. Jerome’s College.

PSYCH 341  3C  0.5  
**Psychology of Early Childhood Education**

An introduction to theories and issues in early childhood education. Topics include issues differentiating preschool programs and application of psychological theory to early education.

**Prerequisite:** PSYCH 211

PSYCH 344  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.

**Prerequisite:** PSYCH 101

Offered at St. Jerome’s College.

PSYCH 354  3C  0.5  
**Interpersonal Processes in Critical Situations**

The course will examine reactions to victims of misfortunes such as serious physical and mental illness, natural disaster, poverty and discrimination.

**Prerequisite:** PSYCH 253

PSYCH 355  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

**Prerequisite:** PSYCH 101

Priority enrolment for Psychology majors.

Cross-listed as PSYCH 322R

PSYCH 367  3C  0.5  
**Psychopathology**

The nature and origin of deviant behaviour.

Students may receive credit for only one of PSYCH 367 or PSYCH 328R

**Prerequisite:** PSYCH 101

Priority enrolment for Psychology majors.

Cross-listed as PSYCH 328R

Also offered at St. Jerome’s College

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.

**Prerequisite:** PSYCH 261 or permission of the instructor

PSYCH 363 (A-Z) - 366 (A-Z)  3C  0.5  
**Special Subjects**

One or more term courses will be offered at different times as announced by the Department.

(Departmental listing of special subjects courses for 1989-90 should be consulted.)

**Prerequisite:** Consent of instructor

PSYCH 391  3C,  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.

**Prerequisite:** PSYCH 292 and third year Honours standing in Psychology

See overlapping content note

(Grading Systems, item 6 on p. 8.7)
PSYCH 392 3C, 1L  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)

PSYCH 422A/B  F,W  0.5/0.5
Principles and Practice in Early
Childhood Education II
An examination of the various aspects of planning and administration in early child-
hood education programs. Topics include: Practical applications of Piag-
et’s theory; parent education. Students must achieve at least a B grade to
remain in the E.C.E. program.
Prereq: PSYCH 322A/B and 323A/B or
325A/B
A grade for PSYCH 422A will be
submitted only after the completion of
PSYCH 422B

PSYCH 423A/B  F,W  25/25
Practicum in Early Childhood
Education II
Practicum for advanced students in early childhood education. This course
require a total of 300 hours of fieldwork over two terms. Possible placements
include preschool, daycare, kindergarten, and specialized programs. The time will
be distributed between regular weekly responsibilities and block placements of
full-time work. Students must achieve at least a B grade to remain in the E.C.E.
program. Must be taken concurrently
PSYCH 422A/B.
Prereq: PSYCH 322A/B and 323A/B
A grade for PSYCH 423A will be
submitted only after the completion of
PSYCH 422B

PSYCH 425A/B  F,W  1.0/1.0
Practicum in Early Childhood
Education B
Practicum for advanced students in early childhood education. These courses
require a total of 400 hours of fieldwork over two terms. Possible placements
include preschool, daycare, kindergarten, and specialized programs. The time will
be distributed between regular weekly responsibilities and block placements of
full-time work. Students must achieve at least a B grade to remain in the E.C.E.
program. Must be taken concurrently
PSYCH 422A/B.
Prereq: PSYCH 322A/B and 325A/B
A grade for PSYCH 425A will be
submitted only after the completion of
PSYCH 425B

PSYCH 440A/B  F,W  0.5/0.5
Group and Individual Counselling
The practice of counselling in terms of current psychological theories and
research. The demonstration and devel-
OPment of these concepts are aided by
personal participation, exercises, role
play and videotape simulation.
Prereq: PSYCH 334 and 344 or suit-
able alternative and permission of
instructor
Offered at St. Jerome’s College.
A grade for PSYCH 440A will be
submitted only after the completion of
PSYCH 440B.

HONOURS SEMINARS
Consult departmental listings for topics
and pre-requisites for 1989-90. Open to
third and fourth year Honours Psychology
or Make-up Psychology students, or by
consent of the instructor.

PSYCH 450 (A-Z) 2S  0.5
Honours Seminar in the History of
Psychology

PSYCH 451 (A-Z) 2S  0.5
Honours Seminar in Learning

PSYCH 452 (A-Z) 2S  0.5
Honours Seminar in Perception

PSYCH 453 (A-Z) 2S  0.5
Honours Seminar in Developmental
Psychology

PSYCH 454 (A-Z) 2S  0.5
Honours Seminar in Educational
Psychology

PSYCH 455 (A-Z) 2S  0.5
Honours Seminar in Social
Psychology

PSYCH 456 (A-Z) 2S  0.5
Honours Seminar in Personality

PSYCH 457 (A-Z) 2S  0.5
Honours Seminar in Clinical
Psychology

PSYCH 458 (A-Z) 2S  0.5
Honours Seminar in Cognitive
Processes

PSYCH 459 (A-Z) 2S  0.5
Honours Seminar in Motivation

PSYCH 461 (A-Z) 2S  0.5
Honours Seminar in Physiological
Psychology

PSYCH 482 (A-Z) 2S  0.5
Honours Seminar in Heredity and
Development

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Psychology
PSYCH 463 (A-Z) • 466 (A-Z) 2S 0.5
Honours Seminar in Special Topics

PSYCH 480 (A-Z) 1S 3L 0.5
Directed Studies in Special Topics
This is an opportunity for independent experimental research or extensive reading. Before a student can register for this course, a proposal outlining the course as agreed to by both the student and the professor, should be filed with the undergraduate secretary. A maximum of one term course in directed studies may be used toward the five Psychology electives required for the General Program and a maximum of two term courses towards the Psychology electives required in the Honours Program.
Prereq: Open to third and fourth year Psychology students who have a cumulative Psychology average of 75% or better

PSYCH 499A/B 0.5/0.5
Honours Thesis
Each student will work under the direction of a member of the department on a Research Project. The project will involve an empirical study and/or a critical integrative review of some issue or issues in the research literature of Psychology. The result of this investigation will be presented by the student in the form of a thesis which will be examined critically by members of the department. Although a thesis supervisor normally comes from within the Psychology Department, approval for other thesis supervisors may be sought from the course coordinator.
Open to fourth-year Honours Psychology or Make-Up Psychology students only
A letter grade for PSYCH 499A will be submitted only after the completion of PSYCH 499B.

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 120F 3C 0.5
Introductory Psychology
Cross-listed as PSYCH 101

PSYCH 121W 3C 0.5
Introductory Psychology (Special Topics)

PSYCH 220F 3C 0.5
Social Psychology
Cross-listed as PSYCH 253

PSYCH 221R W 3C 0.5
Interpersonal Interaction
Cross-listed as PSYCH 254

PSYCH 322R F 3C 0.5
Personality Theory
Cross-listed as PSYCH 355

PSYCH 323R W 3C 0.5
Abnormal Psychology
Cross-listed as PSYCH 357

PSYCH 367R/369R
Special Topics in Psychology

PSYCH 369R W 3C 0.5
Advanced Topics in Counselling Psychology

PSYCH 369R/369R S,F,W R 0.5
Independent Study
Open to senior Social Development Studies majors only.

Department of Recreation and Leisure Studies

Associate Professor, Chairman of the Department
S.L. J. Smith, B.A. (Wright State), MA (Ohio State), PhD (Texas A&M)

Professor, Associate Dean for Computing and Special Projects, Faculty of Human Kinetics and Leisure Studies
E.M. Avedon, BSS (William and Mary), MA, EdD (Columbia)

Assistant Professor, Associate Chairman, Graduate Affairs
W. Frisby, BPE (Alberta), MHK (Windsor), PhD (Waterloo)

Assistant Professor, Associate Chairman, Undergraduate Affairs
L. Heywood, BA (North Dakota), MA (Florida State), PhD (Wisconsin)

Professors
W.R. Forbes, BSc, PhD, DSc (London), Dic, Arcs
B.D. McPherson, BA, MA (Western Ontario), PhD (Wisconsin)
G. Wall, BA (Leeds), MA (Toronto), PhD (Hull)
J. Zuzaneck, MA (Moscow State University), CSC (Prague Institute of Sociology), PhD (Charles University, Prague)

Associate Professor
R.C. Mannell, BA (McMaster), MPE, PhD (Windsor)

Assistant Professors
L. Caldwell, BS (Pennsylvania State), MS (North Carolina State), PhD (Maryland)
P. Eagles, BSc (Waterloo), MSc (Guelph), PhD (Waterloo), MIP
D. Geitz, BEd (Waterloo), MA (Carleton), PhD (Edinburgh)
R.D. Graham, BA, MA (Western)
R. Johnson, BA, MA (Windsor), PhD (Minnesota)

Adjunct Faculty
D. Ng, BA (Lingnan), MA (Carver), MS, RD (Indiana)

Lecturers
A. Gilbert, BA, MA (Waterloo)
B. Smale, BA, MA (Waterloo)

Faculty Members of Recreation and Leisure Studies holding cross appointments to:
1Sociology
2Geography

Faculty Members holding cross appointments to Recreation and Leisure Studies from:
1Kinesiology
2Statistics and Actuarial Science
2Geography

Course Descriptions

Courses not offered in the current academic year are listed at the end of this section.

REC 100 3C 0.5
Introduction to the Study of Leisure and Recreation and Leisure Services
An overview of the field of recreation emphasizing the understanding of leisure phenomena as well as an introduction to various leisure service resources.

REC 200 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.

REC 201 3C 0.5
Leisure and the Social Sciences
Examination of modern methodological and theoretical approaches to the study of leisure behaviour with emphasis upon the socio-cultural, socio-psychological and economic dimensions.
REC 203 3C 0.5
An Introduction to the Sociology of Sport
An introduction to the characteristics, processes and problems of sport as a social system. In addition, the social psychological aspects of sport involvement are considered.
Prereq: SOC 101
Cross-listed as KIN 252 and SOC 348

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 210 3C 0.5
Organization and Administration of Recreation Services
The organization and administration of recreation on federal, provincial and municipal levels; legislation, financing, budgeting, problem solving, public relations, administrative practices and departmental organization with particular emphasis on the municipal level.

REC 220 2C,2L 0.5
Program Management in Leisure Services
A study of the scope of recreation programs and the factors involved in program management. Emphasis will be placed on the goals in recreation for the leader and participant, effective leadership of individuals and groups, individual and group creativity.

REC 230 3C 0.5
Introduction to Outdoor Recreation
A study of outdoor recreation in relation to contemporary lifestyles, natural and human resource systems. Includes the examination of outdoor settings as an integral part of an outdoor recreation continuum. Includes the role of selected governmental and non-governmental bodies.

REC 241 3C,3L 0.5
Administration of Camping and Outdoor Education
The philosophy and objectives of camping and outdoor education; administration, organizing, planning, staff, relationships, leadership training, trends in camping and outdoor education. The emphasis in this course will be the place of the resident camp in education and recreation.
Prereq: REC 230

REC 250 3C 0.5
Introduction to Recreation for Special Populations
Examines the philosophical, theoretical and empirical frameworks of recreation as a therapeutic service and process to individuals with physical, emotional and intellectual disabilities.

REC 270A 3C 0.5
Research Design Applicable to Leisure Studies
An introduction to the 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.

REC 300 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: Consent of instructor, third year standing

REC 301 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 302 3C,1L 0.5
Travel and Tourism
The scope and nature of travel and tourism as contemporary leisure experiences. Economic, political and social ramifications, research strategies employed, implications for the future.

REC 304 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 301 or 305 or consent of instructor

REC 305 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

REC 307 2C,1T 0.5
Social Psychology and Physical Activity
An examination of sport and other forms of physical activity as social situations. Topics such as social facilitation, modelling, person perception, expectations, group structure, unity, motivation, leadership, conformity, and intergroup relations are introduced in relation to motor performance.
Prereq: PSYCH 101
Cross-listed as KIN 354

REC 310 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 and BUS 121, or consent of instructor

REC 311 3C 0.5
School Recreation
An analysis of the relationship between recreation and education with particular emphasis on the sponsoring of community recreation programs by education authorities including leisure education and co-curriculum activities.
Prereq: REC 210

REC 312 3C 0.5
Recreation and Community Action
The role of the citizen in recreation systems with regard to social change. Students will examine models for social change which interact with recreation systems and power relationships between citizen's groups and recreation systems.
Prereq: REC 210
REC 317 2.5 0.5
Introduction to Museum Management
Overview of organization and structure of federal, provincial, and local Canadian heritage institutions, i.e., museums, art galleries, historic sites, and parks, etc. Examination of staff-personnel functions with respect to policy and program, income and expenditure, micro-environmental issues, computerized information holdings, etc. Laboratory work and field trips.
Prereq: Introductory management course, or consent of the instructor

REC 320 2.5 0.5
Evaluation of Recreational Programs
Evaluation procedures and techniques applicable to recreation programs are examined in detail. Specification of objectives, development of practical recording procedures and experimental analysis is stressed. Students conduct field evaluations in local community agencies.
Prereq: REC 270A

REC 321-329 0.5
Selected Topics in Recreation and Leisure Studies

REC 321 3 0.5
Recreation and Tourism Analysis
Descriptive quantitative indices for tourism and recreation development, trend extrapolation, forecasting, market evaluation. Emphasis is on applications of quantitative methods.
Prereq: REC 371A

REC 322 3 0.5
Technology and Leisure
Socio-political, and economic impacts of contemporary technology upon the leisure service industry; impacts upon leisure behaviour; moral and ethical issues generated by these impacts.
Prereq: Senior Students

REC 323 3 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 323A 3 C 0.5
Advanced Seminar in Leisure Service Management
This course is designed to explore and examine problems and issues associated with the delivery models, and administration of services are covered.
Prereq: Senior Therapeutic Students or consent of the instructor

REC 325A 3 C 0.5
Applying Behavioural Science to Leisure Problems and Issues
A general examination of how social psychological methods, theories and findings are being applied to the solution of social problems and the planning of improved arrangements for work, home life and recreation. Major emphasis will be given to the identification of applied leisure-related problems and the development of behavioural science strategies for solving these.
Prereq: Recreation 270A, 371A and 301 or 305, or consent of instructor

REC 327A 3 C 0.5
Leisure and Mass Media
Analysis of social effects of mass media as a form of leisure. The role of mass media in the daily lives, leisure and consumer behaviour of Canadians.
Prereq: Recreation 300 or 301 or 305

REC 331 2 C 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. Current problems.
Prereq: REC 230

REC 332 2 C 0.5
Applied Methods in Outdoor Recreation
Emphasis on methods and techniques for the selection, development, and implementation of programs and projects through the utilization of diverse and unique natural settings and environments.
Prereq: REC 230

REC 333 3 C 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.
Cross-listed as GEOG 333

REC 334 3 C 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 ENV S 334

REC 352 3 C 0.5
Recreation and Mental Retardation
An analysis of the motoric and psychosocial-historical dimensions specific to the retarded with direct and obvious applicability to the planning, implementing and evaluating of recreational programs.
Prereq: REC 290, PSYCH 312

REC 353 3 C 0.5
Recreation and Physical Disabilities
The psycho-social aspects of physical disabilities will be analysed, with special focus given to the planning, implementing and evaluating of leisure activities.
Prereq: REC 260, permission of instructor

REC 354 3 C 0.5
Recreation and Mental Health
A psycho-social analysis of the determinants and consequences of recreational behaviour as related to positive and negative mental health, discussing in detail, structure, semiotic factors and interaction patterns.
Prereq: REC 250

REC 361 3 C 0.5
Aging and Leisure
Social parameters of the aging process with particular reference to the Leisure Service Industry.
Prereq: Third-year standing or consent of instructor

REC 370 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. May be repeated once in a subsequent term.
Prereq: Faculty approval

REC 371A 3 C 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.
REC 372 2C, 2L 0.5
Introduction to Statistical Problem Solving by Computer
This is an applications oriented course which prepares the nonmathematical student to use the computer as a research tool. Topics include aids for statistical analysis and the preparation of documents such as reports and theses. The course provides sufficient background for application to other problems specific to the individual's field.
Prereq: A one term statistics course and computer literacy (e.g. CS 100 or high school computing)
Cross-listed as CS 316

REC 401 3C 0.5
The Economics of Recreation
A critical examination of the applications of market and non-market segmentation, valuation, and related concepts to recreation and leisure. Course content is based on recent research methods and findings from the field of leisure studies.
Prereq: Third year standing and ECON 101 or permission from instructor

REC 402 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 and other leisure-related institutions.

REC 406 0.5/0.5
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 410 3C, 1L 0.5
Planning of Recreation Facilities
A course to introduce the students to the planning, design and layout of recreation areas and facilities.
Prereq: REC 210 or 332 or consent of instructor

REC 416 3C, 1L 0.5
Principles of Recreation Planning
An exploration of alternative approaches to the planning of recreation opportunities. The demand for and supply of recreation opportunities; standards, models and systems; recreation planning policies and agencies; and selected recreation planning issues.
Prereq: PLAN 156 or 332 or a full credit in Geography, or consent of instructor

REC 425 3C, 1L 0.5
Marine Recreation
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 conflict resolution.
Prereq: REC 334 or equivalent

REC 428 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: Recreation 322

REC 429 2C, 2L 0.5
Computer Applications in Leisure Services
Theory and application in leisure service management and programming. Examination of computer impact on leisure service industry.
Prereq: Fourth-year standing or consent of instructor

REC 432 3C, 1L 0.5
Interpretation
Concepts, philosophy and practices of interpretation related to understanding the use of cultural and natural heritage resources.
Prereq: REC 332 or consent of instructor

REC 433 3C 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 design and management of natural areas will be studied.
Prereq: REC 334/ENV 334
Cross-listed as ENV S 433

REC 434 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 435 3C 0.5
Recreation Resource Policy
A study of policies, policy development and policy gaps related to recreation resources in Canada. Based on a literature review and discussion of decision-making procedures, roles and tools used in the recreation field; students are required to research real and theoretical situations for seminar presentation.
Prereq: REC 100 and REC 230 or consent of instructor

REC 470/471 3C 0.5/0.5
Research Project
An independent research project on an approved topic supervised by a faculty member. Required of all students enrolled in the Honours Recreation and Leisure Studies program.
REC 470 includes an approved design and completion of the first segment of the project.
Prereq: REC 270A, 371A
REC 471 requires the completion of the project begun in REC 470.

REC 475 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. May be repeated once in a subsequent term.
Prereq: Faculty approval

COURSES NOT OFFERED 1986-89

REC 201 Leisure and the Social Sciences
REC 241 Administration of Camping and Outdoor Education
REC 311 School Recreation
REC 312 Recreation and Community Action
REC 435 Recreation and Resource Policy
Department of Religious Studies

Associate Professor and Chairperson
M.D. Bryant,4 BA (Concordia College), STL (Harvard), MA, PhD (St. Michael's) R

Associate Professor and Undergraduate Officer
A.F. Thompson, BA (Toronto), BTh (Huron), MA (Western Ontario), STM, PhD (McGill)

Associate Professors
W.J. Bildstein, BA (Western Ontario), STB (Gregorian), MA (Windsor), STD (Angelicum) J
M.S. Bird,5 BA, MA, PhD (Iowa) R
A.L. Evans,6 BA (Toronto), BD (Emmanuel), STM (McGill), DMin (Andover-Newton) P
F.C. Gerard,7 MA (College St. Dominique, France), BD, STM (McGill), PhD (Hartford Seminary Foundation) P
M. Higgins, BA (St. Francis Xavier), MA, PhD (York) J
R.D. Legge,8 BA (Transylvania), STB (Harvard), PhD (McMaster) P
M. Malone, BA (University College, Dublin), MA, PhD (Toronto) J
J.W. Miller, BA (Goshen), MA (New York), BD (Princeton), ThD (Basel) G
D.J. Sahas,6 BA (Athens), STM (Christian Theological Seminary), PhD (Hartford Seminary Foundation) P
R.J. Sawatsky,2 BA (Bethel, Kansas), MA (Minnesota), MA, PhD (Princeton) G

Assistant Professors
M. Kiley, BA (Boston), STM, PhD (Harvard) J
A.J. Reimer, BA (Manitoba), MA (Toronto), MA, PhD (St. Michael's) G

Lecturers
R. Kooistra, BTh (Kampen), DTh (Amsterdam) P
S.A. MacDonal5, BA, STB (Western Ontario), MA (San Francisco) J
T. Yoder Neufeld,3 BA (Manitoba), MDiv (Harvard) G

Faculty designated with suffix G (Conrad Grebel), J (St. Jerome's), P (St. Paul's), and R (Renison) are located in the respective Colleges.

Faculty Members of Religious Studies holding cross appointments to:
1Fine Arts
2History
3Peace and Conflict Studies
4Social Development Studies
5Studies in Personality and Religion
6Middle East Studies

Course Descriptions

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.

R S 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.

R S 100A S,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

R S 100B F,W 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

R S 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

R S 100E F,W 3C 0.5
Biblical Studies 1
A survey of the literature, history and religion of ancient Israel as seen in its cultural setting in the ancient Near East.

Area 3

R S 100F F,W 3C 0.5
Biblical Studies 2
A survey of the literature, history and religious thought of the Christian community during the New Testament period as seen in its cultural setting in the Greco-Roman world.

Area 3

R S 100H F,W 3C 0.5
Catholic Theology
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 lay, women, ministry, and ecumenism.

Area 4

R S 106A F 3C 0.5
New Testament Greek
An introduction to Greek grammar with appropriate grammatical exercises and development of vocabulary.

Area 3

R S 106B W 3C 0.5
New Testament Greek
A continuation of the study of Greek grammar with an exegetical study of some texts from the Gospel of Mark.

Area 3

R S 200 F,W 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.

R S 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.

R S 205 W 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

R S 209 F,W 3C 0.5
The Apostle Paul: Life and Letters
An examination of the career and thought of Paul as seen in his letters and in the Acts of the Apostles.

Area 3
R S 213 W 3C 0.5
Hinduism
A study of the development of religious thought in India from the Vedic Period to the present. The course will combine an historical survey with a study of representative texts from the religious, philosophical, social and political thought of the Hindus.
Area 1

R S 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

R S 216 W 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

R S 217 F 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

R S 221 F,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

R S 225 F 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

R S 229 F 3C 0.5
The Cult of Mary
This course will explore the origins, development and forms of the cult of Mary in the Christian tradition with particular focus on contemporary insights and concerns.
Area 4

R S 230 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 225
Area 2

R S 231 F,W 3C 0.5
History of Christian Thought
An analysis of the major theological developments in the Christian traditions from the apostolic era to the present.
Area 4

R S 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

R S 238 F 3C 0.5
The Ecumenical Movement
A study of those unitive efforts which marked the history of the Christian Church, emphasizing developments from the Reformation to the present.
Area 4

R S 256 W 3C 0.5
Current Ethical Issues
An examination of specific current individual and social problems such as human sexuality, social justice, urban decay, and human rights, in the light of Christian moral consciousness.
Area 4

R S 260 F 3C 0.5
Issues in Science, Technology and Religion
A study of the questions raised by the interaction of religious faith with modern scientific and technological approaches to understanding the physical, social and psychological dimensions of our world.
Area 5

R S 263 S 3C 0.5
Justice, Peace and Development
An examination of movements, communities, and theologies which express a Christian hope for justice, peace and development in the encounter with injustice, oppression and poverty.
Area 4

R S 266 F 2C,1S 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
Film fee $5.00.
Area 5

R S 267 W 2C,1S 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
Film fee $5.00.
Area 5

R S 269 S,W 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.
Cross-listed as FINE 218A
Area 5

R S 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

R S 271 S,W 3C 0.6
Personality and Religion
A study of the psychology of personality in its relationship between personality and religious thought, experience and behaviour.
Area 5
R S 282 S 2C 1D 0.5
New Perspectives in Sacramental Theology
A discussion of sacramental theology in the light of the ongoing renewal, inaugurated by the Second Vatican Council, through a study of the individual sacraments and their role as meaningful cuts in contemporary Roman Catholicism.
Prereq: Second-year standing or consent of instructor
Area 4

RS 291 A-D
Studies in the History of Religion
RS 292 A/B J.F.W. 1.0/0.5/0.5
Women in the Church
A multi-disciplinary examination of the evolution of the relationship between women and the church in the Christian tradition.
Area 5

R S 298
Directed Reading in Special Subjects
R S 302 F 0.5
The Gospel of John
An interpretation of the Fourth Gospel in the light of the situation of the Church at the end of the first century, with an emphasis on the Johannine portrait of Jesus. The letters of John will also be studied.
Prereq: RS 100F or consent of instructor
Area 3

R S 304 F 3C 0.5
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 man.
Prereq: RS 100F or consent of instructor
Area 3

R S 305A W 3C 0.5
Intermediate New Testament Greek
Prereq: R S 106 or consent of instructor.
Area 3

R S 306 F.W 3C 0.5/0.5
Intermediate Biblical Hebrew
Reading and grammatical analysis of selected prose and poetic portions of the Hebrew Bible.
Cross-listed as R&C 206-256
Taught at WLU

R S 307A A-D
Selected Topics in Biblical Studies
Special topics will be offered Summer, Fall and Winter, 1988-89. Consult Department.

R S 308 W 3C 0.5
Old Testament Themes
An analysis and discussion of selected ethical, ritual, sociological and theological issues recurrent in Hebrew Scripture, with attention to their historical meanings and contemporary relevance.
Area 3

R S 310 W 3C 0.5
The Sacred Book of Islam
A study of the Koran (Qur’an) as literature and as the Holy Book of Islam with reading and interpretation of selected chapters (sūrahs), in translation.
Area 1

R S 318 W 3C 0.5
Islam and Christianity
A survey of the history of the Muslim-Christian relations from the time of the emergence of Islam to the present, with a special emphasis on the characteristics of the literature and its development over the centuries.
Prereq: RS 100B or consent of instructor
Area 3

R S 331A F 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

R S 331B W 3C 0.5
The Church in the Modern World
A critical study of the church’s roles in contemporary secular society.
Area 2

R S 335 W 3C 0.5
Modern Theology
A study of modern thinkers (for example, Kant, Hegel, Schleiermacher and Kierkegaard), with special emphasis on their influence on 19th-century theology.
Prereq: RS 230 or 231 or consent of instructor
Area 4

R S 338 F 3C 0.5
Theology in North America
An examination of leading ideas in the thought of major theologians in Canada (Strachan to Baum) and the United States (Edwards to Niebuhr) in order to uncover the distinctive themes of theology in North American societies.
Prereq: R S 230 or 231 or consent of instructor
Area 4

R S 350 W 3C 0.5
Christian Spirituality and Mysticism
A study of the spiritual experience and mystical knowledge of great Christian mystics, from the desert Fathers and Heptarchy in the Eastern Orthodox tradition to the mystical schools of the Western Catholic tradition.
Prereq: R S 230 or 231 or consent of instructor
Area 2

R S 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: R S 100E or 100F or consent of instructor
Area 4

R S 354 F 3C 0.5
War and Peace in Christian Theology
The Contemporary Discussion. A survey of Christian teaching on war and peace, focusing on the 20th-century discussion.
Prereq: R S 230 or 231 or consent of instructor
Area 4

R S 356 W 3C 0.5
Bioethics and Religious Values
This course will study issues such as sexual ethics, euthanasia, suicide, genetic screening, organ transplantation, organ and baby banking, as they stand in relation to traditional religious values.
Area 4

R S 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: R S 271 or consent of instructor
Area 5
Course Descriptions

Religious Studies

R S 375 W 3C 0.5
Religion and Psychotherapy
A review and analysis of the dialogue between theistic religion in the West and the personality sciences since Freud, their respective views of God, man, sin, sickness and the therapeutic process. Clinicians and theorists in psychotherapy and religion from the surrounding community will contribute to the exploration.
Prereq: R S 270 or 271 or consent of instructor
Area 5

R S 382 S,F 3C 0.5
Theology of Marriage
A study of the development of the theology of marriage in the Christian tradition.
Prereq: R S 236/236 or 261/262 or consent of instructor
Area 4

R S 383 W 3C 0.5
Shapers of the Roman Catholic Tradition
An examination of some influential thinkers in the Christian tradition who have played a critical role in Roman Catholic theology, including individuals like Augustine, Thomas Aquinas, John Henry Newman, Karl Rahner.
Prereq: R S 100H or R S 230 or R S 231 or consent of instructor
Area 4

R S 398-399
Directed Reading in Special Subjects

R S 400-A-H
Special Topics in Religious Studies
Special topics will be offered in 1986-87. Consult department.

R S 400A S,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

R S 400B S,F,W 0.5
Honours Seminar
A continuation of the above.
Every student in the Honours R S Program is required to take R S 400A and 400B.

R S 500-597 F,W R 0.5
Directed Research in Special Subjects for Graduate Students

R S 598-599 R 0.5
Directed Reading in Special Subjects for Graduate Students

COURSES NOT OFFERED 1988-89

R S 100D Religious Movements
R S 203 Wisdom Literature in the Old Testament
R S 208 The Parables of Jesus
R S 215 Religion in China
R S 220 Evangelical Christianity
R S 232A Jesus Christ in Contemporary Perspective
R S 232B Jesus Christ in Historical Perspective
R S 255 Christian Ethics
R S 257 The Thought and Practice of Christian Peacemaking
R S 261 Women and the Great Religions
R S 264 Religion in the Canadian Experience
R S 265 Unity and Diversity in Canadian Religion
R S 269A Religious Perspectives in Contemporary Literature
R S 269B Religious Perspectives in Contemporary Canadian Literature
R S 274 Religious Approaches to Personal Crises
R S 281 Theology of Worship and Sacrament
R S 290A The Religious Experience of the Young
R S 290B The Just Society
R S 290C Gospel and Liberation
R S 305B Intermediate New Testament Greek
R S 309 New Testament Themes
R S 311 Hindu Scriptures
R S 313 Indian Spirituality in the Modern Era
R S 314 Zen Buddhism
R S 315 The Narrative Expression of Canadian Native Religions
R S 316 Canadian Native Religious Traditions
R S 322 Radical Reformation
R S 323 Medieval Church History 312-1122
R S 324 Medieval Church History 1122-1449
R S 334 Islamic Theology, Philosophy and Mysticism
R S 336 Contemporary Theology
R S 339 Luther and Calvin
R S 344 Theology of Radical Protestantism
R S 360 Religion and the Arts
R S 369B-F Study-Travel Seminar in Religion
R S 371 Religion and Suicidal Behaviour
R S 450A Study Term Abroad

Faculty of Science

Course Descriptions

Courses not offered in the current academic year are listed at the end of this section.

Introductory Notes

1. The Faculty of Science offers the following courses of a general nature intended for students registered in other Faculties (Arts, Environmental Studies, Engineering, Mathematics, Human Kinetics and Leisure Studies) 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. (Students in Liberal Science programs should consult the program description on page 1410.)

SCI 000 F,W 0.0
Co-op Orientation
A non-credit orientation course for new Co-op Science students. Should be taken the term (on-campus) before the first work term.

SCI 205 F,W 3C 0.5
Physics of High Fidelity Sound Reproduction
Applies elementary physical principles to the study of the components of high fidelity systems. Will convey an appreciation of the physics of such systems and an understanding of the specifications of modern equipment. Includes several evening clinics during which interested students can measure their own or available systems using laboratory measuring equipment.
Prereq: At least one year of Secondary School Physics

SCI 209 F,W 2C,1T 0.5
Technical Writing and Speaking
Retrieving information and imparting the information you have to others; the art of speaking and writing; modern aids to producing scientific papers, reports, letters, etc.; and common errors in writing.
SCI 219 W 2C 0.5
Chemistry in Modern Society
The impact of chemistry on modern society will be considered by discussion of a number of topics including: marijuana and other non-medical drugs; food additives; birth controls; cancer-causing chemicals; pesticides and other chemical methods to control insects; chemical warfare.
Prereq: At least one year of Secondary School Chemistry

SCI 220 W 2C 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

SCI 237 F 3C 0.5
Descriptive Astronomy
A survey course in astronomy intended for non-Science students (primarily Arts, Environmental Studies, Human Kinetics and Leisure Studies students). The solar systems, stars, the galaxy, galaxies and the universe.
Open to first-year or upper-year students.
Not for Engineering, Mathematics or Science students.

SCI 238 W.S 3C 0.5
Descriptive Astronomy
A survey course in astronomy intended for Mathematics, Engineering and Science students. Newtonian developments in the solar system, the Sun and planets, stars, the Milky Way, galaxies and cosmology.
Open to first-year or upper-year students in all faculties.
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
The influence of geological factors on the natural environmental: natural hazards; efforts of engineering works on the environment; geological aspects of water resources and water disposal with particular attention to solid waste (garbage) and deep well injection of liquid wastes.
Prereq: Students will find a course in Physical Geography or Earth Sciences to be an advantage: Students whose major field is Earth Sciences may not take this course for credit.
Antireq: EARTH 358

SCI 251 F 2C 0.5
Human Genetics
An examination of recent advances in human heredity including the genetics, cytological and biochemical aspects of individual inheritance. The principles of human population genetics will be discussed. The social implications of some of the modern discoveries will be stressed.
Students whose major field is Biology may not take this course for credit.
Offered only by Correspondence for 1988-89.

SCI 252 W 3C 0.5
Biology and Society
A topical approach to problems of human society directly related to biological systems. Areas for discussion in any one year will be chosen from a wide range of topics. These will be dealt with both from the theoretical and practical aspects of modern biology.
Open to first year or upper year students.
Students whose major field is Biology may not take this course for credit.
Offered only by Correspondence for 1988-89.

SCI 255 W 2C.1T 0.5
The Biology of Aging
An introduction to the biological mechanisms of aging at the molecular, cellular and systemic levels. Topics to be discussed will include the theories of aging, methods for studying the aging process, the role of diseases in aging and chronological changes in organisms during aging.
Cross-listed as GERON 255

SCI 260 W 3C 0.5
The Science of Senses
Vision, hearing, smell, taste and other senses. A multidisciplinary view of some of the basic principles underlying these, with emphasis upon concepts which are common to all senses. Various aspects of the senses (e.g. social consequences of sensory impairment, esthetics, historical theories of sensory function) are discussed and demonstrated.
Liberal Science Core Course

SCI 261 W 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.
Liberal Science Core Course

SCI 263 F 3C 0.5
Science and Society
Social and economic impacts of science. Analysis of biotechnology as an area of science expected to have substantial impacts on modern society. Aspects of this issue will be critically examined in this team-taught, multi-disciplinary course.
Prereq: Successful completion of one year of Honours or General studies. Year One students will not be admitted to this course.
Liberal Science Core Course

SCI 265 W 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: Successful completion of one year of Honours or General studies. Year One students will not be admitted to this course.
Liberal Science Core Course

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.
Liberal Science Core Course
SCI 28A-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 uses of these isotopes 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  T  0.5
Human Biology 1
An introduction to selected topics in human physiology and consideration of factors that influence normal physiological function. Topics discussed include the structure and mechanisms of action of nerves, muscles, the cardiovascular and respiratory systems.
Antireq: BIOL 233
Offered only by Correspondence for 1988-89.

SCI 352  F.W.S  T  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.
Antireq: BIOL 233
Offered only by Correspondence for 1988-89.

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 1989 and alternate years thereafter.

SCI 369  F.W  1T  0.5
Major Paper and General Examination
Details available from the Liberal Science Office. For students in their third year of Liberal Science only.

SCI 410  0.5
Technical Report
[for Students in Co-op Applied
Chemistry, Co-op Applied Physics,
Co-op Applied Earth Sciences,
Co-op Biology and Co-op Biochem-
istry (Biology and Chemistry) only]
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 Coordination and Placement regarding sequence of work terms and satisfaction of work report requirements. A word Grading system will be used and all 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 on exploitation and pollution upon the animals and plants that inhabit them.
Students whose major field is Biology may not take this course for credit.

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. Not available to students who have taken BIOL 451.
Students whose major field is Biology may not take this course for credit.

SCI 462  F  2C  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.

SCI 468 A/B  F.W  2C  0.5/0.5
Liberal Science Senior Seminar
A forum for intensive discussion of topics of interest with resident or visiting speakers.
Prereq: Year Four standing in Liberal Science (or in another program with consent of instructor). Enrolment may be limited.

SCI 469  F.W  1T  0.5
Major Paper and General Examination
Details available from the Liberal Sciences Office. For students in their final year of Liberal Science only.

COURSES NOT OFFERED 1988-89
SCI 201 Contemporary Science 2
SCI 202 Energy
SCI 312 Physics of Music 1
SCI 350 Canadian Non-Renewable Natural Resources

Social Development Studies
Professor, Principal of Renison College
I.L. Campbell, BA (Carleton), MSc (Econ) (London), R

Associate Professor, Undergraduate Officer
M. Smyth, BA (Toronto), MA, PhD (York), R

Associate Professor, Co-ordinator of English Language Programs
J. Miller, BA, BLS (McGill), MA, MPhil (Waterloo), PhD (York), R

Adjunct Assistant Professor, Co-ordinator of Placements, Diploma Program
K. Bailey Robinson, BA (MacMurray College), MSW (WLU), R

Professor Emeritus
D.G.S. M'Timkulu, BA, MA (South Africa), MA (Yale), PhD (Natal), R

Professor
J.O. Towler, BA (Toronto), MEd, PhD (Alberta), R

Associate Professors
M.S. Bird, BA, MA, PhD (Iowa), R
M.D. Bryant, BA (Concordia College), MEd (Harvard), MA, PhD (St. Michael's), R
J.T. Harris, BMus (Temple), MSW (Pennsylvania), R
B. Hyma, BSc, MSc (Machias), MA (Sheffield), PhD (Pittsburgh), R
R. Lahue, BSc (Fordham), PhD (Waterloo), R
M.L. Nagle, BA (British Columbia), MA (Chicago), PhD (Stirling), R
M. Zentner, BA (Temple), MSW (Kansas), R
Course Descriptions

Assistant Professors
J. Major, BA (CUNY), MSW (SUNY, Albany), PhD (Toronto)
K. Mott, BA (WLU), BA (Union Theo., Vancouver) MSW (SUNY, Albany)

Adjunct Faculty
B. Abbott, BA (Waterloo), MSW (WLU), R
J. Bambrik, BA, MA (Guelph), PhD (Windsor), R
A. Bros, BA (Waterloo), MSW (WLU), R
L. Fiscus, BA (Hofstra), MA (Chicago)
D. Payne, BA (Sir George Williams), MSW (WLU), R
M. Thompson, STh (Wycliffe), RN (Wellesley), BA (Waterloo), MSW (WLU), R

Lecturers
B. Bell-Robotham, BA, MA (Western), R
T. Brenner, BA (Waterloo), MSW (WLU), R
P. Dery, BA, MA, PhD (Western), CPsyC, R
R. Finch, BA (UW), MSW (WLU)
C. Gillin, BSc (Pittsburgh), MA, PhD (Windsor)
C. Holldige, BA (Waterloo), MSW (WLU), R
N. Millard, ARTC (Royal Conservatory), BA, MSW (WLU)
M. Poynter, BA (Waterloo), MSW (WLU)
J. Turner, BA, BSW, MSW (Toronto), R
V. Wall, BA, MSW (Toronto)
J. Zirkann, BA (Toronto), LLB (Osgoode), MWS (WLU), R

Faculty Members of Renison College
holding cross appointments to:
1. Political Science
2. Religious Studies
3. geography
4. Psychology
5. Sociology
6. Fine Arts
R refers to faculty members at Renison College

Course Descriptions

Courses not offered in the current academic year are listed at the end of this section.

INTERDISCIPLINARY SOCIAL SCIENCE

ISS 131R W 3C 0.5
Social Ideas, Social Policy and Political Practice 1
An introduction to some of the major social and political ideas of Western civiliza-
tion. Attention is given to the influence and applicability of these ideas to social policy and political practice in contem-
porary Canada.

ISS 150R F,W,S 3C 0.5
Lifespan Processes: The Normal Events
An examination of the significant psycho-
social events during the lifespan with con-
ternation 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 stati-
tical analysis of social research data using a variety of qualitative and quanti-
tative methods.

Prerequisites: 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 8) on page 87.

ISS 251R W 3C 0.5
Social Research
Introduction to the philosophy and meth-
ology of applied social science
research including treatment of the prob-
lems and strategies of research design
and execution.

Prerequisites: Second year standing and at least two term courses in the social sciences or consent of the instructor.
Iss 250R or an equivalent also recommended.

ISS 320R F 3C 0.5
Critical Encounter with the Nature of Man
An attempt to increase students' under-
standing of human nature and deepen
their awareness of some fundamental issues in the life of 20th century man.
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.

Prerequisites: 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.

Prerequisites: ISS 150R or consent of instructor.

ISS 360E F 3C 0.5
Family Law and Social Work
Consideration of the court system, inves-
tigation of divorce mediation, court
mandated custody, access and juvenile
precipositional assessment, child
care, psychiatric advocacy, corre-
tions, and highlighting of professional,
ethical, confidentiality, civil and criminal
liability issues for social workers.

Prerequisites: Second year standing.

ISS 360H,F 3C 0.5
Values and the Contemporary Family
An exploration of how religious,
economic, political and other social insti-
tutions shape values in our society, and
what impact society's changing values
are having upon marriage and the family.

Prerequisite: At least two social science courses.

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.

Prerequisite: Permission of Undergraduate Officer.
ISS 499A/B T 0.5/0.5
Senior Honours Essay
The essay will normally be related to the student's chosen theme area, supervised by only one faculty member, but criticially 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 120F 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 120F or PSYCH 101

PSYCH 121R W 3C 0.5
Introductory Psychology (Special Topics)
A continuation of PSYCH 120F with in depth study of some selected topics.
Prereq: PSYCH 120F
Students may receive credit for only one of PSYCH 121R or PSYCH 102

PSYCH 220R F 3C 0.5
Social Psychology
Examination of psychological principles involved in individual-society interaction. Topics may include research methods, self, sexual attitudes and behaviour, person perception, attitudes, affiliation, aggression, altruism, groups, environment and behaviour, loneliness, social psychology and legal process.
Prereq: An introductory Psychology course
Cross-listed as PSYCH 253
Students may receive credit for only one of PSYCH 220R or PSYCH 253

PSYCH 221R W 3C 0.5
Interpersonal Interaction
A consideration of selected theories of interpersonal interaction. Topics include E. Goffman, non-verbal communication, H.S. Sullivan, transactional analysis, the double-bind theory, R.D. Laing, the basic dimensions of interpersonal behaviour, and social exchange.
Prereq: PSYCH 220R or PSYCH 253
Cross-listed as PSYCH 254
Students may receive credit for only one of PSYCH 221R or PSYCH 254

PSYCH 322R F 3C 0.5
Personality Theory
An examination of the major theories of personality including consideration of the psychoanalytic, dispositional, humanistic, and behaviourist models.
Prereq: An introductory Psychology course
Cross-listed as PSYCH 355
Students may receive credit for only one of PSYCH 322R or PSYCH 355

PSYCH 323R W 3C 0.5
Abnormal Psychology
A survey of concepts, theory, and research dealing with the nature and etiology of behavioural abnormality. Topics include neurosis, schizophrenia, depression, psychophysiological and behavioural disorders.
Prereq: An introductory Psychology course
Cross-listed as PSYCH 357
Students may receive credit for only one of PSYCH 323R or PSYCH 357

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: 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. Only subject will be dependent upon special research and/or instructional interests of faculty.

PSYCH 399R/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 in 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 Officer

SOCIAL WORK

SOCW 001 W 3S 0.0
Casework Technique Seminar
A required non-credit seminar for Social Work Diploma students. Includes further consideration of topics introduced in SOCW 350E and ongoing discussion of students' practicum experiences.
Social Work Diploma students only

SOCW 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.

SOCW 220R F 3C 0.5
Social Casework 1
A presentation of some of the theoretical constructs necessary for the understanding of the individual in the casework relationship, as well as an introduction to some appropriate casework interventions. Emphasis in the course will be theoretical.
Prereq: SOCW 120R or consent of instructor

SOCW 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: SOCW 120R or consent of instructor

SOCW 222R F.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: SOCW 120R or consent of instructor
SOCWK 230R W 3C 0.5
A Christian Perspective on Social Work Practice
The course explores the relevancy and impact of the Christian faith in social work practice and examines some of the ethical issues and value conflicts facing the Christian and non-Christian social worker in practice today.
Prereq: SOCWK 120R or consent of instructor

SOCWK 320R W 3C 0.5
Social Casework
Consider 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
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,W 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.
Prereq: SOCWK 120R or consent of instructor

SOCWK 350F F,W 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 355R F,W,J 3C 0.5
Child Maltreatment: Identification and Prevention
The objectives of this course are to provide an understanding of the dimensions and causes of child maltreatment, to develop skills identifying cases of the 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,S 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 367R F,W,J 3C 0.5
Family Violence
An application of the principles and models of medical, psychogenic, and sociogenic adjustment to an understanding of family violence. The treatment of victims of family violence, the prevention of such violence, and social policies affecting family welfare are considered.
Prereq: SOCWK 120R or consent of instructor
Antireq: SOCWK 350B

SOCWK 367R W,S 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 380A/B J,F,L,W 3/3C 0/0.5
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 380A will be submitted only after the completion of SOCWK 380B

SOCWK 388R/389R 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
SOCIOLOGY

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.
Students may receive credit for only one of SOC 120R or SOC 101

SOC 223 F, S 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 Physical Disability
Examination of the social adaptations of the physically disabled. Particular attention is given to the theoretical tradition which considers physical 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 recosealization 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 1988-89

ISS 231R Social Ideas, Social Policy and Political Practice 2
ISS 240R Art and Society
ISS 360C Children in Difficulty: Biosocial Perspectives
ISS 350F Values in the Social Sciences
ISS 350L Individualism and the Family Life Cycle
PSYCH 369R Advanced Topics in Counselling Psychology
SOC 220R The Individual, Society and Religion
SOC 221R Master Trends in Modern Society
SOC 327R Minority Status in Canadian Society
SOC 328R Canadian Ethnic and Cultural Minorities
SOCWK 121R Contemporary Social Problems
SOCWK 365R Medical Social Work

Course Descriptions

STV 100 0.5
Society, Technology and Values: An Introduction
This introductory, team-taught course examines the social implications of new developments in technology. The theme of the course in a particular term is determined by the instructors.
Prereq: None

STV 200 0.5
Society, Technology and Values: Projects Course
A self-directed group learning exercise focusing on a particular technology in its societal context or, alternatively, on a commonly held value and its interaction with one or more technologies.
Prereq: Registration in the STV Option and successful completion of STV 100 or consent of the instructor

STV 400 0.5
Society, Technology and Values: A Senior Project
An independent but supervised research project at the level of a senior honours essay or equivalent.
Prereq: Registration in the STV Option normally at the fourth-year level and successful completion of STV 200
Department of Sociology

Professor, Chairman
D. Kubat, MA (Kansas), PhD (L. Maximilian, Munich)

Professor, Associate Chairman for Graduate Studies
H.J. Fallding, BA, BSc, MA (Sydney), PhD (Australien National), FRSC

Associate Professor, Associate Chairman for Undergraduate Studies
F.A. Fasick, BA (Pennsylvania State), MA, PhD (Columbia)

Professors
W.F. Forbes, BSc, PhD, DSc (London), DIC, APSC
R.D. Lambert, BA, MA (McMaster), PhD (Michigan)
B.D. McPherson, BA, MA (Western Ontario, PhD (Wisconsin)
C. Redekop, BA (Goshen), MA (Minnesota), PhD (Chicago) G
W.G. Scott, BA (Western Ontario), MA (Toronto) Honorary Member of the University, (Retired)*
E.W. Vaz, BA, MA (McGill), PhD (Indiana)
K. Westhues, BA (Conception), MA, PhD (Vandebilt), Recipient of the Distinguished Teacher Award
J. Zuzanele, MA (Moscow State University), CSC (Prague Institute of Sociology), PhD (Charles University, Prague)

Associate Professors
J.E. Curtis, BA (Sir George Williams), MA (Central Michigan), MA (Cornell)
F. Desroches, BA (Waterloo), MA (Toronto), PhD (Waterloo), J
J. Goyder, BA (Bishop's), MA, PhD (McMaster)
S.A. McDaniel, BA (Massachusetts), MA (Cornell), PhD (Alberta), Recipient of the Distinguished Teacher Award
M.I. Nagler, BA (British Columbia), MA (Chicago), PhD (Stirling), R
R.C. Prus, BA (Manitoba), MA, PhD (Iowa)
M. Shimo, BA (International Christian, Japan), MA, PhD (British Columbia) J
N. Theberge, BA (Massachusetts), MA (Boston), PhD (Massachusetts)
J.B. Whitney, BA (Western Ontario), MA, PhD (Toronto)
A. Wipper, BA, MA (McGill), PhD (California, Berkeley)

Assistant Professors
P.J. Carrington, BA (Harvard), MA, PhD (Toronto)
A.J. Flanagan, BA (Waterloo), MA (McMaster), PhD (Victoria, New Zealand)
B.J. Given, BA, MA (Carleton), PhD (Alberta)
B.G. Hanson, BA (Western Ontario), MA (Carleton), PhD (Toronto)
G.K. Warner, BA (British Columbia), MA (Wisconsin), PhD (British Columbia)
A.V. Wister, BA, MA, PhD (Western Ontario)

Adjunct Faculty
A.A. Hunter, BA (British Columbia), MA, PhD (Wisconsin)

Faculty Member of Sociology holding cross appointment to:

Kinesiology

Faculty Members holding cross appointments to Sociology from:

Statistics and Actuarial Science
Recreation and Leisure Studies
Withd Laurier University, Faculty of Arts, Political Science
Health Studies

*Also has Adjunct appointment
G refers to faculty members at Conrad Grebel College
J refers to faculty members at St. Jerome's College
R refers to faculty members at Renison College

Course Descriptions
Courses not offered in the current academic year are listed at the end of this section.

SOC 101 F.W.S 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.
Not open to students who have taken SOC 101(1), 101(m), 101(u) or SOC 120R. 101(m) is an introductory course intended as an elective for mathematics students or as a basis for a combined honours in Mathematics and Sociology. 101(u) is especially designed for Planning students.

Offered at Conrad Grebel, Renison and St. Jerome's Colleges.

SOC 102 W 2C 0.5
Social Problems
An examination of cultural forces that create social problems and failures in personal and institutional adjustments. Specific attention is paid to the problems of poverty, delinquency and ethnic relations in Canadian society.

SOC 200 2C 0.5
Marriage and the Family
A survey of sociological perspectives on marriage and the family in urban-industrial societies. Special attention is given to marriage and the family in Canada. Comparisons with U.S and Britain will be undertaken.
Prereq: SOC 101 or consent of instructor
Also offered at St. Jerome's College.

SOC 204 2C 0.5
Sociology of Adolescence
The social definitions of adolescence in cross-cultural and historical perspective. Social roles of adolescents in the institutional structures of urban-industrial societies with special emphasis on the family, education, and the economy. The relationship of adolescents' social roles to processes of social change and stability.
Prereq: SOC 101 or consent of instructor

SOC 206 2C 0.5
Gender Roles
An examination of male and female roles in contemporary Canadian society. Current and past roles of both sexes in different societies are considered. Selected topics of interest include sex role identity and its development, male role change, media images of men and women and men's and women's liberation.
Prereq: SOC 101 or consent of instructor
SOC 207 F S 2C 0.5
Sociology of Education
Attention will be focused on the concepts and theories of sociology as they apply especially to the educational system. This course is designed for Co-op and Regular students who plan to enter the teaching field.
Prereq: SOC 101 or consent of instructor
Offered at Conrad Grebel College.

SOC 208 F 3C 0.5
Education and Native Peoples
An examination of some of the limitations and alternatives to formal schooling employed mainly by Canadian and Australian indigenous groups (Indian, Inuit, and other aboriginal groups). Special emphasis is placed on skills training and the group's search for identity.
Offered at St. Jerome's College.

SOC 209 F 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
Offered at St. Jerome's College.

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 216 2C 0.5
Language, Society, and Identity
A sociology of language is provided with particular reference to the relationship between language, (Canadian) society, and identity. Included are various sociolinguistic issues such as the role of language in shaping the (re)construction of diverse realities.
Offered at St. Jerome's College.

SOC 219 3C 0.5
Catholic Sociological Thought
An analysis of the distinctive emphasis and perspectives which characterize contemporary sociological theory in Catholic cultures. The course will focus on theories of the family, the community, human sexuality, politics and the economy.
Offered at St. Jerome's College.

SOC 220 F 3C 0.5
Sociology of Business Management
A study of the structure, stratification and social roles in the organization, operation and management of small businesses. Attention will also be given to decision making, labour-management relations, the institutionalization of value systems, and job satisfaction.
Offered at Conrad Grebel College.

SOC 221 2C 0.5
Canadian Society
An introductory survey of Canadian society. This course will examine issues in socio-historical development of Canadian society. Its present social structure, organizations and ideologies.
Formerly SOC 103

SOC 222 2C 0.5
Juvenile Delinquency
A systematic analysis and criticism is presented of biological, psychological, psychoanalytical and sociological theories of juvenile delinquency. Attention is given to statistics and contemporary research with special emphasis on the distribution and types of delinquent subcultures.
Prereq: SOC 101 or consent of instructor

SOC 223 F S 2C 0.5
Deviance: Perspectives and Processes
The deviance-making process is examined in a variety of social contexts. Examines the emergence of rules and control agencies, the processes by which people become involved in deviant activities, and the contingencies affecting their careers as deviants.
Prereq: SOC 101 or consent of instructor
Also offered at Renison College.

SOC 224 2C 0.5
Law and Order: Regulating Deviance
Focusing on the "processes and problems of social control", this course examines: the conditions affecting the emergence of legal norms; the enforcement of criminal law; and the processing of offenders.
Prereq: SOC 101 or consent of instructor

SOC 226 3C 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

SOC 228 0.5
Sociology of Corrections
Decisions to process offenders and the role of social factors in the Canadian criminal justice system are critically examined. Focuses on issues such as police discretion, the legal profession and prison systems.
Prereq: SOC 101

SOC 232 0.5
Technology and Social Change
This course relates the prospect of social change to issues such as the division of labour, automation, technology and ecology, "post-industrial" society, small scale technology, workers' control and the domination of nature.
Prereq: SOC 101

SOC 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, 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
Formerly SOC 104

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
   Formerly SOC 106

SOC 238 2C 0.5
Sociology of Marketing and Sales
This course considers the (social) processes by which people "do business". Focusing on day to day exchanges, ongoing relationships within the business and consumer community are examined from an interactionist perspective.
Prereq: SOC 101 or consent of instructor

SOC 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 S 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 Disorder
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 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
Comparative Social Structure
General theoretical and methodological issues facing comparative sociology; comparative methods at work in the treatment of Western and non-Western societies (including Canada).
Prereq: SOC 101 or consent of instructor
   Also offered at St. Jerome's College

SOC 256 W 2C 0.5
Ethnic and Racial Relations
Relations between different racial and cultural groups, analysis of majority-minority group status with special reference to Canada.
Prereq: SOC 101 or consent of instructor

SOC 263 F 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 R S 221
   Offered at Conrad Grebel College.

SOC 264 S 2C 0.5
Sociology of Religion
Religion is defined broadly and its relation to phenomena like totalitarian movements, psychoanalysis and drug experience examined. The features common to all religions are explained, viz, myth, dogma, church, ritual, ethics and religious experience.
Prereq: SOC 101 or consent of instructor
   Also offered at St. Jerome's College.

SOC 265 2C 0.5
Political Sociology
The sociological analysis of the institutionalization of power, political movements, parties, conflict and its accommodation.
Prereq: SOC 101 or consent of instructor
SOC 267 2C 0.5
Sociology of the Contemporary University
How have recent demographic and economic changes in North America affected the organization and goals of higher learning? This course explores organizational crises and various attempts at containing and managing them.
Prereq: SOC 101 or consent of instructor

SOC 275 W 2C 0.5
The Mennonites as a Sociological Community
A case study of the Waterloo County Mennonites as a social system. Attention is paid to a methodology for studying religious-cultural group by engaging in direct field studies. The community, charter resources, integration, family system, life ceremonies, adaptation to change, and survival techniques will be examined.
Prereq: An introductory social science course
Offered at Conrad Grebel College

SOC 280 F.W. 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 8) on page 8:7

SOC 286 W 2C 0.5
Environment and Behaviour
A study of the interaction between social organization and ecological factors such as pollution, energy and land resources.
Offered at Conrad Grebel College

SOC 290 F 2C 0.5
Community, Communes and Utopias
Using communes and the writings of utopia visionaries as case studies, the nature and definition of community, the place and problem of community in modern societies, and the function of community in local and worldwide societal harmony will be analysed.
Offered at Conrad Grebel College

SOC 305 2C 0.5
Introductory Sociological Theory
An examination of the object and function of sociological theory in social research. Types of sociological theories. Discussion of selected classics of sociological theory.
Prereq: SOC 101 or consent of instructor

SOC 307 W 2C 0.5
Problems in Contemporary Education
A study of problems arising from the interplay between institutionalized education and the forces of rapid social change in the contemporary society. It emphasizes the changing roles of the learners and instructors and social dimensions of newer learning theories and programs. Themes will be selected and studied in depth on a seminar basis.
Prereq: SOC 101 and 207
Offered at Conrad Grebel College

SOC 310 2S 0.5
Seminar in Group Dynamics
An analysis of naturally occurring and experimental groups from a social structural perspective. The study of processes of internal differentiation, integration, authority, etc. and the relationships between small groups and their environments.
Prereq: SOC 101 or consent of instructor

SOC 321 F C 0.5
Methods 1
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. Equivalent to: ERS 150, P SCI 315, PSYCH 291, REC 270A, ISS 251R.
Prereq: SOC 101 or consent of instructor

SOC 322 W 2C 0.5
Methods 2
Continuation of Methods 1. The course involves seminar meetings emphasizing the critical evaluation of research techniques.
Prereq: SOC 321 or consent of instructor

SOC 329 2C 0.5
Crime as Business
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

SOC 333 2C 0.5
Canadian Multiculturalism
A seminar dealing with multicultural attitudes and beliefs in Canadian society, especially within the majority English and French Canadian populations.
Prereq: An introductory course in a Social Science

SOC 336 2C 0.5
Sociology of Professions
An examination of the distinctive nature of professions; professional recruitment, socialization and identification; professional careers; the professionalization of occupations; relationship to government; professional specialization; status, power and mobility of professionals.
Prereq: SOC 101

SOC 340 2C 0.5
Complex Organizations
Examines the role of large-scale organizations in industrial society, and their impact and influence. Illustrations will be drawn from commerce and industry, as well as education, health services, and government.
Prereq: SOC 101 and SOC 242

SOC 342 2C 0.5
Sociology of Industrial Relations
Using sociological concepts and theories, the course will examine the nature of the relationship between employers and employees, current issues facing unions and management, and the character of accommodation which may be realized between the two.
Prereq: SOC 101 and SOC 242

SOC 343 2C 0.5
Sociology of Health Care
Examination of the organizations which provide health care, including assumptions under which they operate, interactive roles played by all members, including patients, alternative arrangements for providing health care, and the social positions held by health professionals.
Prereq: SOC 101 or consent of instructor

SOC 344 3C 0.5
Sociology of Aging
An introduction to individual and population aging. Topics discussed include: aging from an historical and comparative perspective; aging in subcultures; aging and the social structure; aging and social processes; aging and the environment; work and retirement; and aging and leisure patterns.
Prereq: SOC 101 and 1 other Sociology course Cross-listed as KIN 352

SOC 347 3C 0.5
Sociology of Leisure
Nature and extent of leisure phenomena in contemporary society. Examination of institutional and formal organization aspects, social role, social research strategies employed in the study of leisure.
Prereq: Two term courses in sociology Cross-listed as REC 301
SOC 348 3C 0.5  
Sport in Society  
An introduction to the sociology of sport. Utilizing the major frames of reference of the social sciences, the function of sport in contemporary society is examined.  
Prereq: SOC 101 and one other Sociology course  
Cross-listed as REC 203 and KIN 252

SOC 354 2C 0.5  
World Population Problems  
Comparative analysis of population problems across societies. Focus is on social institutions and their relationships to population. Emphasis on fertility and family planning.  
Prereq: SOC 101 and SOC 253

SOC 360 2C 0.5  
Social Psychology and Political Participation  
A seminar examining the relations between the social psychological characteristics of Canadians and their political behaviour, with an emphasis on public opinion and voting.  
Prereq: SOC 101 or consent of instructor

SOC 364 2C 0.5  
Social Change  
A systematic review and analysis of sources, patterns, processes, and consequences of social change in developing countries, the role of ideas, and the breakdown and reorganization of social structure.  
Prereq: SOC 101 and one other Sociology course  
Also offered at St. Jerome's College

SOC 366 2C 0.5  
Urban Sociology  
The comparative study of urbanization as a process, the culture and organization of cities, urban problems; special attention is given to industrial cities of Canada, with comparative reference to the principal cities of Western societies.  
Prereq: SOC 101 and one other Sociology course

SOC 370 W 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.

SOC 405 F 2C 0.5  
The Development of Sociological Theory  
Development of sociological theory in the 19th and early 20th centuries. Emphasis is on the European tradition, although selective attention is given to North American theorists.  
Prereq: SOC 101 and one other Sociology course (SOC 271 is recommended)

SOC 406 W 2C 0.5  
Contemporary Sociological Theory  
Development of sociological theory in the 20th century. Included is discussion of current theoretical work.  
Prereq: SOC 101 and one other Sociology course (SOC 271 is recommended)

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  
Formerly SOC 380

SOC 415 2C 0.5  
Social Networks  
A survey of applications of the concept of the network in studying social structures. Examples will be drawn from diverse areas, such as interpersonal relations, community studies, social support, interorganizational relations, elites, deviant groups, etc.  
Prereq: SOC 101 or consent of instructor

SOC 421 2C 0.5  
Quantitative Methods  
Design and data analysis in contemporary sociological research; with an emphasis on the analysis of secondary data and computer applications.  
Prereq: SOC 280 or equivalent or consent of instructor  
Formerly SOC 381

SOC 440A-X S,F,W 0.5  
Directed Readings  
Selected readings and essay assignments under the direction of a faculty member.  
Prereq: Fourth-year standing in Sociology

SOC 440A F,W,S 0.5  
Directed Readings in Deviance, Criminology, and Corrections.

SOC 440B F,W,S 0.5  
Directed Readings in Social Psychology

SOC 440C F,W,S 0.5  
Directed Readings in Social Inequality

SOC 440D F,W,S 0.5  
Directed Readings in Quantitative Methods and Statistics

SOC 440E F,W,S 0.5  
Directed Readings in Social Theory

SOC 440F F,W,S 0.5  
Directed Readings in the Family

SOC 440G F,W,S 0.5  
Directed Readings in the Marketplace

SOC 440K F,W,S 0.5  
Directed Readings in Industry, Work and Complex Organizations

SOC 440M F,W,S 0.5  
Directed Readings in Religion

SOC 440N F,W,S 0.5  
Directed Readings in Demography
Department of Spanish

Associate Professor and Chairman of the Department
A. Fama, BA (Brock), MA (Western Ontario), PhD (SUNY at Buffalo)

Assistant Professor, Undergraduate Officer
B. Thalman, BA (DePauw), MA, PhD (Ohio State)

Associate Professor
C.M. Fernández, Lic en Arq (Madrid), MA (Tulane), D Lit et Phil Universitas Complutensis (Madrid)

Language Instructor
P. Graham, BA (McMaster)

Participating Adjunct Faculty at Wilfrid Laurier University
Professor
A.A. Borras, BA (Kentucky), MA (Indiana), PhD (Pennsylvania State)
Assistant Professor
M. Ratcliffe, BA, MA (Carleton), PhD (Toronto)

Course Descriptions

Courses not offered in the current academic year are listed at the end of this section.

Students with a knowledge of Spanish not acquired in an academic institution must write a placement test before registering in a language course.

SPAN 101 F,W 3C,1L 0.5
Introduction to Spanish 1
Intensive drill in the fundamentals of grammar, comprehension and speaking. Some reading, translation and composition. The language laboratory is used as an integral part of the course.
For students with no previous knowledge of Spanish. Cannot be taken concurrently with SPAN 111.
(WLU 101/151-40)

SPAN 102 F,W 3C,1L 0.5
Introduction to Spanish 2
A continuation of SPAN 101.
Prereq SPAN 101 or consent of Department
(WLU 101/152-40)

SPAN 201A F 3C,1L 0.5
Intermediate Spanish 1
For students with some knowledge of Spanish. Seeks to reinforce the language, both oral and written, through selections from literary works and grammar review. Language laboratory also used to increase understanding and speaking skills.
Prereq SPAN 102 or consent of 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 Department
(WLU 122/172-03)

SPAN 203 F 3C,0.5
Spanish Civilization 1
Development of Spanish Civilization and culture from the earliest times to the present.
Taught in English.
(WLU 203/253-30)

SPAN 204 W 3C,0.5
Spanish Civilization 2
A continuation of SPAN 203.
Taught in English.
(WLU 213/263-03)

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.
Prereq SPAN 201B
(WLU 205/253-30)

SPAN 206 W 3C,0.5
Survey of Spanish Literature 2
A continuation of SPAN 205 from the 18th century to the present.
Prereq SPAN 205
(WLU 206/256-03)

SPAN 217 F 3C,0.5
Spanish American Civilization 1
A survey of the geography, history and problems of Spanish America from pre-Columbian times to the present.
Taught in English.
(WLU 223/273-30)

SPAN 218 W 3C,0.5
Spanish American Civilization 2
A survey of the art, music and literature of Spanish America from pre-Columbian times to the present.
Taught in English.
(WLU 233/283-03)
SPAN 227 F 3C 0.5
Survey of Spanish American Literature 1
Literary trends and most significant works from the conquest to the 19th century.
Prereq: SPAN 201B (WL2 208/258-30).

SPAN 228 W 3C 0.5
Survey of Spanish American Literature 2
A continuation of SPAN 227.
Prereq: SPAN 227 (WL2 208/259-03).

SPAN 251A F 3C 0.5
Composition and Conversation 1
Intensive language study based on literary texts, including vocabulary, grammar and syntax. Introduction to commercial Spanish. Essay writing, translation, and discussion.
Prereq: SPAN 201B or consent of the Department (WL2 211/261-30).

SPAN 251B W 3C 0.5
Composition and Conversation 2
A continuation of SPAN 251A.
Prereq: SPAN 251A (WL2 212/262-03).

SPAN 266 W 3C 0.5
The Spanish American Short Story
Selected stories from outstanding writers of the 19th and 20th centuries in Spanish America.
(WL2 214/264-03).

SPAN 294 F 2C 0.5
Romanticism in Spain
Readings of selected 19th century plays, poetry and novels.

SPAN 295 W 2C 0.5
The Spanish Realist Novel
Study of the fundamental narrative techniques and ideology in some of the most representative realist novels of the 19th century.
Prereq: SPAN 206 (WL2 305/355-03).

SPAN 322 F 2C 0.5
The Generation of '98: Fiction
A study of selected works of Valleleclan, Azorin, Baroja and Unamuno.
Prereq: SPAN 206 (WL2 330/480-20).

SPAN 324 W 3C 0.5
Contemporary Spanish Theatre and Poetry
Prereq: SPAN 206 (WL2 324/474-20).

SPAN 325 F 2C 0.5
Contemporary Spanish Novel
Influences on the novel and literary tendencies, with stress on Cela, Matute, Lahoret, Angel de Lera and Carlos Rojas.
Prereq: SPAN 206 (WL2 325/473-02).

SPAN 333 F 2C 0.5
Modern Spanish American Poetry
A study in depth of major poets and movements since Modernism.
(WL2 339/469-20).

SPAN 334 F 2C 0.5
Modern Spanish American Prose
A critical study of masterpieces in prose from Sarmiento to the present.
(WL2 338/358-02).

SPAN 344 F.W 2T 0.5
Special Topics in Hispanic Studies
By special arrangement, an individual student or a small group of students will follow a course of study under the supervision of a faculty member.
(WL2 317/467-20).

SPAN 351A F 2C 0.5
Advanced Composition and Conversation 1
Writing of essays and discussion based on selected themes or topics relating to Spain or Spanish America.
Prereq: SPAN 251B (WL2 301/351-20).

SPAN 351B W 2C 0.5
Advanced Composition and Conversation 2
A continuation of SPAN 351A.
Prereq: SPAN 351A (WL2 302/352-02).

SPAN 387 W 2C 0.5
Women and Spanish American Literature
A study of selected works by women from the Baroque to the 20th century, with focus on their literary quality and the varying position of women from early times to the present.
Prereq: SPAN 206 (WL2 320/370-20).

SPAN 495 W 2C 0.5
The Novel in Mexico
This course will trace the development of the novel in Mexico through its most prominent and representative authors. Azuela's Los de abajo, Ruffo's Pedro Páramo and Fuentes' La muerte de Artemio Cruz will be analyzed. These works will be approached both as an art form and as a social document, and will be examined within a broad cultural context.
Prereq: SPAN 228 or consent of department (WL2 328/478-02).

COURSES NOT OFFERED 1988-89
SPAN 265 The Spanish Short Story
SPAN 311A Applied Spanish Stylistics 1
SPAN 311B Applied Spanish Stylistics 2
SPAN 328 The Spanish Golden Age: Theatre and Poetry
SPAN 338 Contemporary Spanish American Theatre
SPAN 446 Medieval Spanish Literature
SPAN 497 The Novel in South America

Studies in Sexuality, Marriage and the Family

Associate Professor, Director
P.j. Naus, BA, PhD (Nijmegen), J.

Associate Professor
J.P. Theis, BA (Western), MA (Notre Dame), PhD (Windsor), J
J refers to faculty members at St. Jerome's College

Course Descriptions
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

SMF 201A F 3C 0.5
Introduction to Sexuality and Sex Education 1
A broad multidisciplinary overview of perspectives on human sexuality,
SMF 201B W 3 C 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.
Prereq: SMF 201A

SMF 202A/B F.W 3 C 0.5/0.5
Introduction to Marriage and the Family
A multidisciplinary examination of marriage and the family.
Offered at St. Jerome's College

SMF 202A F 3 C 0.5
Introduction to Marriage and the Family 1
A broad multidisciplinary overview of perspectives on marriage and the family.

SMF 202B W 3 C 0.5
Introduction to Marriage and the Family 2
A multidisciplinary examination of selected topics regarding marriage and the family. Methods for incorporating significant knowledge about marriage and family into family life programs will also be examined.
Prereq: SMF 202A

SMF 301A/B F.W 3 C 0.5/0.5
Advanced Study of Sexuality and Sex Education
An in-depth and multidisciplinary examination of some issues in human sexuality and sex education.
Offered at St. Jerome's College

SMF 301A F 3 C 0.5
Advanced Study of Sexuality and Sex Education 1
An in-depth and multidisciplinary examination of some theoretical perspectives in human sexuality.
Prereq: SMF 201A/B

SMF 301B W 3 C 0.5
Advanced Study of Sexuality and Sex Education 2
An in-depth and multidisciplinary examination of some special and selected topics in the area of human sexuality and sex education.
Prereq: SMF 301A

SMF 302A/B F.W 3 C 0.5/0.5
Advanced Study of Marriage and the Family
An advanced multidisciplinary examination of some theoretical perspectives on marriage and the family.
Prereq: SMF 202A/B

SMF 302A F 3 C 0.5
Advanced Study of Marriage and the Family 1
An advanced multidisciplinary examination of some special and selected topics in the area of marriage and the family.

SMF 302B W 3 C 0.5
Advanced Study of Marriage and the Family 2
An advanced multidisciplinary examination of some special and selected topics in the area of marriage and the family.
Prereq: SMF 302A

SMF 303A/B F.W 3 C 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 3 C 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 302A/B

SMF 303B W 3 C 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

Department of Systems Design Engineering

Professor, Chairman
M. Chandrashekar, BTech (Indian Institute of Technology, Kanpur), MASc, PhD (Waterloo), PEng

Professor, President of the University
D.T. Wright, BASc (Toronto), MS (Illinois), PhD (Cambridge), DEng (Carleton), LLD (Brock) DSc (Memorial), LLD (Concordia), LHD (Northeastern), PEng

Associate Professor, Associate Dean for Computing, Faculty of Engineering
B.L. Wills, BASc, MASc, PhD (Waterloo), PEng

Professor, Associate Chairman, Graduate Studies
K.W. Hipecl, BASc, MASc, PhD (Waterloo), PEng

Associate Professor, Associate Chairman, Undergraduate Studies
M.E. Jernigan, SB, SM, PhD (Massachusetts Institute of Technology), PEng, Recipient of the Distinguished Teacher Award

Professors
W.K. Adjan, Dipl-Ing (TH Darmstadt), Dr habil, apl Professor (Karlsruhe)
M.P. Bryden, SD (MT), MSc, PhD (McGill)
T.M. Fraser, MB, CHB (Edinburgh), MSc (Ohio State), LMCC, FACPM, PEng, (Retired)
K. Husseyn, MSc (Istanbul), PhD (London), DSc (Eng)(London), PEng

Recipient of the Distinguished Teacher Award
H.K. Kembwan, BSc, BE (Mysore), MS (Illinois), PhD (Michigan State), PEng
A. Pugh, BSc (Wales), PhD (Nottingham), CEng, REE, PREE
P.H.O’N. Roe, BASc (Toronto), MASc, PhD (Waterloo), PEng
S.S. Sengupta, MA, DPhil (Calcutta)
K. Singhal, BTech (Indian Institute of Technology, Kharagpur), MS, EngScD (Columbia), PEng
G.N. Soulis, BASc (Toronto), PEng
T.E. Unny, BE (Madras), M Tech (Kharagpur), Dr Ing (Dresden), PEng
D.A. Winter, BSc (Queens), PhD (Dalhousie), PEng
A.K.C. Wong, BSc, MSc (Hong Kong), PhD (Carnegie), PEng
Course Descriptions

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
      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 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 per week. The department endeavors 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 his/her studies.

SY DE 121 F 3C,1T 0.5 Digital Computation
Introduction to electronic digital computers; hardware and software organization, basic features of Pascal and/or Fortran, examples of efficient algorithms for engineering computation.

SY DE 122 S 3C,1T 0.5 Introduction to Computer Systems
Binary variables and basic logic circuits; computer architecture and machine instructions for small computers; assembly language programming; interfacing with peripheral equipment; current engineering applications of microcomputers.

SY DE 131 F 3C,1T 0.5 Engineering Economics
Cost-benefit analysis, critical path methods, interest, project economics, decision making, utility theory, project organizational theory.

SY DE 142 S 2C,2T 0.5 Introduction to Ergonomics
The man-machine environment complex; the nature of the operational environment; human sensory processes, human information processing, motor function; human work, thermal regulation and metabolism, skill, fatigue; shift work and circadian rhythms, problems of acoustic noise, vibration, heat, cold; needs of ventilation and lighting, information displays and control systems.

SY DE 161 F 3C,3L 0.5 Introduction to Systems Design Engineering
Introduction to the ideas and techniques of systems analysis and design. Fundamentals of graphic techniques. The use of graphics as an aid to idea generation in design. Principles of planning, innovation, creation of design solutions, feasibility analysis, solution evaluation and selection. The systems approach to value and utility.

SY DE 181 F 3C,1T 0.5 Statics

SY DE 182 S 3C,1T 0.5 Dynamics
SY DE 184 S 2C,1T 0.5
Introduction to Chemical Systems
Concepts of electronic structure, bonding; shapes of molecules, especially in covalent molecules; reactivity, energetics, chemical behaviour as a consequence. Acidity, basicity and buffer solutions. Organic Chemistry – systems of nomenclature, functionality and common relations. Important systems of natural and synthetic polymers and biomolecules.

SY DE 201/202 W,F 1C 0.0
Tutorial
Systems Design second-year students will meet with a faculty member designated as their class professor. Performance in assignments, conceptual difficulties with courses, interrelation of coursework, later work and engineering practice will be discussed. Non-credit courses.

SY DE 211 W 3C,1T 0.5
Differential Equations
First order differential equations, integrating factor, higher order differential equations. Complex variables, forced and free solutions to differential equations, transient and steady state solutions, applications. Laplace transforms and applications.

SY DE 212 F 3C,1T 0.5
Applied Mathematics for Linear Systems
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 transform, Fourier analysis, Laplace transform. Transfer functions and frequency response, frequency domain analysis of linear systems; sampling theory, stability, and linear filters.

SY DE 213 W 3C,1T 0.5
Theory and Applications of Probability

SY DE 214 F 3C,1T 0.5
Theory and Applications of Statistics

SY DE 252 F 3C,1T 0.5
Physical Systems 1
Component models, interconnection models, systems equations and their rank properties and solutions. These concepts are developed with respect to electrical systems.

SY DE 261 W 1C,3L 0.5
Systems Design Workshop 1
A problem and project oriented course wherein emphasis is placed on designing and presenting creative solutions to real-life problems. The problems are related to cover all disciplines. Both the problems and the student’s work are expected to increase in sophistication through the Workshop course sequence.

SY DE 262 F 1C,3L 0.5
Systems Design Workshop 2
A continuation of the Systems Design Workshop sequence.

SY DE 281 W 3C,1T 0.5
Mechanics of Deformable Solids

SY DE 283 W 3C,1T 0.5
Electricity, Magnetism and Networks
Introduction to the fundamental laws of electricity and magnetism; properties of dielectrics, conductors and semiconductors and terminal characteristics of passive and active components; Kirchhoff’s laws; step response of first and second order networks; sinusoidal steady state analysis using phasors. Applications.

SY DE 284 F 3C,1T 0.5
Fluid Mechanics

SY DE 292 F 2C,3L 0.5
Digital Circuits and Systems Laboratory
Digital systems design, an introduction to digital logic with emphasis on the use and characteristics of integrated circuits. Design of logic systems involving gates, counters, registers, flipflops and arithmetic logic units. An introduction to microprocessor components.

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, interrelation of coursework, later work and engineering practice will be discussed. Non-credit courses.

SY DE 311 S 3C,1T 0.5
Introduction to Optimization
Deterministic operations research models. Topics will include: mathematical techniques of unconstrained and constrained optimization, followed by the construction, evaluation and applicability of various models in allocation, inventory, replacement, sequencing and related problems.

SY DE 321 S 3C,1T 0.5
Numerical Analysis and Computer Methods
Introduction to numerical techniques for engineering problems. Topics covered include: source of computational error; solutions to linear and non-linear equations; matrix factorization; eigensystems; numerical interpolation and approximation; numerical integration solution of ordinary and partial differential equations. Introduction to data structures and their application.

SY DE 322 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 332 W 3C,1T 0.5
Mathematical Programming
Theory and algorithms for non-linear constrained optimization problems: convex set, convex functions, convex programming, Kuhn-Tucker conditions, duality, quadratic programming, quasi-Newton methods, geometric programming, dynamic programming.

SY DE 333 S 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.
Introduction to Occupational Hygiene
History and development of occupational hygiene. Review of organic chemical terminology. Recognition, evaluation, and control of, and human response to, hazardous chemical and physical agents in the environment.

Physical Systems 2
The subject matter is similar to SY DE 252 except that the development is based on other physical systems such as mechanical and hydraulic systems. Mixed nodal, state formulation and solution. Relationship to classical approaches to modeling of systems from other physical systems.

Fundamentals of 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.

Introduction to Linear Control Systems
Application of systems theory to the problems of control. The course integrates this study with an exposition of classical control theory.

Systems Design Workshop 3
A continuation of the Systems Design Workshop sequence for third year students.

Manufacturing Science

Aesthetic and Perceptual Aspects of Design
Presentation and discussion of appropriate and possible methods for the designing of systems or artifacts in which aesthetic characteristics and visual form are primary requirements of the design.
SY DE 432 F 3C,1T 0.5
Computer Algorithm Design and Analysis
Design of efficient algorithms and methods for their analysis, mathematical algorithms, string processing algorithms, geometrical algorithms, exhaustive search and traversal techniques, introduction to a lower bound theory and NP-completeness, examples from engineering problems.
Prereq: SY DE 352 or equivalent

SY DE 433 W 3C,1T 0.5
Analysis of Large Systems
Topics include macroscopic modelling of large scale resource and societal systems, decomposition techniques, graph-theoretic and computer based methods of analysis, decision and control problems, other problems concerned with complexity, largeness and aggregation.

SY DE 434 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 442 W 2C,1T 0.5
Occupational and Environmental Systems Safety

SY DE 443 F 2C,1T 0.5
Human Function
The structure and function of man in relation to the design of man-machine systems with specific emphasis on human physiology and bioengineering. The cell as micro-system and man as a complex of systems and sub-systems.

SY DE 453 F 3C 0.5
Time Domain Models for Physical Systems
State equations for two-terminal component systems; time varying and non-linear components; analytical solutions for state models; numerical and analog methods for solution.

SY DE 454 W 3C 0.5
Topics in Physical Systems Theory
This course applies physical systems theory to problems where the physical process is continuously distributed throughout a medium. The course contents include introduction to field and continuum problems; overview of approximate solution methods - including the finite difference method and the finite element method; identification of field variables; spatial discretization; modelling the field characteristics; formulations and computer solutions; applications of multi-terminal representations.

SY DE 458 W 3C,1T 0.5
Large Scale Engineering Systems
Maximum Entropy Principle (MEP), Jayne's formalism, applications to thermodynamics, derivation of some common probability distributions on the basis of MEP, spectral analysis and state estimation. The intent of the course is to spell out a systems methodology for probabilistic systems from an information-theoretic point of view.

SY DE 461 F 1C,3L 0.5
Systems Design Workshop 4
A continuation of the Systems Design Workshop Sequence for fourth-year students.

SY DE 462 W 1C,3L 0.5
Systems Design Workshop 5
A continuation of the Systems Design Workshop sequence for fourth-year students.

SY DE 466 W 3C 0.5
Technological Innovation and its Management
Factors influencing technological innovation. The environment for technological innovation in Canada. Technological innovation in the corporations. The role of governments and universities. International comparisons.

SY DE 468 W 3C,1T 0.5
Structures and Design
Structural forms. Structural requirements. Statically determinate and indeterminate structures. Basic theorems of linear elastic structures. Methods of analysis: slope-deflection, moment distribution, etc. Applications of Graph Theory to the analysis of structural systems.

SY DE 472 W 2C,1T 0.5
Man-Machine Communications
The nature and design of machine-mediated human communication systems. Displays, computer graphics, computer-aided instruction and mass communication media (film, TV, radio, print). A systems approach will be adopted with special attention to the socio-economic aspects of such systems.

SY DE 474 W 3C,1T 0.5
Image Processing
Beginning with a discussion of quantitative models of imaging systems, this course proceeds 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 212 or equivalent

SY DE 525 F 3C 0.5
Computer-Aided Simulation and Design
System modelling and simulation techniques; fundamentals of analog computation, time and magnitude scaling; continuous system simulation on the digital computer; advantages and disadvantages of digital and analog simulation techniques; discrete-event simulation on the digital computer; system simulation examples and problems.

SY DE 535 F 3C 0.5
Selected Topics for Socio-Economic Systems Design
This course is intended for students who, with little prior background, are interested in enlarging their knowledge of Systems Design. The emphasis is on the quantitative methods applicable to the design of engineering systems wherein the criteria concerning social, environmental and economic considerations are important. Both deterministic and probabilistic situations are discussed.

SY DE 544 S 3C 0.5
Ergonomics
Significance of ergonomics; man-machine-environment complex; physiology of work, human information processing, fatigue, circadian rhythms and the health consequences of shift work; environmental factors in industry; noise, vibration, vision, illumination, heat, cold, toxic chemicals, industrial safety.
SY DE 565 W 3C 0.5

Introduction to Physical Systems
This course introduces students to a unified approach to Physical System Theory, using a graph-theoretical modelling technique. Specific topics include: component modelling, the system graph and its matrices, system modelling by the branch, chord and branch-chord methods, power, energy, Tegel's Theorem, multi-terminal representations, piecewise analysis of systems through subsystems, multiport representations, formulation and solutions of state models, introduction to advanced topics.

A.F. Thompson, BA (Toronto), BTh (Huron), MA (Western Ontario), STM, PhD (McGill)
A. Wipper, BA, MA (McGill), PhD (California-Berkeley)

Assistant Professors
S.P. Gunz, BA, LLB, MA (Sydney), MBA (Manchester)
G.O. Michalenko, BA, PhD (Saskatchewan)
W.B. Moul, BA, MA, PhD (British Columbia)
M. van Dijk, BA, MA (Wellington), PhD (Toronto)
C.A. Weaver, BMus, MMus, DMus (Indiana)
A.C. Zeller, BSc (Trent), MA, PhD (Western Ontario)

Lecturer
R.L. Walker, BSc, MSc (Western Ontario)

Instructor
J. Lowe, BSc (Carleton), Recipient of the Distinguished Teacher Award

Library
S. Bellingham, BA (Waterloo Lutheran), MLS (Western Ontario)

Independent Studies
A. Degg, BA, MA (Toronto), PhD (Waterloo), Academic Director

University of Waterloo
Since WS 200, the core course of the Joint Option, is an interdisciplinary introductory course to Women's Studies; this course is a team-taught effort. The participating lecturers from other disciplines of Art, Sociology, Psychology, Philosophy, Religious Studies, Economics, Political Science and English may vary each term.

Wilfrid Laurier University
Associate Professor
J. Clarke, BA, MA, PhD (Waterloo)

Course Descriptions
WS 300

Seminar in Women's Studies
A seminar in which students will examine the origins and course of the women's movement from an interdisciplinary perspective, with special attention to topics such as the Canadian woman.

Women's Studies core courses and approved courses are listed in the Interdisciplinary Options, Chapter 15.
Governing Bodies and Staff
The Board of Governors

The Board of Governors acts as the governing body of the University and as such has the power to control UW’s property and revenues, and the conduct of its business and affairs. Planning and implementation of the physical and operational development of the University, establishment and enforcement of rules and regulations with respect to University property, and designation of University funds are included under the jurisdiction of the Board of Governors.

The membership of the Board of Governors consists of representatives from the University faculty, staff and student bodies, and the community-at-large, as well as appointees from the Lieutenant-Governor-in-Council, and a number of ex officio members.

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R. Grant (Electrical Engineering)

Governing Bodies
Board of Governors
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J. Kalish
T. White

Graduate Students
N. Calkin
P. Van Oorschot

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 committees include Senate Undergraduate Council, Senate Scholarships and Student Aid Committee and Senate Long Range Planning Committee.

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Acting Vice-Chairman, R.K. Banks,
BA, MA, PhD (term to June 30, 1988)
Secretary, J.W. Brown, BA

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Chairman, Board of Governors, J. Bergsma, BASc, MASC, MBA, PEng
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Treasurer, J.G. Robb, CGA
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R. Lebold, BA, MA, MTh, DMin (President, Conrad Grebel)

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R.W. Norman, BA, BPE, MSc, PhD (Acting Dean of Human Kinetics and Leisure Studies, term to August 31, 1988)
J.G. Kalbfleisch, BSc, MA, PhD (Mathematics)
D.E. Brodie, BSc, MSc, PhD (Science)

The Dean of Graduate Studies
J.S. Gardner, BSc, MSc, PhD

The Dean of Computing and Communications
J.W. Graham, BA, MA

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M. Vogel-Sprott, BA, MA, PhD (At large)
L.T. Guelke, BSc, MA, PhD (At large)

To 1989
R.A. George, MA, PhD (Arts)
S.N. Kalra, BSc, MS, PhD, PE Eng (Engineering)
A.G. McLellan, BSc, PhD (Environmental Studies)
S.L.J. Smith, BA, MA, PhD (Human Kinetics and Leisure Studies)
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J.A. Legault, BSc, MSc, PhD (Science)
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C.A. Peterson, BSc, MSc, PhD (At large)
A. Roberts, BA, MA (At large)

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F.R. McCourt, BSc, PhD (At large)
D.A. Brisbin, BSc, PhD (At large)

Student Representatives
To 1988
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A. Chamberlain (Environmental Studies/Independent Studies)
B. Burow (Science)
J.K. Herbert (At large)

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G. Wang, BASc, MASc

To 1989
Undergraduate
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J. Kafieh (Human Kinetics and Leisure Studies)
M. Lamoureux (Mathematics)
T. Lee (At large)

Graduate
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G. Kotturi, BSc

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To 1988
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To 1989
W. Schneider, BASc
S. Wells, BA
R. Whent, BA
Board of Governors Representatives

To 1988
vacancy
vacancy

To 1989
vacancy

Note:
More information regarding the Senate and the Board of Governors, their Councils and Committees, may be obtained from the University Secretarial.

Most meetings are open to the University community and are 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.

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D.A. Brisbin, BSc, PhD
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Director, Mathematics Faculty Computing Facility
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Chairman, Academic Board
A.I. Dagg, BA, MA, PhD
Academic Director

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Dean of Graduate Studies
H. Kilbride, BA, MEd
Associate Registrar, Graduate Studies

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Space Utilization and Campus Planning
A.E. Lappin, BSc, PEng
Director
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The President's Committee was established in 1980 and is composed of friends of the University who annually contribute $1000 or more to the University's development program.

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J.A. George, Knoxville

President's Committee members play an important role in the development of the University, not only directly through their financial contributions but indirectly through the example they set for Corporations and Foundations which are approached to support the University.
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H. Good, Waterloo
P. Good, Waterloo
H.D. Greb, Waterloo
H. Grisebach, Kitchener
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J. Grindlay, Waterloo
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H. Hanuki, Waterloo
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M.H. Hill, Kitchener
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H.B.S. Hogg, Richmond Hill
E.L. Holmes, Waterloo
R.Y. Huang, Waterloo
N.C. Huttin, Waterloo
B.I. Hyma, Waterloo
D.E. Irish, Waterloo
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H.W. Jasper, Kitchener
L.S. Joyce, Mississauga
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J.G. Kalbfleisch, Kitchener
P.F. Karrow, Waterloo
J. Kates, Willowdale
S.E. Kemp, Baden
A. Kerr-Lawson, Waterloo
R.R. Kerton, Waterloo
T. Knighton, Toronto
R. Kraft, Waterloo
H.L. Krug, Waterloo
D. Kubat, Waterloo
H.J. Lang, Toronto
W.F. Lang, Kitchener
R. Lebold, Waterloo
H. Leipholz, Waterloo
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W.R. Macnaughton, Waterloo
W. MacPherson, Waterloo
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R.G. Marteniuk, Waterloo
W.R. Martin, Waterloo
A.D. Maynes, Kitchener
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Hon. F.J. McDonald, Waterloo
M.F. McDonald, Waterloo
I.J. McGee, Waterloo
D.B. McIntyre, Brantford
H.G. McLeod, St. Catharines
I.J. McNabb, Calgary
K.I. McPhee, Kitchener
J.B. Moffat, Waterloo
P.E. Morrison, Baden
G.P. Moser, Kitchener
M.I. Nagler, Hamilton
J.F. Narveson, Waterloo
P.H.J. Nash, Waterloo
W.R. Needham, Waterloo
L. Needleman, Waterloo
J.G. Nelson, Kitchener
T.T. Nguyen, Waterloo
W.U. Ober, Kitchener
J.L. Ord, Waterloo
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M.S. Pollock, St. Catharines
P.J. Ponzo, Waterloo
C. Porter, Cambridge
J. Porter, Toronto
C.W. Redekop, Waterloo
B.G. Rees, Waterloo
P.M. Reilly, Waterloo
E. Rhodes, Sarnia
M. Richter, Waterloo
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