The Undergraduate Calendar

The information in this Calendar applies to the 1979-80 academic session which commences in September 1979.

The University also publishes:

- a Graduate Studies Calendar
- an Admissions Brochure
- a Correspondence Programme Calendar
- a Part-Time Studies Calendar

All courses listed may not be offered in the current session; therefore, students are advised to consult the University course offerings list prior to arranging their programmes. This calendar should not be used as a pre-registration document.

The Senate and Board of Governors of the University of Waterloo reserve the right to invoke changes in this Calendar without prior notice.

Enquiries

Enquiries and formal applications for admission should be directed to the:

Registrar,
University of Waterloo,
Waterloo, Ontario, Canada
N2L 3G1

Telephone 885-1211 (Area Code 519)
The Registrar's Office is located on the second floor of the 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
Waterloo, Ontario
N2L 3G3
(519) 884-8110

St. Paul's College,
Waterloo, Ontario
N2L 3G5
(519) 885-1460
# Undergraduate Calendar 1979-80

## Contents

**Academic Calendar**, 5-8  
**Campus Guide and Legend**, 10, 11  

### General Information

1. University of Waterloo, 14  
2. Admission, 24  
3. Fees and Registration, 34  
4. Scholarships, Bursaries, Prizes and Financial Aid, 42  
5. Department of Co-ordination and Placement, 56  
6. The University Libraries, 76

### Undergraduate Programmes

7. Faculty of Arts, 80  
8. Faculty of Engineering, 114  
9. Faculty of Environmental Studies, 134  
10. Faculty of Human Kinetics and Leisure Studies, 164  
11. Programme of Integrated Studies, 172  
12. Faculty of Mathematics, 176  
13. Faculty of Science, 192

### Undergraduate Course Descriptions

14. Undergraduate Course Descriptions, 226

### Governing Bodies and Staff

15. Governing Bodies and Staff, 452  
16. Index, 458  
   - Index 1, Faculty Members, 458  
   - Index 2, General, 459
Glossary of Terms

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

Credit
A unit of an academic programme earned toward a degree. A credit weight of 1.0 is normally assigned to a 26 week (2 term) course; a credit weight of 0.5 is normally assigned to a 13 week (1 term) course. These credit weights are used in the calculation of averages for academic standing.

Note
Most courses have credit weights of 0.5 or 1.0, but some have other weights such as 0.25, 0.75, 2.0.

Programme
A series of courses, a number of which may be mandatory and of a specialized nature, which lead toward a degree. Details of the several types of programmes offered such as Honours, General, Pass, Pre-Professional, Professional are given in the Calendar.

Major
Used by some faculties to refer to the area(s) of academic emphasis selected in either an Honours or a General programme.

Minor
A group of approved courses taken by an honours student in a subject outside his/her “major” area.

Note
Minor is often defined differently by other institutions. Students should be sure that they meet the requirements as set out by other institutions they may wish to attend, e.g. teacher’s colleges, etc.

Option
A specified combination or grouping of courses which provides a secondary emphasis in certain programmes. 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).

Pre-requisite
A course required to be taken 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).

Co-requisite
A course required to be taken concurrently with another course which lists it as a co-requisite.

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.

Term
Refers to a particular four-month (13 week) period of 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 which occur in the above time periods.

Session
Refers to the eight month (26 week) period of registration for programmes and courses extending from September to April. Also used in reference to the six week summer session held in July and August.

Pre-registration
The process of selecting courses and having them approved by a faculty advisor prior to registration.

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.

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

Letter of Permission
A document permitting a student to take one or more courses at another university to be used for credit toward the University of Waterloo degree.

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.

Part-time Students
Part-time students are normally limited to studying 2 half-courses per term.
### Academic Calendar 1979

<table>
<thead>
<tr>
<th>Event</th>
<th>Date</th>
<th>Day</th>
</tr>
</thead>
<tbody>
<tr>
<td>Meeting - Senate Executive Committee</td>
<td>March 5</td>
<td>Monday</td>
</tr>
<tr>
<td>Supplemental Examinations Begin - Co-operative Programmes</td>
<td>March 5</td>
<td>Monday</td>
</tr>
<tr>
<td>Pre-registration Begins - Regular and Co-operative Students for Fall Term 1979</td>
<td>March 5</td>
<td>Monday</td>
</tr>
<tr>
<td>Pre-registration Ends - Regular and Co-operative Students for Fall Term 1979</td>
<td>March 9</td>
<td>Friday</td>
</tr>
<tr>
<td>Meeting - University Senate, 7:30 p.m.</td>
<td>March 19</td>
<td>Monday</td>
</tr>
<tr>
<td>Lectures End - Winter Term</td>
<td>March 28</td>
<td>Wednesday</td>
</tr>
<tr>
<td>Examinations Begin - Winter Term</td>
<td>March 31</td>
<td>Saturday</td>
</tr>
<tr>
<td>Meeting - Senate Executive Committee</td>
<td>April 2</td>
<td>Monday</td>
</tr>
<tr>
<td>Meeting - Board of Governors, 10:00 a.m.</td>
<td>April 3</td>
<td>Tuesday</td>
</tr>
<tr>
<td>Good Friday - University Holiday*</td>
<td>April 13</td>
<td>Friday</td>
</tr>
<tr>
<td>Meeting - University Senate, 7:30 p.m.</td>
<td>April 16</td>
<td>Monday</td>
</tr>
<tr>
<td>Examinations End - Winter Term</td>
<td>April 20</td>
<td>Friday</td>
</tr>
<tr>
<td>Final Examination Results Due</td>
<td>April 27</td>
<td>Friday</td>
</tr>
<tr>
<td>Winter Work Term Ends - Co-operative Programmes</td>
<td>April 27</td>
<td>Friday</td>
</tr>
<tr>
<td>Spring Work Term Begins - Co-operative Programmes</td>
<td>April 30</td>
<td>Monday</td>
</tr>
<tr>
<td>Registration - Undergraduate Co-operative Programmes</td>
<td>April 30</td>
<td>Monday</td>
</tr>
<tr>
<td>Lectures Begin - Spring Term</td>
<td>April 30</td>
<td>Monday</td>
</tr>
<tr>
<td>Start of Late Fees - Spring Term</td>
<td>May 1</td>
<td>Tuesday</td>
</tr>
<tr>
<td>Meeting - Senate Executive Committee</td>
<td>May 7</td>
<td>Monday</td>
</tr>
<tr>
<td>End of Course Change Period - Spring Term</td>
<td>May 18</td>
<td>Friday</td>
</tr>
<tr>
<td>Victoria Day - University Holiday*</td>
<td>May 21</td>
<td>Monday</td>
</tr>
<tr>
<td>Meeting - University Senate, 7:30 p.m.</td>
<td>May 22</td>
<td>Tuesday</td>
</tr>
<tr>
<td>Spring Convocation</td>
<td>May 24</td>
<td>Thursday</td>
</tr>
<tr>
<td>Spring Convocation</td>
<td>May 25</td>
<td>Friday</td>
</tr>
<tr>
<td>Spring Convocation</td>
<td>May 26</td>
<td>Saturday</td>
</tr>
<tr>
<td>Meeting - Senate Executive Committee</td>
<td>June 4</td>
<td>Monday</td>
</tr>
<tr>
<td>Meeting - Board of Governors, 10:00 a.m.</td>
<td>June 5</td>
<td>Tuesday</td>
</tr>
<tr>
<td>Pre-registration Begins - Co-operative Students for Winter Term 1980</td>
<td>June 6</td>
<td>Wednesday</td>
</tr>
<tr>
<td>Pre-registration Ends - Co-operative Students for Winter Term 1980</td>
<td>June 8</td>
<td>Friday</td>
</tr>
<tr>
<td>Meeting - University Senate, 7:30 p.m.</td>
<td>June 18</td>
<td>Monday</td>
</tr>
<tr>
<td>Dominion Day - University Holiday*</td>
<td>July 2</td>
<td>Monday</td>
</tr>
<tr>
<td>Registration - Summer Session</td>
<td>July 3</td>
<td>Tuesday</td>
</tr>
<tr>
<td>Lectures Begin - Summer Session</td>
<td>July 3</td>
<td>Tuesday</td>
</tr>
<tr>
<td>Start of Late Fees - Summer Session</td>
<td>July 4</td>
<td>Wednesday</td>
</tr>
<tr>
<td>Supplemental Examinations Begin</td>
<td>July 9</td>
<td>Monday</td>
</tr>
<tr>
<td>Lectures End - Spring Term</td>
<td>July 25</td>
<td>Wednesday</td>
</tr>
<tr>
<td>Examinations Begin - Spring Term</td>
<td>July 28</td>
<td>Saturday</td>
</tr>
</tbody>
</table>

*Some university departments may be open for limited service on these days*
1979 Continued

<table>
<thead>
<tr>
<th>Event</th>
<th>Date</th>
<th>Day</th>
</tr>
</thead>
<tbody>
<tr>
<td>Civic Holiday - University Holiday*</td>
<td>August 6</td>
<td>Monday</td>
</tr>
<tr>
<td>Examinations End - Spring Term</td>
<td>August 9</td>
<td>Thursday</td>
</tr>
<tr>
<td>Lectures End - Summer Session</td>
<td>August 9</td>
<td>Thursday</td>
</tr>
<tr>
<td>Examinations Begin - Summer Session</td>
<td>August 10</td>
<td>Friday</td>
</tr>
<tr>
<td>Examinations End - Summer Session</td>
<td>August 11</td>
<td>Saturday</td>
</tr>
<tr>
<td>Final Examination Results Due</td>
<td>August 16</td>
<td>Thursday</td>
</tr>
<tr>
<td>Application Deadline, Correspondence - Fall Term</td>
<td>August 17</td>
<td>Friday</td>
</tr>
<tr>
<td>Spring Work Term Ends - Co-operative Programmes</td>
<td>August 24</td>
<td>Friday</td>
</tr>
<tr>
<td>Fall Work Term Begins - Co-operative Programmes</td>
<td>August 27</td>
<td>Monday</td>
</tr>
<tr>
<td>Labour Day - University Holiday*</td>
<td>September 3</td>
<td>Monday</td>
</tr>
<tr>
<td>Registration Begins - Undergraduate Regular and Co-operative Programmes</td>
<td>September 4</td>
<td>Tuesday</td>
</tr>
<tr>
<td>Meeting - Senate Executive Committee</td>
<td>September 4</td>
<td>Tuesday</td>
</tr>
<tr>
<td>Registration - Graduate Studies - Fall Term</td>
<td>September 7</td>
<td>Friday</td>
</tr>
<tr>
<td>Registration Ends - Undergraduate Regular and Co-operative Programmes</td>
<td>September 7</td>
<td>Friday</td>
</tr>
<tr>
<td>Lectures Begin - Fall Term</td>
<td>September 10</td>
<td>Monday</td>
</tr>
<tr>
<td>Start of Late Fees - Fall Term</td>
<td>September 10</td>
<td>Monday</td>
</tr>
<tr>
<td>Meeting - University Senate, 7:30 p.m.</td>
<td>September 17</td>
<td>Monday</td>
</tr>
<tr>
<td>End of Course Change Period - Fall Term</td>
<td>September 28</td>
<td>Friday</td>
</tr>
<tr>
<td>Meeting - Senate Executive Committee</td>
<td>October 1</td>
<td>Monday</td>
</tr>
<tr>
<td>Meeting - Board of Governors, 10:00 a.m.</td>
<td>October 2</td>
<td>Tuesday</td>
</tr>
<tr>
<td>Thanksgiving Day - University Holiday*</td>
<td>October 8</td>
<td>Monday</td>
</tr>
<tr>
<td>Meeting - University Senate, 7:30 p.m.</td>
<td>October 15</td>
<td>Monday</td>
</tr>
<tr>
<td>Fall Convocation</td>
<td>October 19</td>
<td>Friday</td>
</tr>
<tr>
<td>Application Deadline, Correspondence - Winter Term</td>
<td>October 26</td>
<td>Friday</td>
</tr>
<tr>
<td>Supplemental Examinations Begin - Co-operative Programmes</td>
<td>October 29</td>
<td>Monday</td>
</tr>
<tr>
<td>Meeting - Senate Executive Committee</td>
<td>November 5</td>
<td>Monday</td>
</tr>
<tr>
<td>Pre-registration Begins - On-Campus - Co-operative Students for Spring Term 1980</td>
<td>November 7</td>
<td>Wednesday</td>
</tr>
<tr>
<td>Pre-registration Ends - On-Campus - Co-operative Students for Spring Term 1980</td>
<td>November 9</td>
<td>Friday</td>
</tr>
<tr>
<td>Meeting - University Senate, 7:30 p.m.</td>
<td>November 19</td>
<td>Monday</td>
</tr>
<tr>
<td>Meeting - Senate Executive Committee</td>
<td>December 3</td>
<td>Monday</td>
</tr>
<tr>
<td>Lectures End - Fall Term</td>
<td>December 4</td>
<td>Tuesday</td>
</tr>
<tr>
<td>Examinations Begin - Fall Term</td>
<td>December 7</td>
<td>Friday</td>
</tr>
<tr>
<td>Meeting - University Senate, 7:30 p.m.</td>
<td>December 17</td>
<td>Monday</td>
</tr>
<tr>
<td>Examinations End - FallTerm</td>
<td>December 20</td>
<td>Thursday</td>
</tr>
<tr>
<td>Fall Work Term Ends</td>
<td>December 21</td>
<td>Friday</td>
</tr>
<tr>
<td>Winter Work Term Begins</td>
<td>December 27</td>
<td>Thursday</td>
</tr>
<tr>
<td>Christmas Holidays*</td>
<td>December 24</td>
<td>Monday -</td>
</tr>
<tr>
<td></td>
<td>to December 26</td>
<td>Wednesday</td>
</tr>
<tr>
<td></td>
<td>December 31</td>
<td>Monday</td>
</tr>
</tbody>
</table>

*Some university departments may be open for limited service on these days.*
<table>
<thead>
<tr>
<th>Event</th>
<th>Date</th>
<th>Day</th>
</tr>
</thead>
<tbody>
<tr>
<td>New Year's Day - University Holiday*</td>
<td>January 1</td>
<td>Tuesday</td>
</tr>
<tr>
<td>Registration - Undergraduate Co-operative Programmes</td>
<td>January 2</td>
<td>Wednesday</td>
</tr>
<tr>
<td>Final Examination Results Due</td>
<td>January 2</td>
<td>Wednesday</td>
</tr>
<tr>
<td>Registration - Graduate Studies - Winter Term</td>
<td>January 2</td>
<td>Wednesday</td>
</tr>
<tr>
<td>Lectures Begin - Winter Term</td>
<td>January 2</td>
<td>Wednesday</td>
</tr>
<tr>
<td>Meeting - Senate Executive Committee</td>
<td>January 2</td>
<td>Wednesday</td>
</tr>
<tr>
<td>Start of Late Fees - Winter Term</td>
<td>January 3</td>
<td>Thursday</td>
</tr>
<tr>
<td>End of Course Change Period - Winter Term</td>
<td>January 18</td>
<td>Friday</td>
</tr>
<tr>
<td>Meeting - University Senate, 7:30 p.m.</td>
<td>January 21</td>
<td>Monday</td>
</tr>
<tr>
<td>Meeting - Senate Executive Committee</td>
<td>February 4</td>
<td>Monday</td>
</tr>
<tr>
<td>Meeting - Board of Governors, 10:00 a.m.</td>
<td>February 5</td>
<td>Tuesday</td>
</tr>
<tr>
<td>Meeting - University Senate, 7:30 p.m.</td>
<td>February 18</td>
<td>Monday</td>
</tr>
<tr>
<td>Study Week Begins - Arts &amp; Environmental Studies (Regular Programmes)</td>
<td>February 18</td>
<td>Monday</td>
</tr>
<tr>
<td>Application Deadline, Correspondence - Spring Term</td>
<td>February 22</td>
<td>Friday</td>
</tr>
<tr>
<td>Meeting - Senate Executive Committee</td>
<td>March 3</td>
<td>Monday</td>
</tr>
<tr>
<td>Supplemental Examinations Begin - Co-operative Programmes</td>
<td>March 3</td>
<td>Monday</td>
</tr>
<tr>
<td>Pre-registration Begins - Regular and Co-operative Students for Fall Term 1980</td>
<td>March 3</td>
<td>Monday</td>
</tr>
<tr>
<td>Pre-registration Ends - Regular and Co-operative Students for Fall Term 1980</td>
<td>March 7</td>
<td>Friday</td>
</tr>
<tr>
<td>Meeting - University Senate, 7:30 p.m.</td>
<td>March 17</td>
<td>Monday</td>
</tr>
<tr>
<td>Lectures End - Winter Term</td>
<td>March 26</td>
<td>Wednesday</td>
</tr>
<tr>
<td>Examinations Begin - Winter Term</td>
<td>March 29</td>
<td>Saturday</td>
</tr>
<tr>
<td>Good Friday - University Holiday*</td>
<td>April 4</td>
<td>Friday</td>
</tr>
<tr>
<td>Meeting - Senate Executive Committee</td>
<td>April 7</td>
<td>Monday</td>
</tr>
<tr>
<td>Meeting - Board of Governors, 10:00 a.m.</td>
<td>April 8</td>
<td>Monday</td>
</tr>
<tr>
<td>Examinations End - Winter Term</td>
<td>April 18</td>
<td>Monday</td>
</tr>
<tr>
<td>Meeting - University Senate, 7:30 p.m.</td>
<td>April 21</td>
<td>Monday</td>
</tr>
<tr>
<td>Final Examination Results Due</td>
<td>April 25</td>
<td>Friday</td>
</tr>
<tr>
<td>Winter Work Term Ends - Co-operative Programmes</td>
<td>April 25</td>
<td>Friday</td>
</tr>
<tr>
<td>Spring Work Term Begins - Co-operative Programmes</td>
<td>April 28</td>
<td>Monday</td>
</tr>
<tr>
<td>Registration - Undergraduate Co-operative Programmes</td>
<td>April 28</td>
<td>Monday</td>
</tr>
<tr>
<td>Lectures Begin - Spring Term</td>
<td>April 28</td>
<td>Monday</td>
</tr>
<tr>
<td>Start of Late Fees - Spring Term</td>
<td>April 29</td>
<td>Tuesday</td>
</tr>
<tr>
<td>Meeting - Senate Executive Committee</td>
<td>May 5</td>
<td>Monday</td>
</tr>
<tr>
<td>End of Course Change Period - Spring Term</td>
<td>May 16</td>
<td>Friday</td>
</tr>
<tr>
<td>Victoria Day - University Holiday*</td>
<td>May 19</td>
<td>Monday</td>
</tr>
<tr>
<td>Meeting - University Senate, 7:30 p.m.</td>
<td>May 20</td>
<td>Tuesday</td>
</tr>
<tr>
<td>Spring Convocation</td>
<td>May 22</td>
<td>Thursday</td>
</tr>
<tr>
<td>Spring Convocation</td>
<td>May 23</td>
<td>Friday</td>
</tr>
<tr>
<td>Spring Convocation</td>
<td>May 24</td>
<td>Saturday</td>
</tr>
</tbody>
</table>

*Some university departments may be open for limited service on these days
<table>
<thead>
<tr>
<th>Event Description</th>
<th>Date</th>
<th>Day</th>
</tr>
</thead>
<tbody>
<tr>
<td>Meeting - Senate Executive Committee</td>
<td>June 2</td>
<td>Monday</td>
</tr>
<tr>
<td>Meeting - Board of Governors, 10:00 a.m.</td>
<td>June 3</td>
<td>Tuesday</td>
</tr>
<tr>
<td>Pre-registration Begins - Co-operative Students for Winter Term 1980</td>
<td>June 4</td>
<td>Wednesday</td>
</tr>
<tr>
<td>Pre-registration Ends - Co-operative Students for Winter Term 1980</td>
<td>June 6</td>
<td>Friday</td>
</tr>
<tr>
<td>Meeting - University Senate, 7:30 p.m.</td>
<td>June 16</td>
<td>Monday</td>
</tr>
<tr>
<td>University Holiday*</td>
<td>June 30</td>
<td>Monday</td>
</tr>
<tr>
<td>Dominion Day - University Holiday*</td>
<td>July 1</td>
<td>Tuesday</td>
</tr>
<tr>
<td>Registration - Summer Session</td>
<td>July 2</td>
<td>Wednesday</td>
</tr>
<tr>
<td>Lectures Begin - Summer Session</td>
<td>July 2</td>
<td>Wednesday</td>
</tr>
<tr>
<td>Start of Late Fees - Summer Session</td>
<td>July 3</td>
<td>Thursday</td>
</tr>
<tr>
<td>Supplemental Examinations Begin</td>
<td>July 7</td>
<td>Monday</td>
</tr>
<tr>
<td>Lectures End - Spring Term</td>
<td>July 23</td>
<td>Wednesday</td>
</tr>
<tr>
<td>Examinations Begin - Spring Term</td>
<td>July 26</td>
<td>Saturday</td>
</tr>
<tr>
<td>Civic Holiday - University Holiday*</td>
<td>August 4</td>
<td>Monday</td>
</tr>
<tr>
<td>Examinations End - Spring Term</td>
<td>August 7</td>
<td>Thursday</td>
</tr>
<tr>
<td>Lectures End - Summer Session</td>
<td>August 8</td>
<td>Friday</td>
</tr>
<tr>
<td>Examinations - Summer Session</td>
<td>August 9</td>
<td>Saturday</td>
</tr>
<tr>
<td>Final Examination Results Due</td>
<td>August 14</td>
<td>Thursday</td>
</tr>
<tr>
<td>Spring Work Term Ends - Co-operative Programmes</td>
<td>August 22</td>
<td>Friday</td>
</tr>
<tr>
<td>Fall Work Term Begins - Co-operative Programmes</td>
<td>August 25</td>
<td>Monday</td>
</tr>
</tbody>
</table>

*Some university departments may be open for limited service on these days.*
### 1979

<table>
<thead>
<tr>
<th>S</th>
<th>M</th>
<th>T</th>
<th>W</th>
<th>T</th>
<th>F</th>
<th>S</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>January</strong></td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
</tr>
<tr>
<td>7</td>
<td>8</td>
<td>9</td>
<td>10</td>
<td>11</td>
<td>12</td>
<td>13</td>
</tr>
<tr>
<td>14</td>
<td>15</td>
<td>16</td>
<td>17</td>
<td>18</td>
<td>19</td>
<td>20</td>
</tr>
<tr>
<td>21</td>
<td>22</td>
<td>23</td>
<td>24</td>
<td>25</td>
<td>26</td>
<td>27</td>
</tr>
<tr>
<td>28</td>
<td>29</td>
<td>30</td>
<td>31</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>April</strong></td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
</tr>
<tr>
<td>7</td>
<td>8</td>
<td>9</td>
<td>10</td>
<td>11</td>
<td>12</td>
<td>13</td>
</tr>
<tr>
<td>14</td>
<td>15</td>
<td>16</td>
<td>17</td>
<td>18</td>
<td>19</td>
<td>20</td>
</tr>
<tr>
<td>21</td>
<td>22</td>
<td>23</td>
<td>24</td>
<td>25</td>
<td>26</td>
<td>27</td>
</tr>
<tr>
<td>28</td>
<td>29</td>
<td>30</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>July</strong></td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
</tr>
<tr>
<td>7</td>
<td>8</td>
<td>9</td>
<td>10</td>
<td>11</td>
<td>12</td>
<td>13</td>
</tr>
<tr>
<td>14</td>
<td>15</td>
<td>16</td>
<td>17</td>
<td>18</td>
<td>19</td>
<td>20</td>
</tr>
<tr>
<td>21</td>
<td>22</td>
<td>23</td>
<td>24</td>
<td>25</td>
<td>26</td>
<td>27</td>
</tr>
<tr>
<td>28</td>
<td>29</td>
<td>30</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>October</strong></td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
</tr>
<tr>
<td>7</td>
<td>8</td>
<td>9</td>
<td>10</td>
<td>11</td>
<td>12</td>
<td>13</td>
</tr>
<tr>
<td>14</td>
<td>15</td>
<td>16</td>
<td>17</td>
<td>18</td>
<td>19</td>
<td>20</td>
</tr>
<tr>
<td>21</td>
<td>22</td>
<td>23</td>
<td>24</td>
<td>25</td>
<td>26</td>
<td>27</td>
</tr>
<tr>
<td>28</td>
<td>29</td>
<td>30</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### 1980

<table>
<thead>
<tr>
<th>S</th>
<th>M</th>
<th>T</th>
<th>W</th>
<th>T</th>
<th>F</th>
<th>S</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>January</strong></td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
</tr>
<tr>
<td>7</td>
<td>8</td>
<td>9</td>
<td>10</td>
<td>11</td>
<td>12</td>
<td>13</td>
</tr>
<tr>
<td>14</td>
<td>15</td>
<td>16</td>
<td>17</td>
<td>18</td>
<td>19</td>
<td>20</td>
</tr>
<tr>
<td>21</td>
<td>22</td>
<td>23</td>
<td>24</td>
<td>25</td>
<td>26</td>
<td>27</td>
</tr>
<tr>
<td>28</td>
<td>29</td>
<td>30</td>
<td>31</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>April</strong></td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
</tr>
<tr>
<td>7</td>
<td>8</td>
<td>9</td>
<td>10</td>
<td>11</td>
<td>12</td>
<td>13</td>
</tr>
<tr>
<td>14</td>
<td>15</td>
<td>16</td>
<td>17</td>
<td>18</td>
<td>19</td>
<td>20</td>
</tr>
<tr>
<td>21</td>
<td>22</td>
<td>23</td>
<td>24</td>
<td>25</td>
<td>26</td>
<td>27</td>
</tr>
<tr>
<td>28</td>
<td>29</td>
<td>30</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>July</strong></td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
</tr>
<tr>
<td>7</td>
<td>8</td>
<td>9</td>
<td>10</td>
<td>11</td>
<td>12</td>
<td>13</td>
</tr>
<tr>
<td>14</td>
<td>15</td>
<td>16</td>
<td>17</td>
<td>18</td>
<td>19</td>
<td>20</td>
</tr>
<tr>
<td>21</td>
<td>22</td>
<td>23</td>
<td>24</td>
<td>25</td>
<td>26</td>
<td>27</td>
</tr>
<tr>
<td>28</td>
<td>29</td>
<td>30</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>October</strong></td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
</tr>
<tr>
<td>7</td>
<td>8</td>
<td>9</td>
<td>10</td>
<td>11</td>
<td>12</td>
<td>13</td>
</tr>
<tr>
<td>14</td>
<td>15</td>
<td>16</td>
<td>17</td>
<td>18</td>
<td>19</td>
<td>20</td>
</tr>
<tr>
<td>21</td>
<td>22</td>
<td>23</td>
<td>24</td>
<td>25</td>
<td>26</td>
<td>27</td>
</tr>
<tr>
<td>28</td>
<td>29</td>
<td>30</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### 1981

<table>
<thead>
<tr>
<th>S</th>
<th>M</th>
<th>T</th>
<th>W</th>
<th>T</th>
<th>F</th>
<th>S</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>January</strong></td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
</tr>
<tr>
<td>7</td>
<td>8</td>
<td>9</td>
<td>10</td>
<td>11</td>
<td>12</td>
<td>13</td>
</tr>
<tr>
<td>14</td>
<td>15</td>
<td>16</td>
<td>17</td>
<td>18</td>
<td>19</td>
<td>20</td>
</tr>
<tr>
<td>21</td>
<td>22</td>
<td>23</td>
<td>24</td>
<td>25</td>
<td>26</td>
<td>27</td>
</tr>
<tr>
<td>28</td>
<td>29</td>
<td>30</td>
<td>31</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>April</strong></td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
</tr>
<tr>
<td>7</td>
<td>8</td>
<td>9</td>
<td>10</td>
<td>11</td>
<td>12</td>
<td>13</td>
</tr>
<tr>
<td>14</td>
<td>15</td>
<td>16</td>
<td>17</td>
<td>18</td>
<td>19</td>
<td>20</td>
</tr>
<tr>
<td>21</td>
<td>22</td>
<td>23</td>
<td>24</td>
<td>25</td>
<td>26</td>
<td>27</td>
</tr>
<tr>
<td>28</td>
<td>29</td>
<td>30</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>July</strong></td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
</tr>
<tr>
<td>7</td>
<td>8</td>
<td>9</td>
<td>10</td>
<td>11</td>
<td>12</td>
<td>13</td>
</tr>
<tr>
<td>14</td>
<td>15</td>
<td>16</td>
<td>17</td>
<td>18</td>
<td>19</td>
<td>20</td>
</tr>
<tr>
<td>21</td>
<td>22</td>
<td>23</td>
<td>24</td>
<td>25</td>
<td>26</td>
<td>27</td>
</tr>
<tr>
<td>28</td>
<td>29</td>
<td>30</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>October</strong></td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
</tr>
<tr>
<td>7</td>
<td>8</td>
<td>9</td>
<td>10</td>
<td>11</td>
<td>12</td>
<td>13</td>
</tr>
<tr>
<td>14</td>
<td>15</td>
<td>16</td>
<td>17</td>
<td>18</td>
<td>19</td>
<td>20</td>
</tr>
<tr>
<td>21</td>
<td>22</td>
<td>23</td>
<td>24</td>
<td>25</td>
<td>26</td>
<td>27</td>
</tr>
<tr>
<td>28</td>
<td>29</td>
<td>30</td>
<td>31</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Campus Guide

Information Kiosks
After hours please enquire at Security Office, Building No. 36.

Parking Lots
Visitor pay parking D (.50¢ per hr.) 8:00 a.m.-6:00 p.m. weekdays, 50¢ per entry evenings, weekends and holidays; N. M. (.50¢); Visitor lot Optometry adjacent to 0 (.50¢); B & H evenings and weekends (.25¢); Student pay parking in C (.25¢); Reserved parking in all other lots; Free parking in Lot E.

Academic Faculties

Arts
1 Dana Porter Arts Library
2 Arts Lecture Hall
3 Modern Languages
   includes Theatre of the Arts; Art Gallery; coffee shop
4 J. G. Hagey Hall of Humanities
   includes Humanities Theatre
5 Psychology

Engineering
6 Engineering 1
7 Engineering 2 (Audio Visual Library)
8 Engineering 3
9 Engineering 4
10 Engineering Lecture Hall

Environmental Studies
11 Isaiah Bowman Environmental Studies Building, E. S. Library (maps)
12 Architecture

Human Kinetics and Leisure Studies
13 Offices in Mathematics and Computer Building
14 Physical Activities Complex
   includes Department of Athletics
39 Dept. of Recreation (Phillip St.)

Integrated Studies Programmes
5 Offices in Psychology Building

Mathematics
13 Mathematics and Computer
   includes computing centre; data processing; EMS Library (4th Floor)

Science
15 Physics
16 Earth Sciences and Chemistry
17 Chemistry 2
18 Biology 1
   includes Biology and Earth Sciences museum
19 Biology 2
20 Optometry
   includes Optometry clinic

Church Colleges
21 Conrad Grebel College
22 Renison College
23 St. Jerome's College
24 Notre Dame Women's Residence
25 St. Paul's College

Residences
26 Student Village 1
27 Student Village 2
28 Tutors' Apartments
29 Minota Hagey Graduate Residence
30 Married Student's Apartments
43 Hammarskjold House (co-op)
44 Phillip St. Residence (co-op)

Administration
31 Administrative Services
   includes office of Vice-President, Finance and Operations; Administrative Services; Bookings; Financial Services; Operations Analysis and Internal Audit; Personnel (including the Secretarial and Clerical Overload Service); Physical Resources Group; Purchasing; Safety.
32 Needles Hall
   includes office of President, office of Vice-President, Academic; Academic Services; Alumni; Career Information Centre; Chaplain's office, Co-ordination and Placement; Studies; Information Services; Office of Research Administration; Registrar; Student Housing; University Secretariat; Word Processing Centre.

University Services
33 South Campus Hall
   includes Book Store; Festival Room, Laurel Room
34 Campus Centre
   includes student organizations; various commercial services; snack bar
35 Faculty Club
36 Central Services
   includes Graphic Services; Mail Services; Commissary; Security
37 Graduate Club
   includes Graduate Student Union
38 Health Services
42 Grounds Maintenance
The University of Waterloo

Campus Scene - View from the Humanities Building
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 current and official list of academic courses and programmes, policies, and regulations regarding admissions, examinations, and fees, as well as general information about the University. It also serves as an official and historical record of the University.

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 contains general information about the University. The second division outlines the undergraduate programmes and the third division describes the courses offered in these programmes. The last division of the Calendar describes the general administrative structure of the University.

The information in this Calendar applies to the 1979-80 academic session which commences in September 1979.

The University

Classes at the University of Waterloo commenced in July, 1957, with the introduction of the Co-operative Engineering Programme. 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. Programmes are offered in Architecture, Arts, Engineering, Environmental Studies, Integrated Studies, Mathematics, Optometry, Human Kinetics and Leisure Studies, Science and Urban and Regional Planning. 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 175,000.

Since the opening of the first permanent structure on campus in 1958, the University has expanded steadily. The thirty teaching and service buildings presently on campus include a Computing Centre, a Physical Activities Complex, extensive library facilities, two theatres, four residential Church Colleges, and a variety of modern residential accommodation.

University Colours and Coat of Arms

The Official colours of the University of Waterloo are gold, black and white. The coat of arms for the University of Waterloo, as adopted in October 1961, is:

Arms
Or, a chevron sable surmounted by a chevronell argent between three lions rampant, gules.

Motto
Concordia Cum Veritate - In Harmony with Truth

The University Mace

The symbolic theme may be described as follows:

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

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

The four-fold diversity is significant because of the four faculties existing at the time the Mace was presented to the University and as well, of the four church-related colleges federated and affiliated with the University. These diverse elements together form a crown, and the points of the crown, while tending toward a union do not quite touch but remain as individuals suspended in tension and yet engaged in a deep harmony. This creative process is focussed 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 a 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 jurisdiction whether on or off campus.
The University of Waterloo
Academic Organization

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 Integrated Studies Programme.

Renison College

Renison College was founded by a group of Anglicans committed to the principle of a small residence-teaching community which could emphasize the virtues of intimacy, creativity, and innovation with regard to both teaching and residential life. Academic offerings at Renison include courses in two areas:

a) Social Development Studies Programme, and
b) General Arts.

The former is an integrated programme of courses in the areas of Social Work, Psychology, Sociology and Interdisciplinary Social Science, with emphasis on both classroom study and community involvement. Within General Arts are courses in Arts, English, Fine Arts, Geography, History, Psychology, Religious Studies and Sociology. Renison College faculty members and courses are indicated by an R suffix.

Full time enrolment for each Faculty including church colleges and off campus students (as of November 1, 1978)

| Faculty of Arts | 2,566 |
| Faculty of Engineering | 2,987 |
| Faculty of Environmental Studies | 1,354 |
| Faculty of Human Kinetics and Leisure Studies | 1,167 |
| Integrated Studies Programme | 64 |
| Faculty of Mathematics | 3,347 |
| Faculty of Science | 1,898 |

Total Undergraduate Enrolment (Full-Time) 13,383

Graduate Student Enrolment (Full-Time) 1,128

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 which had been affiliated with the University of Ottawa before entering into federation with the University of Waterloo in July, 1960. It offers a complete range of undergraduate courses in the Faculty of Arts and registers students in regular Mathematics programmes. Students registered at St. Jerome's College freely supplement their programmes with courses offered at the University and students registered at the University complement their programmes with courses offered uniquely at St. Jerome's. In the Calendar, St. Jerome's faculty members and courses are indicated by a J suffix. Graduates of the college receive University of Waterloo degrees in accordance with the terms of the federation agreement. A continuous building programme since 1962 finds St. Jerome's presently with a teaching and administration building, a library, a men's residence accommodating 110 and a women's residence, Notre Dame College, operated by the School Sisters of Notre Dame, which has room for 122 students. The University of St. Jerome's College is conducted by the Congregation of the Resurrection.

St. Paul's College

St. Paul's United College is a teaching and residential community of 150 men and women. It offers a limited number of courses in Religious studies which are available for academic credit to any student enrolled in the University. St. Paul's College faculty members and courses are indicated by a P suffix. Resident life in the College provides a valuable contribution to university experience beyond that which comes from courses taken for credit. Through a programme of athletics, community dinners, a congregation and interest groups engaged in various projects and issues relating to the University, the Church, personal life and society, members of the College and associates participate in a vital and enriching community.

Conrad Grebel College

Conrad Grebel College is a Mennonite school with residential, teaching, research, and community programmes. Its courses are open to all students on campus. In the Calendar, Conrad Grebel College courses have a G suffix, and they can be found under Arts, History, Music (Fine Arts), Religion and Sociology. Special emphases include peace studies in the various disciplines. The academic programme in music at the University is administered by Conrad Grebel College. There are several choirs, choral, and instrumental ensembles. An addition which includes classrooms, offices, a library and an auditorium opened in September, 1976.
Degrees Offered

The University of Waterloo offers the following undergraduate degrees:

- Bachelor of Architecture (B.Arch.)
- Bachelor of Arts (B.A.)
- Bachelor of Applied Science (B.A.Sc.)
- Bachelor of Environmental Studies (B.E.S.)
- Bachelor of Independent Studies (B.I.S.)
- Bachelor of Mathematics (BMath.)
- Bachelor of Science (B.Sc.)
- Doctor of Optometry (O.D.)

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

The University of Waterloo offers the following graduate degrees:

- Master of Arts (M.A.)
- Master of Applied Science (M.A.Sc.)
- Master of Science (M.Sc.)
- Doctor of Philosophy (Ph.D.)

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

Honorary Degrees

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

- Doctor of Engineering (D.Eng.)
- Doctor of Environmental Studies (D.E.S.)
- Doctor of Laws (L.L.D.)
- Doctor of Letters (D.Litt.)
- Doctor of Mathematics (D.Math.)
- Doctor of Science (D.Sc.)

Systems of Study

The University offers its students two different systems of study, the Regular System and the Co-operative System. Some programmes are offered under one system only, while others are offered under either system. Each of the programme sections in this calendar contains information concerning the System of Study that can be followed for the programme 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 spend alternating terms of four months duration on the campus for academic studies, and with business, industry, or government for off-campus practical training. Further information about the Co-operative System can be found in Chapter 5.

Part-time Studies

The University makes a special effort to provide opportunities for students pursuing a degree on a part-time basis. These students may:

- normally take any of UW’s regularly scheduled daytime classes in the Fall, Winter and Spring terms;
- choose from a substantial number of late afternoon and evening courses scheduled for their convenience in each term;
- choose from over 200 courses offered through the Correspondence Programme;
- take courses offered primarily through the Faculty of Arts in a six-week Summer Session;
- take courses offered each term at various off-campus centres.

Some degrees may be completed entirely by part-time study.

There is no distinction between part-time and full-time students in regard to admission requirements, grading practices and promotion policies. Tuition is assessed on a fee-per-course basis for both part-time and full-time students.

In regard to admission, individuals of mature age who do not possess the normal minimum admission requirements may apply under the adult student clause. Information regarding the availability of courses and admission and registration procedures can be obtained from the Part-time Studies Office, Needles Hall.

Part-time Studies Off-Campus

Over forty University of Waterloo credit courses are now being offered annually off-campus in such communities as Orangeville, Palmerston, Walkerton, Cambridge and Stratford. Most of these courses meet in the evening for three hours each week during one term (Fall, Winter or Spring), although some are held in the day-time hours and through two terms. These courses may also be attended as free public interest lectures. For information about 1979-80 off-campus lectures, call or write the part-time studies office. (519-885-1211, ext. 3447)

Correspondence Courses

The University of Waterloo offers more than 200 degree credit courses by correspondence in Anthropology, Arts, Biology, Chemistry, Classical Civilization, Earth Sciences, Economics, English, Fine Arts, French, Geography, German, History, Latin, Mathematics, Music, Philosophy, Physics, Political Science, Psychology, Recreation, Sociology, Spanish, and Urban
and Regional Planning. Other courses are contemplated.

Specially prepared lectures, recorded on audio tape cassettes, and accompanying lecture notes are prepared by the professors to explain and supplement material in the text. These, together with assigned problems, form the basis of the courses.

The courses may be taken by anyone with a suitable academic background and can be used for credit towards a degree at the University of Waterloo. Several General Degree programmes in Arts, Mathematics and Science may be taken entirely on a part time basis by correspondence or by any combination of correspondence, regular, or summer courses which will fulfill the degree requirements of the faculty.

Further information and correspondence application forms are included in the Correspondence Calendar which can be obtained from:

Correspondence Programme.
University of Waterloo
Waterloo, Ontario
N2L 3G1

Continuing Education
Through a number of channels the University recognizes its responsibility for the continuing education of adults.

A number of academic departments sponsor special lecture series of interest to all persons in the community. Information regarding these series can be obtained from the department concerned or from the Part-Time Studies 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 sections for a complete breakdown of the appropriate grading system.

<table>
<thead>
<tr>
<th>Assigned Letter Grades</th>
<th>Common Weighing Factors</th>
<th>Assigned Percentage Grades</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>
</tr>
<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.

Interpretation of Averages
Averages are classified in the following broad categories. The "Passing" and "Failure" categories do not apply to the Faculty of Engineering (refer to the Engineering Examinations and Promotions policy - chapter 8).

<table>
<thead>
<tr>
<th>Honours</th>
<th>General</th>
</tr>
</thead>
<tbody>
<tr>
<td>80-100</td>
<td>First Class Honours Excellent</td>
</tr>
<tr>
<td>70-79.99</td>
<td>Second Class Honours Very Good</td>
</tr>
<tr>
<td>60-69.99</td>
<td>Third Class Honours Good</td>
</tr>
<tr>
<td>50-59.99</td>
<td>Passing</td>
</tr>
<tr>
<td>0-49</td>
<td>Failure</td>
</tr>
</tbody>
</table>

Non-Graded Standings
CR Credit Granted
AEG Aegrotat, credit granted due to illness
NCR No credit granted
INC Incomplete course work, no credit granted
DNW Did not write examination, no credit granted
AUD Audit only, no credit granted
NMR No mark reported

Examinations Regulations
The following are excerpts from the Senate Regulations governing Examination Procedures: 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 programme sections of this Calendar, Chapters 7-13.

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.

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 in February or March for their own students who plan to return in the next academic year. Course limits are adjusted on the basis of the demand indicated and tentative space is provided for Cross-Registered students in the courses concerned. Formal requests to Cross-Register are accepted only after the academic timetables are finalized in August.

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., will be applicable where the student is taking the course. Grades are reported to the student's home University based on the grading system of the host University and are combined with the results of the student's other courses to complete the examination report. A student's overall academic standing is determined solely by the home University.

Regulations concerning the dates for adding or dropping a course as well as petitions for cross-registered courses are governed by the student's home institution.

For further details, contact the Registrar's office.

Academic Offenses
Disciplinary jurisdiction with respect to all students is vested in the Board of Governors which may delegate its authority in any particular case to the President. The President normally delegates to the Faculty Deans his authority to deal with academic offenses, except that he may not delegate his authority to expel a student from the University.

The following is a condensed version of the Report of the Senate Committee on Academic Regulations and Discipline (approved by Senate December 18, 1970).

Any act by a student which is in violation of any academic regulation of the University shall be considered an academic offense. The following list of examples of academic offenses is not necessarily all-inclusive: cheating on examinations or tests; being impersonated by or impersonation of another student; plagiarism; theft of examination papers, their distribution or use; falsification of academic records.

When an academic offense has allegedly occurred, the individual is presumed innocent until the contrary is established. In all cases reasonable effort should be made to settle any disciplinary issue, including alleged academic offenses, by means of informal discussions between the student(s) involved and the faculty member(s) concerned.

For academic offenses that cannot be resolved by discussion, formal procedures involving an Advisory Committee on Academic Discipline established to advise the Dean of the faculty may be invoked. The membership of the Committee is as follows: a non-voting chairman, who shall be the Associate Dean, one faculty member from each department within the faculty, and two students appointed by the student society of the faculty. Full details of the procedures are contained in the Report.

For a student found guilty of an academic offense one of three disciplinary actions may be recommended to the Dean:

1) Probation, for a stated period of time;  
2) Suspension, for a stated period of time;  
3) Expulsion, which shall be permanent.

If the recommendation is for expulsion, the final decision shall rest with the President.

Right of Appeal
A student may appeal any decision by the Dean to the President.

The complete version of the Report on Academic Regulations and Discipline may be obtained from the University Secretariat or from the office of the Dean in each faculty.
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

Campus Centre
Opportunity to participate in extracurricular activities is provided by the Federation of Students. All students at Waterloo are members of the Federation of Students. 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.

Objects
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 Student's Council
Twenty-nine elected members plus officers make up the Student's Council. Members representing all faculties, societies and colleges are included.

The functions of the Students' Council, the governing body of the Federation, include upholding the objects of the Federation, administration and control of finance, and operation and control of all Boards and Committees of the Council. Social and cultural activities of the student body are managed by the Students' Council as well as off-campus representation of the student body.

The Executive Board
The Executive Board is composed of the principal officers including the President, Vice-President, Treasurer, and all Board Chairmen. The Board controls day-to-day administration, finance, and recommends policy to the Students' Council. It also co-ordinates programmes of all other Boards and provides liaison between them.

The Creative Arts Board
The Creative Arts Board provides activities in music, drama and dance.

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

The Board of Education
The Board of Education sponsors programmes to examine and improve the quality of education.

The Board of Entertainment
The Board of Entertainment co-ordinates and supervises campus-wide special programmes, including, Freshman Orientation, "pubs", and concerts.

The Board of Co-operative Services
The Toronto bus service, the campus centre ice cream stand, a used book store and large concerts are operated by the Board.

The overriding policy of the Board is to operate on as close to a break-even point as possible.

The Board of Publications
The Board is responsible for overseeing the various publications of the Federation. These include the student newspaper, the *Chevron*; the student handbook, published annually; the student directories published each term and various other less regular publications. More details on each of the Boards and their activities are outlined in the Student Handbook.

Persons wishing more information on any aspect of Federation activities are advised to write:
The Federation of Students

Athletics

Physical Activities Complex
The Department of Athletics offers a complete programme of intercollegiate and intramural activities for the enjoyment of the university community.

Book Store
South Campus Hall
Text books, general interest books and supplies are available at the University Book Store.

Career Information Centre
Needles Hall
The Centre contains material which will assist students in their vocational and educational planning. Information related to personal development and work or travel abroad is also available.

Centre for the Arts
Room 254, Modern Languages Building
The Centre administers the two theatres and the Art Gallery. It sponsors a series of professional attractions and, in conjunction with the Federation of Students, it provides participating activities in music, drama and dance.
The Department of Computing Services
Mathematics and Computer Building
The Department of Computing Services, located on the first two floors of the Mathematics and Computer Centre building, provides computing facilities and services for faculty, staff, graduate and undergraduate students. The facilities include key-punches, terminals and programme preparation areas, an input/output area for submission of batch jobs and retrieval of printed output, an incremental plotting facility, and a variety of 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 the computer in course assignments. Administrative staff also use the computer in applications such as student records, course timetables, examination results, and financial accounting.

Most students, particularly at first and second year levels, gain access to the computer through a system called WIDJET (Waterloo Interactive Debug Job Entry Terminals). WIDJET connects the student, sitting at a key-driven CRT terminal, to a mini-computer which allows the student to construct a programme in a text-editing environment. When the programme is developed, it can be sent for compilation and execution over a high speed communication facility to a large IBM computer. Results are returned to the student's terminal, and if the run was successful the student can have the output directed to an on-line printer. The WIDJET system has largely replaced a cafeteria style batch job entry system which also gives students access to student-oriented software, pioneered by the University of Waterloo, on large IBM computers.

More advanced users also use both the WIDJET and cafeteria style DEBUG service for preliminary work. However, other services are also available, including a general BATCH environment, and the time-sharing system VM/370 CMS. In both environments general text-editing software and other special applications packages are provided. APL is available under CMS and on a separate computer. The CMS environment allows the user to develop and execute programmes, with a choice of several languages, in an interactive manner, thus increasing human productivity, particularly during programme development. The virtual memory capabilities of VM/370 also make it possible to service users with applications requiring large blocks of memory.

The University of Waterloo
Student and Administrative Services

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.

Counselling Services
Needles Hall
Trained counsellors are available to assist the student with his or her vocational, personal and emotional development on a confidential, individual or small group basis.

Dean of Women
Room 224, Modern Languages Building
This office serves as a general academic information and advisory centre for all students.

Health Services
Health Services Building
Staffed by medical doctors, registered nurses, a counsellor and other trained personnel, Health Services is open to all students. The doctors' services are covered by OHIP so the student should be sure he or she is insured.

Office of the Registrar
Needles Hall
Student admissions, registration, records and financial aid for undergraduate students are administered by the Registrar's Office.

Office of Research Administration
(Incorporating Waterloo Research Institute)
The Office of Research Administration (ORA), now located on the third floor of Ira Needles Hall, is responsible for faculty grant applications and contract research, as well as the distribution of grant information and regulations.

Among the functions of the ORA are the following:
- to ensure that university policies and agency/sponsor requirements are met; to provide faculty with information and application forms; to forward applications and proposals to appropriate agencies; to act as a centre of communications between granting agencies and faculty; and to assist faculty in obtaining grants and contracts for undertaking research.

The ORA also administers the university's patent assistance programme.

Contract Research: In this regard the ORA 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 ORA 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.

Research Involving Human Subjects: The Co-ordinator (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 Co-ordinator is also responsible for obtaining school age children as subjects for suitable university research projects.

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. It is the responsibility of the Committee to co-ordinate and review all activities and procedures relating to the care of research animals.

Residences
Residence accommodation is available at the University for approximately 4,000 students in the University Residences, Federated and Affiliated Colleges and the student Co-operative Residences. Apartments for married students and their families are available on campus in the Married Students’ Apartment Complex. An off-campus housing information service is also provided.

Students who wish to apply for residence should write to the Director of Housing or directly to the College of their choice for a brochure and the Residence Information sheet which includes the fee schedule.

International Student Office
This office is located on the second floor of Needles Hall and is available to assist any International Students who require information, e.g., Immigration laws, etc.

Teaching Resource Office
The Teaching Resource Office 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 - especially new faculty members - in improving their teaching performance, offering assistance to departments on teaching methods and evaluation of learning, and keeping the university community informed about developments and innovations relevant to teaching and learning in higher education.
Admissions

Campus Scene
General Information

Applicants seeking admission to undergraduate programmes are required to have suitable and adequate preparation to enable them to successfully undertake studies at the University. Before submitting an application, prospective students should read carefully the description of the programme 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, full-time, part-time or correspondence, wishing to pursue degree studies.

Candidates may apply for admission to the programmes 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.

More detailed information regarding admission requirements is available from the Assistant Registrar (indicate Faculty desired).

Applicants are advised to outline thoroughly their educational background in order to facilitate the admission process. The admission information and requirement set forth in the Calendar are applicable for admission beginning in September 1979.

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 other than the appropriate Admissions Committee.

The University reserves the right to refuse admission to any candidate and to refuse re-admission if, in the opinion of competent authority, a student will not profit from University studies.

The University reserves the right to withdraw the offer of admission made to an Ontario secondary school student if the Applicant fails to complete Year 5 satisfactorily.

St. Jerome’s College

Applicants may apply for Programmes in Arts and Mathematics (regular programme only) through St. Jerome’s College. All applicants should indicate clearly “St. Jerome’s College” on their application form. All transcripts and documents should be sent directly to the College.

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

Admissions
General Admission Requirements

Renison College

Applicants may apply for the Social Development Studies Programme and for General Arts Programmes 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 Year 5 curriculum.

In some programmes 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 Ontario Year 5 (see below) as well as meeting average requirements.

The designation of a limited enrolment programme means that in the past, the number of qualified applicants exceeded the number of places available. It is expected that for 1979 the following programmes will be designated as limited enrolment programmes:

Architecture
Engineering
Geography
Kinesiology
Mathematics
Optometry
Recreation
Urban and Regional Planning

Normally students who are refused admission to a particular programme will automatically be certified for admission to other programmes for which they satisfy the specific subject and marks requirements.
Appllicants - Ontario Year 5 (Grade 13)

For all programmes, the University normally requires completion of an Ontario Year 5 (Grade 13) programme, comprising at least 6 Year 5 credits, leading towards the Secondary School Honour Graduation Diploma. A minimum average of 60% is normally required for admission. The following criteria are used in selecting applicants for admission: Year 5 interim or final standing; Year 4 final standing; Principal’s recommendation.

The 1979-80 Admission Requirements for applicants from Ontario Year 5 Programmes (Grade 13) are shown in the accompanying chart. (page 26-29)

Applicants - Other Than Ontario Year 5 (Grade 13)

Applicants who are not currently registered in Ontario Year 5 are considered under the following broad categories. These categories serve to identify general areas of academic preparation.

Adult Students

Individuals of mature age who have been away from formal education for more than two years and who do not possess the minimum requirement for admission, stated in terms of Ontario secondary school preparation, may apply as adult students.

Applicants applying as adult students are advised to contact the Assistant Registrar of the desired faculty to discuss admissibility and appropriate qualifying work. Generally, it is recommended that applicants who are applying to enter the University as adult students attempt to obtain standing in at least one Ontario Year 5 level subject or its equivalent. This preparation should relate to the programme the applicant wishes to study at the University. Applicants to programmes requiring specific Ontario Year 5 level prerequisites normally must have standing in these required subjects to be considered for admission. Mature students not meeting the requirements for degree candidacy may in certain cases be admitted to degree studies on a part-time probationary basis. Each application is considered on its own merit by the Admissions Committee.

Adult students who are not interested in pursuing a degree may apply on a non-degree basis. Courses taken under this provision will count toward a degree if the student is admitted later as a degree candidate.

Advanced Standing

Applicants to advanced years must specify the Faculty to which they are seeking admission, the programme they wish to study, and the level of admission sought. All faculties, with the exception of Engineering, 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. Applicants are expected to submit courses 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 programme applied to, the relevancy of the previous programme studied, and approval from the appropriate department that such courses are to be credited to the student’s programme.

As the specific transfer credit policies vary with each faculty, students are advised to refer to the faculty sections in the 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 programme at an Ontario College of Applied Arts and Technology are considered for admission to Year Two of a relevant programme at the University of Waterloo.

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.

Certificates Equivalent to the Ontario Secondary School Honour Graduation Diploma

All applicants are required to hold the specific subject requirements indicated on pages 26/28 in addition to the equivalent level of education.

Applicants are required to submit official transcripts for all years spent in secondary and post secondary education. Transcripts must indicate subjects studied, the grades received and an interpretation of the grading system used.

Text continued after charts on page 30.
### Specific Faculty Programme Recommendations and Requirements

<table>
<thead>
<tr>
<th>Faculty</th>
<th>Requirements Specific Year 5 Subjects</th>
<th>Minimum Overall Average in Specific Courses</th>
</tr>
</thead>
<tbody>
<tr>
<td>Engineering</td>
<td>Relations and Functions, Calculus, Algebra, Chemistry, Physics</td>
<td>60%</td>
</tr>
<tr>
<td>Environmental Studies</td>
<td>Relations and Functions, Calculus, Physics, English (Français)</td>
<td>60%</td>
</tr>
<tr>
<td>Architecture (pre-professional programme)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Geography</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Man-Environment Studies</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Urban and Regional Planning</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
This chart with other Faculties continues on pages 28 and 29

<table>
<thead>
<tr>
<th>Recommendations</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>The following recommendations are listed to assist applicants in arranging their Year 5 curriculum. These are recommendations only and it does not mean that the applicant's admission will be jeopardized if the recommended courses are not taken.</td>
<td>The following comments are made in order to inform applicants of the enrolment limitations in certain programmes. These comments are to be considered as guidelines only and are based on historical experience and an anticipated application profile. The factors which affect enrolment limitations may change at any time.</td>
</tr>
<tr>
<td>Applicants should include Year 5 courses such as English, History, Languages (other than English) in their Year 5 programme. Level 5 English courses, particularly those that stress writing skills, are especially recommended.</td>
<td>The first year Engineering enrolment is limited to 660 students. Approximately 90% of these places are filled by Ontario Year 5 students. Experience has shown that applicants with overall Year 5 averages above 70% are given first consideration. The University reserves the right to withdraw offers of early admission to Engineering for students receiving final marks below 60% in any of their six credits.</td>
</tr>
<tr>
<td>Students with high overall standing who are missing one or two of the five specific Year 5 requirements are encouraged to contact the admissions Officer no later than January (for September admission). Applicants will be evaluated and advised on possible courses of action required to meet our specific requirements. 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 and writing performance such as English, History, Geography, etc.</td>
<td>Because of the increasing use of statistics and quantitative methods in environmental research, students should present at least one Year 5 Mathematics course for admission to all programmes in Environmental Studies.</td>
</tr>
<tr>
<td>Applicants should include Geography in their Year 5 programme. Applicants may find at least one Year 5 Mathematics course helpful.</td>
<td>Selected applicants are normally required to come to the University for an interview as part of the admission process. Selection for the interview is based on Year 4 and Year 5 standings. Admission is based on the results of the interview, an English writing exercise designed to test skills of analysis and expression, and on secondary school achievement. The first year programme is limited to 70 students.</td>
</tr>
<tr>
<td>Applicants with overall Year 5 averages above 65% are given first consideration.</td>
<td>Applicants indicating Man-Environment Studies as first choice are given first consideration. The first year programme is limited to 90 students. 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 Year 4 and Year 5 standings. Admission is based on the results of the interview and on secondary school achievement. The first year programme is limited to 70 students.</td>
</tr>
</tbody>
</table>
Specific Faculty Programme Recommendations and Requirements
(The chart below continues from the chart on pages 26 and 27.)

<table>
<thead>
<tr>
<th>Faculty</th>
<th>Requirements</th>
<th>Minimum Overall Average in Specific Courses</th>
</tr>
</thead>
<tbody>
<tr>
<td>Human Kinetics &amp; Leisure Studies</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dance</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Health Studies</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Kinesiology</td>
<td>Two Year 5 courses</td>
<td></td>
</tr>
<tr>
<td></td>
<td>from Biology, Chemistry</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Physics</td>
<td></td>
</tr>
<tr>
<td></td>
<td>One Year 5 Mathematics Course (Calculus preferred)</td>
<td></td>
</tr>
<tr>
<td>Recreation</td>
<td>a Year 5 Mathematics Course</td>
<td></td>
</tr>
</tbody>
</table>

Integrated Studies

<table>
<thead>
<tr>
<th>Mathematics</th>
<th>Calculus</th>
<th>Regular Programme 60%</th>
<th>Algebra</th>
<th>Co-operative Programme 66%</th>
<th>Relations &amp; Functions</th>
<th>Co-operative Programme 66%</th>
</tr>
</thead>
</table>

Science

<table>
<thead>
<tr>
<th>Regular (and pre-professional Optometry)</th>
<th>Two Science courses (one of which must be Chemistry or Physics)</th>
<th>60%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Co-operative Biology</td>
<td>As above</td>
<td>60%</td>
</tr>
<tr>
<td>Co-operative Applied Chemistry</td>
<td>As above</td>
<td>70% in Chemistry and 70% in Math courses</td>
</tr>
<tr>
<td>Co-operative Applied Physics</td>
<td>as Above</td>
<td>an overall 70% in Physics and Math courses</td>
</tr>
<tr>
<td>Recommendations</td>
<td>Comments</td>
<td></td>
</tr>
<tr>
<td>-------------------------------------------------------------------------------</td>
<td>-------------------------------------------------------------------------------------------</td>
<td></td>
</tr>
<tr>
<td>Applicants should include Year 5 Biology and Chemistry</td>
<td>Applicants with overall Year 5 averages above 65% are given first consideration.</td>
<td></td>
</tr>
<tr>
<td>Applicants should include four Year 5 courses from Biology, Chemistry, Physics, Functions and Relations, Algebra, Calculus</td>
<td>Applicants with overall Year 5 averages above 65% are given first consideration.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Applicants with overall Year 5 averages above 65% are given first consideration.</td>
<td></td>
</tr>
<tr>
<td>Students with high overall standing who are missing one of the three specific requirements are encouraged to contact the Assistant Registrar, Mathematics, no later than January (for September admission). Applicants will be evaluated and advised on possible courses of action to meet our specific requirements.</td>
<td>Competition for admission to mathematics programmes has been keen over the past several years...particularly in the co-operative programmes. Accordingly, applicants not offered admission to Co-op will be automatically considered for admission to Regular.</td>
<td></td>
</tr>
<tr>
<td>All Science programmes applicants are advised to select both Year 5 Chemistry and Physics courses.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Applicants to Co-operative Chemistry and Physics are recommended to select both Relations &amp; Functions and Algebra in addition to the required Calculus course.</td>
<td>Applicants to the Co-operative Biology programme with an overall average of over 70% are given first consideration.</td>
<td></td>
</tr>
</tbody>
</table>
A) Applicants from Other Canadian Provinces
- Alberta: Grade 12
- British Columbia: Grade 12
- Manitoba: Grade 12
- New Brunswick: Year 1 Memorial University
- Newfoundland: Grade 12
- Nova Scotia: Grade 12
- Prince Edward Island: First Year CEGEP programme or equivalent
- Quebec: Grade 12
- Saskatchewan: Grade 12

B) Applicants from Other Countries

Equivalent Certificates

Countries following a "British" System of Education
General Certificate of Education or equivalent with passes in at least 5 subjects, 2 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 6 subjects, 3 higher level and 3 subsidiary level with a grade total not less than 28.

Hong Kong
Hong Kong Certificate of Education (English) and University of Hong Kong Matriculation (Advanced Level) with passes in at least 5 subjects, 2 of which must be at the Advanced Level. (Applicants with 3 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 programme.

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
Baccalaureate Passable

United States of America
Secondary School Graduation plus an additional year of formal study in subjects comparable to Ontario Year 5.

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.

English Proficiency Test

Applicants whose native language is not English are advised to take the "Test of English as a Foreign Language" (TOEFL). Normally, a score of 600 is required to satisfy the Admissions Committee that the applicant's knowledge of the English language is adequate to pursue university studies successfully. In addition, applicants to Co-operative programmes must satisfy the Admissions Committee that they can perform satisfactorily in their work terms. The expenses involved in administering the test must be borne by the applicant.

Landed Immigrant Status

Because of the nature of the co-operative programmes 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 Landed Immigrant Status in Canada before applying for admission to a co-operative programme. Exceptions can be made on an individual basis at the request of a government agency or other employer. Until such proof is received, applicants will be considered for a comparable programme, if available, offered under the regular system of study. In the case of the Co-operative Engineering Programmes, immigrants must have one year's residency, with suitable work experience, in Canada before applying for admission.

Application Procedures

1) Applicants who wish to study on a full time basis must submit their applications through the Ontario University 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 (e.g. mature applicants, applicants from outside Ontario) must complete OUAC form 105. These forms may be obtained from the Registrar's Office.
2) a) Applicants requesting part-time, or non degree courses should contact the Registrar’s office for the appropriate application forms. Do not apply through the Application Centre.

b) Applicants requesting correspondence courses should write to the Correspondence Programme, University of Waterloo, Ontario N2L 3G1 or call (519) 885-1211 extension 3901.

Note
When requesting an application form from the University candidates should outline their academic background and indicate the exact programme 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, documents required etc. 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 it cannot guarantee consideration of any application that is received.

<table>
<thead>
<tr>
<th>Session/Term starting</th>
<th>Last date for application</th>
</tr>
</thead>
<tbody>
<tr>
<td>May 1, 1979</td>
<td>March 1, 1979</td>
</tr>
<tr>
<td>July 4, 1979</td>
<td>June 1, 1979</td>
</tr>
<tr>
<td>September 5, 1979</td>
<td>July 1, 1979*</td>
</tr>
<tr>
<td>January 2, 1980</td>
<td>November 1, 1979</td>
</tr>
</tbody>
</table>

Correspondence Programme

<table>
<thead>
<tr>
<th></th>
<th>August 17, 1979</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fall Term 1979</td>
<td></td>
</tr>
<tr>
<td>Winter Term 1980</td>
<td>October 26, 1979</td>
</tr>
<tr>
<td>Spring Term 1980</td>
<td>February 22, 1980</td>
</tr>
</tbody>
</table>

*Applications and all supporting documentation must be received no later than May 1, 1979 for all Year 1 limited enrolment programmes, with the exception of Architecture, in which case applications must be received by April 1, 1979.

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

Processing of an Application

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

All Ontario Year 5 applicants will be notified on or after June 15, 1979, of the status of their application for admission. Year 5 applicants who do not receive an offer of admission at this time will have their applications deferred until the final Year 5 marks are received by the University. When these marks have been received, qualified applicants will be admitted until the remaining places are filled.

Ontario Year 5 applicants who receive an early offer of admission are encouraged to confirm as soon as possible, but are not required to respond before June 30, 1979.

Applicants who are not currently enrolled in an Ontario Year 5 programme can expect to wait several weeks before receiving a decision on their application. Some programmes require applicants to come to the University for an admission interview and a decision cannot be made in such programmes 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

Once admitted to the University, students are advised to pre-register for their courses well in advance of the beginning of lectures. First year students select their courses in conjunction with a member of the Dean’s office; advanced year students select their courses on the advice of the departmental undergraduate advisor. Students registering through Renison or St. Jerome’s select their courses with the appropriate advisor at the College. Information regarding pre-registration is forwarded when the student is admitted. Students are encouraged, where possible, to pre-register and pay their fees by mail. 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.
Note

Pre-registration is the process of choosing courses and having them approved by the appropriate advisor prior to the beginning of classes.

Registration is completed when courses have been approved, fees paid, and a receipt issued.

A schedule of fees is outlined in Chapter 3, page 36 of this calendar.
Fees and Registration

Registration area
Pre-Registration, Registration, Fees

Pre-Registration
Pre-registration is the process of choosing courses and having them approved by the appropriate advisor prior to the beginning of lectures. All students must pre-register for courses as follows:

a) Returning Students
   1) Co-operative Programmes
      During the preceding on-campus term.
   2) Regular Programmes
      During March of the preceding academic year.

b) Newly Admitted Students
   As soon as possible after academic admission.

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

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 finalized.

Assessment
Fees are assessed as follows: (Student Visa Students - see note 4 page 39)

A) Co-operative Programmes
   1) All Terms
      a) Engineering and Architecture
         Students are assessed on a programme 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 Programmes
         Students taking more than two term courses in a term are assessed:
         (i) by course at the Unit Course Fee to a maximum of the Basic Fee,
         (ii) the co-operative fee and incidental fees.
         Students taking one or two term courses only in a term are assessed by course at the Unit Course Fee shown.

B) Regular Programmes
   1) Fall/Winter Session
      a) Architecture Year 1, Integrated Studies and Optometry
         Students are assessed on a programme basis for the Total Tuition and Incidental Fees shown on the Schedule of Fees.
      b) Other Regular Programmes
         Students taking more than two full course equivalents are assessed:
         (i) by course at the Unit Course Fee to a maximum of the Basic Fee,
         (ii) incidental fees.
         Students taking two full course equivalents or less are assessed by course at the Unit Course Fee shown.

   2) Winter or Spring Term
      a) Architecture Year 1, Integrated Studies and Optometry
         Students are assessed on a programme basis for the Total Tuition and Incidental Fees shown on the Schedule of Fees.
      b) Other Regular Programmes
         Students taking more than two full course equivalents are assessed:
         (i) by course at the Unit Course Fee to a maximum of the Basic Fee,
         (ii) incidental fees.
         Students taking two full course equivalents or less are assessed by course at the Unit Course Fee shown.

   3) 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 5 to 8 for appropriate dates. Students must pay or arrange fees by these dates, whether or not a final class schedule has been received.

For sessional students unable to pay fees in full prior to the first day of lectures in September, the University will allow payment of fees in two instalments, the first payable before the start of lectures in September, and the second payable by the start of lectures in January. Instalment values are as follows:

1) for students assessed the Total Fee as shown in the Schedule of Fees, the first instalment will be for one-half of the tuition fee plus incidentals. The second instalment will be for the balance of the tuition fee.
2) For students assessed less than the Total Fee as shown in the Schedule of Fees, the first
instalment will be for the value of the courses
taken in the fall term plus incidentals. The second
instalment will be for the balance of the tuition
fee.

B) Methods
Fees should be paid with money order or cheque
payable to the "University of Waterloo".

Students registered through Renison College or St.
Jerome’s College must pay their fees directly to the
appropriate college.

For students who receive their fee statement by mail
are expected to make payment by mail. Detailed
instructions outlining the payment procedure will be
included with the fee statement.

For students who cannot register by mail, a
registration period is held on campus at the beginning
of each term. The dates of registration are listed on
pages 5 to 8 of the calendar.

For the 1979/80 year, for undergraduates only, the
University will accept post-dated cheques as an
arrangement for the payment of fees. Students
choosing this method of payment must post-date the
cheque as follows:

<table>
<thead>
<tr>
<th>Session/Term</th>
<th>Cheque must be dated</th>
</tr>
</thead>
<tbody>
<tr>
<td>Starting</td>
<td>not later than:</td>
</tr>
<tr>
<td>September 1979</td>
<td>31 August 1979</td>
</tr>
<tr>
<td>January 1980</td>
<td>21 December 1979</td>
</tr>
<tr>
<td>May 1980</td>
<td>25 April 1980</td>
</tr>
</tbody>
</table>

C) Other
Cheques returned by the bank for any reason will be
assessed a handling charge of $15.00 plus late
registration penalty as applicable.

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

Failure to pay all outstanding fees, accounts or
other assessments such as library fines before
conclusion of lectures may bar a student from writing
examinations and will result in withholding of credit and
transcripts for previous work.

Fee payments by scholarships, bursaries or
methods other than those outlined above must be
authorized by Student Accounts, Financial Services.

Students age 60 or over will be awarded a
University bursary to cover tuition and related
incidental (correspondence tape deposits not
included). Proof of eligibility for this bursary should be
furnished to the appropriate Assistant Registrar at the
time of pre-registration.

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, see pages 5 to 8 for dates,
will be assessed a late fee penalty as follows:

<table>
<thead>
<tr>
<th>First Day: $10.00</th>
<th>Thereafter: $3.00 per day (no limit)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Session/Term</td>
<td>Last Date to Register</td>
</tr>
<tr>
<td>May 1979</td>
<td>29 June 1979</td>
</tr>
<tr>
<td>July 1979</td>
<td>1 August 1979</td>
</tr>
<tr>
<td>September 1979</td>
<td>1 November 1979</td>
</tr>
<tr>
<td>January 1980</td>
<td>1 February 1980</td>
</tr>
<tr>
<td>May 1980</td>
<td>30 June 1980</td>
</tr>
</tbody>
</table>
Withdrawals
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 first three weeks of a term (first week for Summer Session) will receive a full refund less a $25 registration charge.

c) Students withdrawing during weeks 4 to 7 of a term (second week of Summer Session) will receive a refund of 50% of one term fee plus second term payment, if applicable.

d) Refunds are not provided to students after week 7 of a term (week 3 of Summer Session). Sessional students who withdraw after week 7 of the Fall term and before the start of the Winter term will receive a refund of the second term payment.

e) Requests for refunds of refundable incidental fees must be addressed to the organization concerned. Such refunds are available for three weeks only after the start of classes.

f) The Intercollegiate Athletic fee is refundable on the same basis as tuition fees.

g) 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 (see section F).

Schedule of Fees
The fee schedule is the one proposed for the 1979/80 year and at the time of printing is still subject to review and possible changes. If a fee change is made, a notice will be issued with a new schedule; however, the University does not undertake or accept responsibility to so notify all recipients of this calendar. The Board of Governors reserves the right to make changes in the published schedule of fees without notice.
## Schedule of Fees - Undergraduate Programmes - Tuition & Incidentals for all Years

<table>
<thead>
<tr>
<th>Faculty</th>
<th>Session/ Term</th>
<th>Basic Fee</th>
<th>Co-op Fee</th>
<th>Total Tuition Fees</th>
<th>Total Incidental Fees</th>
<th>Total Fees (See Note 11)</th>
<th>Unit Course Fee</th>
</tr>
</thead>
<tbody>
<tr>
<td>Architecture - Yr 1</td>
<td>Session</td>
<td>797.00</td>
<td>-</td>
<td>797.00</td>
<td>73.24</td>
<td>870.24</td>
<td>163.00</td>
</tr>
<tr>
<td>- Upper Yr, Co-op</td>
<td>Term</td>
<td>398.50</td>
<td>78.75</td>
<td>477.25</td>
<td>37.45</td>
<td>514.17</td>
<td>81.50</td>
</tr>
<tr>
<td>Arts - Regular</td>
<td>Session</td>
<td>760.50</td>
<td>-</td>
<td>760.50</td>
<td>68.24</td>
<td>828.74</td>
<td>163.00</td>
</tr>
<tr>
<td>- Winter, Spring</td>
<td>Term</td>
<td>380.25</td>
<td>-</td>
<td>380.25</td>
<td>33.08</td>
<td>413.33</td>
<td>81.50</td>
</tr>
<tr>
<td>- Co-op</td>
<td>Term</td>
<td>380.25</td>
<td>78.75</td>
<td>459.00</td>
<td>34.95</td>
<td>493.95</td>
<td>81.50</td>
</tr>
<tr>
<td>Engineering</td>
<td>- Co-op</td>
<td>398.50</td>
<td>78.75</td>
<td>477.25</td>
<td>38.95</td>
<td>516.20</td>
<td>81.50</td>
</tr>
<tr>
<td>Environmental Studies</td>
<td>- Regular</td>
<td>760.50</td>
<td>-</td>
<td>760.50</td>
<td>67.74</td>
<td>828.24</td>
<td>163.00</td>
</tr>
<tr>
<td>- Winter, Spring</td>
<td>Term</td>
<td>380.25</td>
<td>-</td>
<td>380.25</td>
<td>32.63</td>
<td>413.08</td>
<td>81.50</td>
</tr>
<tr>
<td>- Co-op</td>
<td>Term</td>
<td>380.25</td>
<td>78.75</td>
<td>459.00</td>
<td>34.70</td>
<td>493.70</td>
<td>81.50</td>
</tr>
<tr>
<td>HKLS-Regular</td>
<td>Session</td>
<td>760.50</td>
<td>-</td>
<td>760.50</td>
<td>69.24</td>
<td>829.74</td>
<td>163.00</td>
</tr>
<tr>
<td>- Winter, Spring</td>
<td>Term</td>
<td>380.25</td>
<td>-</td>
<td>380.25</td>
<td>33.58</td>
<td>413.83</td>
<td>81.50</td>
</tr>
<tr>
<td>- Co-op</td>
<td>Term</td>
<td>380.25</td>
<td>78.75</td>
<td>459.00</td>
<td>35.45</td>
<td>494.45</td>
<td>81.50</td>
</tr>
<tr>
<td>Integrated Studies</td>
<td>- Regular</td>
<td>760.50</td>
<td>-</td>
<td>760.50</td>
<td>63.24</td>
<td>823.74</td>
<td>163.00</td>
</tr>
<tr>
<td>- Winter, Spring</td>
<td>Term</td>
<td>380.25</td>
<td>-</td>
<td>380.25</td>
<td>30.58</td>
<td>410.83</td>
<td>81.50</td>
</tr>
<tr>
<td>Mathematics</td>
<td>- Regular</td>
<td>760.50</td>
<td>-</td>
<td>760.50</td>
<td>68.24</td>
<td>828.74</td>
<td>163.00</td>
</tr>
<tr>
<td>- Winter, Spring</td>
<td>Term</td>
<td>380.25</td>
<td>-</td>
<td>380.25</td>
<td>33.08</td>
<td>413.33</td>
<td>81.50</td>
</tr>
<tr>
<td>- Co-op</td>
<td>Term</td>
<td>380.25</td>
<td>78.75</td>
<td>459.00</td>
<td>34.95</td>
<td>493.95</td>
<td>81.50</td>
</tr>
<tr>
<td>Optometry</td>
<td>- Regular</td>
<td>760.50</td>
<td>-</td>
<td>760.50</td>
<td>67.24</td>
<td>827.74</td>
<td>163.00</td>
</tr>
<tr>
<td>Science-Regulat</td>
<td>Session</td>
<td>760.50</td>
<td>-</td>
<td>760.50</td>
<td>67.24</td>
<td>827.74</td>
<td>163.00</td>
</tr>
<tr>
<td>- Winter, Spring</td>
<td>Term</td>
<td>380.25</td>
<td>-</td>
<td>380.25</td>
<td>32.58</td>
<td>412.63</td>
<td>81.50</td>
</tr>
<tr>
<td>- Co-op</td>
<td>Term</td>
<td>380.25</td>
<td>78.75</td>
<td>459.00</td>
<td>34.45</td>
<td>493.45</td>
<td>81.50</td>
</tr>
<tr>
<td>Summer Session</td>
<td>Half Course</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>81.50</td>
</tr>
<tr>
<td></td>
<td>Full Course</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>163.00</td>
</tr>
</tbody>
</table>
### Student Visa Students (See Note 4)

<table>
<thead>
<tr>
<th>Faculty</th>
<th>Session</th>
<th>Basic Fee</th>
<th>Co-op Fee</th>
<th>Total Tuition Fees</th>
<th>Total Incidental Fees</th>
<th>Fees (See Note 11)</th>
<th>Unit Course Fee</th>
</tr>
</thead>
<tbody>
<tr>
<td>Architecture - Yr 1</td>
<td>Session</td>
<td>1,514.00</td>
<td>-</td>
<td>1,514.00</td>
<td>73.24</td>
<td>1,587.24</td>
<td>303.00</td>
</tr>
<tr>
<td>- Upper Yr, Co-op</td>
<td>Term</td>
<td>757.00</td>
<td>78.75</td>
<td>835.75</td>
<td>34.70</td>
<td>873.20</td>
<td>151.50</td>
</tr>
<tr>
<td>Arts-Regular</td>
<td>Session</td>
<td>1,514.00</td>
<td>-</td>
<td>1,514.00</td>
<td>68.24</td>
<td>1,582.24</td>
<td>303.00</td>
</tr>
<tr>
<td>- Winter, Spring</td>
<td>Term</td>
<td>757.00</td>
<td>78.75</td>
<td>835.75</td>
<td>33.08</td>
<td>790.08</td>
<td>151.50</td>
</tr>
<tr>
<td>- Co-op</td>
<td>Term</td>
<td>757.00</td>
<td>78.75</td>
<td>835.75</td>
<td>34.95</td>
<td>870.70</td>
<td>151.50</td>
</tr>
<tr>
<td>Engineering</td>
<td>Term</td>
<td>757.00</td>
<td>78.75</td>
<td>835.75</td>
<td>38.95</td>
<td>874.70</td>
<td>151.50</td>
</tr>
<tr>
<td>Environmental Studies</td>
<td>- Regular</td>
<td>Session</td>
<td>1,514.00</td>
<td>-</td>
<td>1,514.00</td>
<td>67.74</td>
<td>1,581.74</td>
</tr>
<tr>
<td>- Winter, Spring</td>
<td>Term</td>
<td>757.00</td>
<td>78.75</td>
<td>835.75</td>
<td>32.83</td>
<td>789.83</td>
<td>151.50</td>
</tr>
<tr>
<td>- Co-op</td>
<td>Term</td>
<td>757.00</td>
<td>78.75</td>
<td>835.75</td>
<td>34.70</td>
<td>870.45</td>
<td>151.50</td>
</tr>
<tr>
<td>HKLS - Regular</td>
<td>Session</td>
<td>1,514.00</td>
<td>-</td>
<td>1,514.00</td>
<td>69.24</td>
<td>1,583.24</td>
<td>303.00</td>
</tr>
<tr>
<td>- Winter, Spring</td>
<td>Term</td>
<td>757.00</td>
<td>78.75</td>
<td>835.75</td>
<td>33.58</td>
<td>790.58</td>
<td>151.50</td>
</tr>
<tr>
<td>- Co-op</td>
<td>Term</td>
<td>757.00</td>
<td>78.75</td>
<td>835.75</td>
<td>35.45</td>
<td>871.20</td>
<td>151.50</td>
</tr>
<tr>
<td>Integrated Studies</td>
<td>- Regular</td>
<td>Session</td>
<td>1,514.00</td>
<td>-</td>
<td>1,514.00</td>
<td>63.24</td>
<td>1,577.24</td>
</tr>
<tr>
<td>- Winter, Spring</td>
<td>Term</td>
<td>757.00</td>
<td>78.75</td>
<td>835.75</td>
<td>30.58</td>
<td>787.58</td>
<td>151.50</td>
</tr>
<tr>
<td>Mathematics</td>
<td>- Regular</td>
<td>Session</td>
<td>1,514.00</td>
<td>-</td>
<td>1,514.00</td>
<td>68.24</td>
<td>1,582.24</td>
</tr>
<tr>
<td>- Winter, Spring</td>
<td>Term</td>
<td>757.00</td>
<td>78.75</td>
<td>835.75</td>
<td>33.08</td>
<td>790.08</td>
<td>151.50</td>
</tr>
<tr>
<td>- Co-op</td>
<td>Term</td>
<td>757.00</td>
<td>78.75</td>
<td>835.75</td>
<td>34.95</td>
<td>870.70</td>
<td>151.50</td>
</tr>
<tr>
<td>Optometry</td>
<td>- Regular</td>
<td>Session</td>
<td>1,514.00</td>
<td>-</td>
<td>1,514.00</td>
<td>67.24</td>
<td>1,581.24</td>
</tr>
<tr>
<td>Science-Regular</td>
<td>Session</td>
<td>1,514.00</td>
<td>-</td>
<td>1,514.00</td>
<td>67.24</td>
<td>1,581.24</td>
<td>303.00</td>
</tr>
<tr>
<td>- Winter, Spring</td>
<td>Term</td>
<td>757.00</td>
<td>78.75</td>
<td>835.75</td>
<td>34.45</td>
<td>871.20</td>
<td>151.50</td>
</tr>
<tr>
<td>- Co-op</td>
<td>Term</td>
<td>757.00</td>
<td>78.75</td>
<td>835.75</td>
<td>34.45</td>
<td>871.20</td>
<td>151.50</td>
</tr>
<tr>
<td>Summer Session</td>
<td>Full Course</td>
<td>-</td>
<td></td>
<td></td>
<td></td>
<td>303.00</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Half Course</td>
<td>-</td>
<td></td>
<td></td>
<td></td>
<td>151.50</td>
<td></td>
</tr>
</tbody>
</table>
Incidental Fees

The following incidental fees are compulsory:

<table>
<thead>
<tr>
<th>Session Term</th>
<th>Fee</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intercollegiate Athletics</td>
<td>$28.00 $14.00</td>
</tr>
<tr>
<td>Health Insurance</td>
<td>$ 6.24 $ 2.08</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 session or term:

- Federation of Students $20.00 $10.00
- Student Society
  - Architecture $10.00 $ 5.00
  - Arts $ 5.00 $ 2.50
  - Engineering $ – $ 4.00
  - Env. Studies $ 4.50 $ 2.25
  - HKLS $ 6.00 $ 3.00
  - Int. Studies $ – $ –
- Mathematics $ 5.00 $ 2.50
- Optometry $ 4.00 $ 2.00
- Science $ 4.00 $ 2.00

The following incidental fees are voluntary, not a requirement of registration and are refundable on request from the organization listed below within three (3) weeks after the start of lectures for the session or term:

- OPIRG (see Note 8) $ 4.00 $ 2.00
- Sandford Fleming Foundation (see Note 9) $ – $ 2.50
- Radio Waterloo (see Note 10) $ 5.00 $ 2.50

Notes

Note 1 - Session/Term
Session refers to the eight month (September-April) period of study. Term refers to the four month period of study for students registered in a) Co-operative programmes, and b) the Winter or Spring terms of regular programmes.

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

Note 3 - Unit Course Fee
The fee assessed at $163.00 for each full course at a weight of 1.0; at $81.50 for each half or term course at a weight of 0.5; and at a prorated value for other course weights. The Unit Course Fee for Student Visa Students is as shown in the Schedule of Fees.

Note 4 - Student Visa Students
The Ontario Government has established a policy of higher tuition fees for international students studying in Ontario on student visas. The policy came into effect as of 1 January 1977. Fees for visa students who had successfully completed one or more terms of a programme prior to that date remain the same as those for Canadian students until the completion of their programme or the Winter term 1980, whichever occurs earlier. The higher fees apply to all students beginning a programme 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 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) or 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 the International Development Research Centre, 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 a 1976-79 Ontario Graduate Scholarship.

In clause 4, “dependent” means a person whose parent or guardian was admitted to and remains in Canada under clause 10 (c) of the Immigration Act, 1976 who is wholly dependent upon such a parent or guardian for support and who is:

a) Under 18 years of age, or
b) 18 years of age or over and in full-time attendance at an eligible post-secondary institution.

“Guardian” means a person who has been appointed by order of a court as the legal guardian of a child in place of a parent.

For applicable fees, refer to “Schedule of Fees, Student Visa Students” on page 38.

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 which are nonrefundable are as shown in the Schedule of Fees. Dependent (family) coverage may be obtained on request and by payment of a further $2.84 per term.

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 - 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 for the term or session as indicated on pages 5 to 8 of this calendar.

Note 7 - 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 for the term or session as indicated on pages 5 to 8 of this Calendar.

Note 8 - OPIRG (Ontario Public Interest Research Group)
This fee is voluntary, refundable, and not a requirement for registration. Requests for refunds or questions concerning OPIRG should be directed to the on-campus OPIRG office within three (3) weeks after the start of lectures for the term or session as indicated on pages 5 to 8 of this Calendar.

Note 9 - Sandford Fleming Foundation (S.F.F.)
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 5 to 8 of this Calendar.

Note 10 - Radio Waterloo
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 or session involved as indicated on pages 5 to 8 of this Calendar.

Note 11 - Other Costs
The fees shown do not include the costs of textbook, class notes, Correspondence Programme tape or kit deposits, mandatory supplies, certain accommodation or other costs associated with field trips, or other similar expenses.

Miscellaneous
Supplemental Examination - Each Paper $10.00
Presiding Fee (at outside centre half day) $10.00
Returned Cheques - Handling charge (plus late registration penalty as applicable) $15.00
Duplicate Fee Statement or Tax Receipt (per request) $ 2.00
Transcript of Record (per request) $ 2.00
Replacement of lost Identification Card $ 5.00
Replacement of lost Health Insurance Card - Payment equivalent to the original premium.

Residence
Residence fees are payable by term and are due in full on or before the day of residence registration. Students who have received Notice of Assistance under any awards programme may apply to reside fees only those funds which are received during the term in question. See page 21 for further information.

Income Tax Receipts
Receipts for income tax purposes for fees covering the academic period 1 May 1979 to 30 April 1980 will be mailed after 1 March 1980 to the home address on record.
Scholarships
Bursaries,
Prizes and
Financial Aid
Scholarships, Bursaries, Prizes 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 Programme (OSAP) and other forms of government aid to students. As well, the office administers the University’s Undergraduate Scholarship and Bursary Programme 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.

Undergraduate Scholarships

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:

Chemistry Scholarships:
students must write the Chem 13 News Exam.
Mathematics:
students must write the Descartes Mathematics Competition.
Physics:
students must write the Sir Isaac Newton Physics Contest.
Engineering:
students must write at least one of the above and are encouraged to write all three.

An application for admission to the University will suffice as an application for any Entrance Scholarship for which the student is eligible, except in the Faculties of Engineering and Mathematics where special applications are required.

The Alberta Optometric Association Scholarships

The Alberta Optometric Association presents two scholarships in the amount of $250 to each of two students admitted to Year 2 (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.

Allied Chemical Canada Limited Scholarship

This scholarship is awarded annually to one student not otherwise holding a scholarship, entering final year of undergraduate studies in Chemical Engineering or majoring in Chemistry. Based on merit, the award is in the amount of $750 and made with the recommendations of both the Faculties of Engineering and Science.

The AOCO Canada Limited Scholarship

AOCO Canada Limited presents annually a scholarship to a Canadian student admitted to Year 2 (the First Professional Year) of the School of Optometry. This award is made on the basis of academic achievement. The value is $600.

Alfred Armbrust Memorial Scholarship

Value: $1,000 Awarded annually to an outstanding student entering the Faculty of Engineering.

Arts Faculty Scholarships

The Faculty of Arts is offering several entrance and upper year scholarships in recognition of academic excellence. Entrance scholarships, awarded on the basis of secondary school performance and recommendations, are valued at $1,400, of which $800 is allocated for first year and an additional $600 for second year, if the student maintains an A average. Upper year scholarships valued at $600 are awarded on the basis of the previous year’s standing and require the recommendation of the candidate’s department. Special awards may be made at the discretion of the Faculty of Arts Scholarship Committee, which Committee is responsible for both regular and special awards.

Association of Professional Engineers Entrance Award

The Association of Professional Engineers of the Province of Ontario provides a $500 Entrance Award to the student who has the highest academic standing in Year 5 examinations and who is entering an accredited engineering programme at the University of Waterloo.
Association of Professional Engineers
Undergraduate Scholarship
The Association of Professional Engineers of the Province of Ontario offers three annual scholarships of $250, one to the student in each of the first, second and third years in an accredited engineering programme who has the highest average in the examinations for his year.

The Bausch and Lomb Optical Company Limited Award for Clinical Proficiency
Bausch and Lomb Optical Company offers a prize to the student in the fifth professional year judged demonstrating the highest levels of proficiency in clinical activities. The prize is a Greens Refractor or equivalent ophthalmic instrumentation to the approximate value of $2600.

The Bausch and Lomb, Soflens Division Outstanding Achievement Awards
Total value of these awards is $1,000. These awards are in recognition of ability and effort in the pursuit and application of knowledge in the contact lens field while a final year student.

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 programme. To be eligible for one of these scholarships a student must obtain an average of 75% in the previous term’s or year’s examinations.

The British Columbia Optometric Association Scholarships
The British Columbia Optometric Association presents two scholarships in the amount of $250 to each of two students admitted to Year 2 (the first Professional Year) of the School of Optometry. These awards are made to students who are residents of British Columbia. They are awarded on the basis of academic achievement.

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 1 are made on the basis of performance on an examination held in April. Students entering upper years in Honours Chemistry (co-operative or regular timetable) are automatically considered for the award.

Chemistry Scholarships
The Department of Chemistry awards Year 1 Chemistry Scholarships annually. Selection is mainly on the basis of a CHEM 13 NEWS/Exam written in Ontario secondary schools. Values are $2,000 and $1,500 for one year.

Concordia Club Scholarship in German
A scholarship in the value of $300 will be awarded annually in the Faculty of Arts by the Kitchener-Waterloo Concordia Club to promote and encourage the study of German language and literature.

Charles E. De Leuw Transportation Scholarship
The De Leuw Gather and Company of Canada Limited, in memory of the company’s founder, is making an annual award available to a 4th 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. The Senate Committee on Scholarships and Student Aid will work in conjunction with the Department of Civil Engineering in determining the winner.

Application forms should be requested from the Awards Office.
Datacrown Computer Science Scholarship
Value: $300. To the outstanding student entering fourth year Computer Science (Co-op) who has demonstrated both academic excellence and outstanding leadership.

Rene Descartes Scholarships, Fellowships, and Bursaries
Entrance awards in varying amounts are offered through the Faculty of Mathematics to first year students enrolled in that Faculty and showing the University of Waterloo as their first choice on the application for admission to the university. In order to be eligible, a student must write the Descartes Mathematics Competition and submit an application form. These may be obtained from the Head of Mathematics or the Guidance Counsellor in the secondary schools.

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. No application is required.

Claude Neon Limited Scholarship
Claude Neon Limited is offering an annual scholarship of $250 to be awarded to a third or fourth year student registered in the Honours Urban and Regional Planning programme. The student must have attained high academic standing and indicate an interest in planning.

Application should be made to the Awards Officer.

Dow Chemical of Canada Scholarship in Chemical Engineering
$750 to the student and a grant-in-aid of $250 to the department. 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.

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.

Environmental Studies Faculty and Staff Scholarships
A limited number of entrance and 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. Further information may be obtained from the Awards Officer.

Freure Homes Scholarship
The Freure Homes Scholarship, valued at $200, is awarded annually to a student entering Year 3 (regular programmes) of either Geography or Urban and Regional Planning. Candidates must have an 80% average or above in Year 1 and 2 and it is desirable but not essential that they have a strong interest in urban problems.

The award will alternate annually between Geography and Urban and Regional Planning and the selection of the candidate will be made by the Chairman of the Department of Geography and the Director of the School of Urban and Regional Planning.

General Motors Scholarships
Two awards of $1,000 each to students in the final or penultimate year of Engineering, Economics or Mathematics (Business Option). The recipients must be Canadian citizens who look forward to careers in industry. General Motors will make summer or work-term work assignments an integral part of the scholarship.

Don Hayes Award
Awarded annually to a deserving undergraduate student who has a minimum of B average standing and who is involved in athletics or the sports training function in the University or the community. Letters of application, including the names of references, should be forwarded to the Awards Officer by November 1.

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 Scholarships.

Human Kinetics and Leisure Studies Faculty and Staff Scholarships
A limited number of entrance and upper year scholarships in varying amounts are made available each year. Scholarships are based on academic achievement in the previous year.

Huron County Scholarships
Huron County Council is offering two $150 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
Value: $100 and a one-year membership in the Institution. Awarded annually to the best all around fourth year student in the production and manufacturing option of Mechanical Engineering, based on academic standing and involvement in student affairs. Established in memory of Stan Thurgar and all the members of the Institution who have conscientiously worked for the good of Canadian industry.

Sir Isaac Newton Scholarships
The Department of Physics awards two freshman Sir Isaac Newton (SIN) Scholarships annually, based mainly on the results of the SIN Physics test written in Ontario Secondary Schools. Values are $2,000 and $1,500 respectively for one year, with an additional $1,950 over three more years as a SIN Assistant. 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 $500, $400, $300, $200 in each year. No application is necessary to be considered for the scholarship in the upper years. (These scholarships may be subject to the condition that no other scholarships are held concurrently).

Sir Isaac Newton Assistantships
The Department of Physics offers Sir Isaac Newton (SIN) Assistantships to recognize and encourage academic excellence in students proceeding towards an Honours Physics degree. The awards are normally made to freshmen, and are valued at $2,000 payable $650 per year. Renewal is based on satisfactory academic standing. About ten new awards are given each year, based mainly on the results of the SIN test mentioned above. Recipients of this award are required to undertake a minor academic or research project within the Department.

Ford S. Kumpf Scholarship
Through a bequest of the late Ford S. Kumpf of Waterloo, three or four scholarships will be offered each year to entering students who graduated from a secondary school in the Regional Municipality of Waterloo. The scholarships are $750 each in Year 1, and will be renewed for an additional $750 in Year 2 with the attainment of a first class honour standing.

Friedrich Lehner Scholarship
This scholarship will be awarded to a third or fourth year undergraduate student of German Literature and Language. The value of this award is $100 and is provided annually by Mr. Friedrich Lehner of Lehner Travel Service, Toronto, Ontario, Canada.

John McKay Memorial Award
Interest from an endowment awarded annually to a student who has completed 3A co-op Geography, on the basis of good academic standing, work-term performance, and broad involvement in class activities.

Optometry Scholarships
The School of Optometry awards scholarships annually to students admitted to the School of Optometry from Year 1 Regular Science at the University of Waterloo. These awards will be made chiefly on the basis of scholastic achievement and as funds permit in Year 2 Optometry, Year 3 Optometry, Year 4 Optometry and Year 5 Optometry.

The 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 2, School of Optometry. Six scholarships are available, each of a total possible value of $1,200, being $300 per year over the four professional years (Years 2, 3, 4 and 5) 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 students who are residents of one 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 Sept. 15 of each year.

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

The Saskatchewan Optometric Association Scholarships
The Saskatchewan Optometric Association presents two scholarships in the amount of $250 to each of two students admitted to Year 2 (the First Professional Year) of the School of Optometry. These awards are made to students who are residents of Saskatchewan. They are awarded on the basis of academic achievement.

Science Faculty Scholarships
A limited number of Entrance Scholarships are awarded to students entering General Science, Biology and Earth Sciences. For Chemistry awards, see Chemistry Scholarships and Assistantships. For Physics, see Sir Isaac Newton Scholarships.
Scholarships, Bursaries, Prizes and Financial Aid

Work Term Awards

Ukrainian Credit Union “Buduchnist” Scholarship in Ukrainian Studies
The Scholarship of $100 will be awarded annually to an outstanding full-time student who attains the highest academic standing in a Ukrainian course.

R. H. Walters Award
A $100 award, based on academic excellence, is made to the most outstanding student in the graduating year of the Honours Psychology programme (Joint Honours included) or equivalent. The Undergraduate Affairs group, Department of Psychology, shall select and recommend the award winner to the Senate Committee on Scholarships and Student Aid, which shall approve the nominee.

University of Waterloo Engineering Scholarships
Entrance scholarships, ranging in value from $1,000 to $1,500 for first year with some renewable in subsequent years to a total value of $3,300, are awarded to students on the basis of outstanding ability in mathematics and science and demonstrated potential for success in engineering. The following criteria will be used in allocating these awards:
- minimum overall average of 85% in Year 5;
- performance in the special Waterloo tests (Descartes Mathematics, Sir Isaac Newton Physics and CHEM 13 NEWS competitions); students must write at least one and are encouraged to write all three of these tests;
- principal’s recommendation and other supporting material.
Students must submit an application form which can be obtained from the Awards Office.

Upper Year Awards, called Undergraduate Research Scholarships and Undergraduate Research Assistantships, 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 - 4A terms. The Scholarships are normally awarded automatically at the beginning of each term. To be eligible for an Assistantship 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.

Michael Wright Memorial Scholarship
Value: $300. To an outstanding student in course in Political Science. Established in 1975 in memory of Michael Wright by his Mother and Sister.

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

University of Waterloo - Waterloo County Entrance Scholarships
Value: $500. Awarded to the top eligible student from each of the Waterloo County secondary schools for first-year study at the University. Decisions are based on recommendations from the secondary schools.

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 Coordination 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 and fourth year Electrical Engineering students.

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

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

Inco Limited Awards
Three awards of $100 to second, third and fourth year Systems Design students.

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

James F. MacLaren Limited Awards
Three awards of $100 each to second, third and fourth year Civil Engineering students.

Union Miniere Explorations and Mining Corp. Ltd. Awards
Three awards of $100 each to second, third and fourth year Applied Geology students.

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

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.
St. Jerome's College Awards

Undergraduate Scholarships
Unless otherwise stated, no application form is necessary. Where an application is required, appropriate forms may be obtained from the office of the Dean, St. Jerome's College, and must be submitted before August 1, 1979.

Year 1 Admission Scholarships

Faculty of Arts
St. Jerome's College is offering entrance scholarships in order to recognize and encourage academic excellence. Entrance awards will be in the amount of $800 and will be awarded on the basis of Year 5 marks and secondary school recommendations. Assessment of these awards will be based on preliminary grades submitted to the Ontario Universities' Application Centre by the candidates' secondary schools in April and will be awarded in June along with the candidates' offers of admission to St. Jerome's College, University of Waterloo.

Faculty of Mathematics
Awards in varying amounts are offered by St. Jerome's College to first year students enrolled in the Faculty of Mathematics and showing St. Jerome's College as their first choice on the application for admission to the university. In order to be eligible a student must write the Descartes Competition. Applications for the Descartes Competition may be received through The Associate Dean, Faculty of Mathematics, University of Waterloo. Students who write the Descartes Competition and who have applied for admission to St. Jerome's College are asked to request a scholarship application form.

St. Jerome's College Scholarships to Students of St. Mary's High School and St. Jerome's High School, Kitchener
Two scholarships of $500 each are awarded annually to one student from St. Jerome's High School, Kitchener and to one student from St. Mary's High School, Kitchener, who demonstrate high academic achievement on six Year 5 level courses, but who are not eligible for an Admission Scholarship in their respective Faculty. Assessment of these awards will be based on preliminary grades submitted to the Ontario Universities' Application Centre by the candidates' secondary schools in April and will be awarded in June along with the candidates' offers of admission to St. Jerome's College, University of Waterloo.
Upper Year Scholarships

St. Jerome's College Upper Year Scholarships
St. Jerome's College is offering upper year scholarships in order to recognize and encourage academic excellence. Upper year scholarships will be in the amount of $600 and will be awarded on the basis of a student's academic standing in the previous year and the recommendation of the College Faculty.

The Father John Bullbrook Scholarships
These awards are the gift of the members of the Congregation of the Resurrection residing at St. Jerome's College given in honour of the late Rev. John Bullbrook, CR, who taught at the College. Five annual scholarships of $150 each are awarded to deserving students who combine academic excellence and contribution to College life. Application forms are required.

The Father Anthony Firetto Scholarships
These awards are the gift of the members of the Congregation of the Resurrection residing at St. Jerome's College given in honour of the late Rev. Anthony C. Firetto, CR, who taught at the College. Five annual scholarships of $150 each are awarded to deserving students who combine academic excellence and contribution to College life. Application forms are required.

The Newman Scholarships
Two awards of $250 each are provided annually to students in their graduating year who have demonstrated consistent academic excellence and contribution to College life.

Gladys and Norman Rater Bursary
Value: $800. Awarded annually to an upper year student registered at St. Jerome's College on the basis of high academic standing and financial need. Application forms are available from the Office of the Dean of the College and must be submitted by August 1.

Undergraduate Awards

St. Jerome's College Awards
Five awards in varying amounts are awarded annually to Year 1 and upper year students registered at St. Jerome's College who combine high academic achievement, and financial need. Application forms are required.

The Father Tony Firetto Bursary Fund
This fund was established and is administered by the Students' Union in memory of the late Rev. Anthony C. Firetto, CR, who taught at the College. The Fund makes $100 available annually to a student or students registered in the College and majoring or honouring in Psychology. Application should be made to the Chairman of the Psychology Department.

Awards for Candidates for the Priesthood
The following awards are available for students studying for the priesthood who demonstrate academic excellence and financial need. Application forms are required.

The Schill Awards
Two awards in the value of $300 are awarded annually to students registered through St. Jerome's College in any year.

Awards for Candidates for the Congregation of the Resurrection:

The J. J. Gnam Award
One award annually in the value of $300.

The M. Wintermeyer Award
One award annually in the value of $300.

The August and Ann Lang Award
One award annually in the value of $300.

Awards for Candidates for the Diocese of Hamilton

The Kehoe - Cosgrove Awards
Two awards annually in the value of $200 each.
Bursaries

Note
Bursaries are awarded on the basis of academic standing (minimum B average) and evidence of financial need. Students with student visas who have not been in Canada for more than one year will not normally be considered. Applications must be submitted to the Awards Office by the end of the first month of first term unless otherwise indicated. All bursaries are applied for on a common University of Waterloo application form unless otherwise stipulated.

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. The recipient is determined by the Senate Committee on Scholarships and Student Aid in conjunction with the Faculty of Mathematics.

ASHRAE, Ontario Chapter Bursaires (American Society of Heating, Refrigerating and Air-Conditioning Engineers, Ontario Chapter)
The American Society of Heating, Refrigeration & Air-Conditioning Engineers, Ontario Chapter is making available annually a sum of money to be distributed in bursary form. Applicants must be normal residents of Metropolitan Toronto or adjacent municipalities, and be enrolling in second or third year Mechanical or Electrical Engineering. Recipients will be determined in conjunction with the related Department and subject to verification by the Senate Committee on Scholarships and Student Aid.

ATA Trucking Industry Educational Foundation Bursaries
The Automotive Transport Association Trucking Industry Educational Foundation was established in 1958 by a group of transport companies who decided to divert monies formerly spent in customer gift-giving at Christmas to bursaries for deserving and needy students. The funds are to be distributed to students in all faculties who, because of extenuating circumstances, are deserving of financial help and would not be in a position to continue their studies without some assistance.

Atkinson Charitable Foundation Bursaries
The Atkinson Charitable Foundation has established a bursary programme 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.

Birks Family Foundation Bursary
The Birks Family Foundation has established a plan of annual contributions to the Student Aid Fund of recognized Canadian Universities for the creation of the Birks Family Foundation Bursaries. The Bursaries are awarded by the Foundation on the recommendation of the University Scholarship Committee and are not restricted to faculty or year and may be renewed. The number and amount of such awards may vary annually, depending upon the funds available for the purpose from the Foundation.

The Canadian Bechtel Limited Bursary
The Canadian Bechtel Limited has made available two bursaries, each in the amount of $500 to be awarded to two students entering first 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.

Central Optical Bursary
A bursary in the amount of $1,500, awarded to a student who has successfully completed the third professional year in Optometry. Based on financial need, academic ability and research interests. Applications are available from the Awards Office.

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 $150 and will be 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.

IBM Canada Bursary Program
IBM Canada Limited makes an annual grant of $1,000 for bursaries to students registered in a full-time course at the university who have satisfactory standing and who demonstrate financial need. Application may be made through the Awards Office.

Interprovincial Pipe Line Company Bursary
The Interprovincial Pipe Line Company Bursary Fund, of a total value of $2,000, has been established by Interprovincial Pipe Line Company to benefit students beyond the first year who are in need of financial assistance. The company has stipulated that at least 50% of the funds granted must go to students in the applied sciences. Preference will also be given to students whose normal residence is Canada or the USA.
J. P. Bickell Foundation Bursaries
The Foundation is making available a sum of money to be used in providing bursary assistance to Chemical Engineering and Earth Science students of good academic standing who need financial assistance.

J. G. Hagey Alumni Bursary
In honour of J. G. Hagey, President Emeritus of the University of Waterloo, the Alumni Association has, in recognition of his significant contributions to post-secondary education, established a bursary fund. Several bursaries to a maximum of $150 each will be awarded annually from the fund to students showing financial need. All students attaining a 60% or equivalent standing in their previous academic years and who have not entered Canada on a student visa are eligible to apply.

Canadian Federation of University Women - Kitchener-Waterloo
The Canadian Federation of University Women has established a bursary fund at the University of Waterloo to assist one or more women 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.

Lambton County Bursary
Lambton County Council offers two bursaries valued at $100 each to students from the county, excluding residents of the City of Sarnia.

Litton Systems Bursary
A bursary, to the value of $500, is offered annually by Litton Systems (Canada) Limited. The bursary may be awarded to students in the Faculty of Engineering with preference being given to those in the electronic or electromechanical fields. It is intended to provide financial assistance to undergraduates in need and may be held concurrently with other awards where the need exists.

Mike Moser Bursary Fund
Bursaries will be awarded to deserving third and fourth year students who have financial need, an exemplary academic record, and who have achieved a high level of accomplishment in extra-curricular activities. Applications should be made in writing to W. N. Widmeyer, Associate Dean, Faculty of Human Kinetics and Leisure Studies.

P. L. Robertson Manufacturing Co. Ltd. Bursary
A bursary, to the value of $100, is offered annually by the P. L. Robertson Manufacturing Co. Ltd. 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. Where the need exists the bursary may be held in conjunction with other awards.

The Minnesota Mining and Manufacturing of Canada Limited Bursaries
Two bursaries, to the value of $500 each, are offered annually by the Minnesota Mining and Manufacturing of Canada Limited. The bursaries may be awarded to any full-time undergraduate student at the University who has a good academic record and is in need of financial assistance for continued studies.

Proctor and Gamble Student Bursary Fund
A number of bursaries are available to assist needy students in any year or faculty. The bursaries are awarded to residents of Canada on the basis of academic standing and financial need.

Rockwell International of Canada Limited, Collins Canada Division Bursary
A bursary of $200 to a deserving undergraduate 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 second year.

Alan W. Shattuck Memorial Bursaries
Normally 2 awards of $400-$500 are awarded annually on the basis of academic standing and financial need to students in fourth year Civil Engineering. Funds made available by associates of Mr. Shattuck in recognition of his contribution in both pollution and water control resources.

Waterloo Young Men's Club Bursary
A bursary of $100 awarded annually to a full-time student who is a permanent resident of Waterloo, has good academic standing and requires financial assistance.
Prizes

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.

Ambassador of Switzerland Book Prizes
Awarded annually to an outstanding student in each of the French, German and Italian programmes.

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 programme who, having received honours, has obtained the highest standing in the final examinations of the current academic year. Included with this award is a gift of technical books valued at approximately $50.

The 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 will be awarded in sequence until the fund is exhausted each year:

a) 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 second, third and fourth years.

b) 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 second, third and fourth years.

c) Two awards to final year students for academic excellence or proficiency in specified subjects.

d) In addition to the above, prizes are awarded for highest academic standing in certain second, third, fourth and fifth year subjects as funds allow. All of the above prizes are made available through contributions of the following Canadian Suppliers and Laboratories:

- Canadian Optical Supply Co., Montreal, Quebec
- Gordon Contact Lenses, Inc., Rochester, N. Y.
- Kahn Optical Company Limited, Toronto, Ontario
- N&N Optical, Mississauga, Ontario
- Plastic Contact Lens Co., Toronto, Ontario
- Professional Optical Co., Willowdale, Ontario
- Superlite Optical Co., Toronto, Ontario
- Veracon Inc., Sherbrooke, Quebec

Classics Prize
The Classics Prize of $50 will be awarded annually to the student who attains the highest mark in either Latin 150 or Greek 200. To qualify for the prize the student must enroll in a further Latin or Greek course at the 200 level.

Political Science Third Year Prize
This prize of $50 will be awarded by the Political Science Department to the fourth year Political Science major with the highest cumulative average in his or her Political Science courses at the end of third year.

No application is necessary.

The J. C. Thompson Memorial Prize (value $125)
The 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 302, 312, etc.).

The Percy Hermant General Proficiency Prizes (value $500 and $250)
The gifts of Sydney Hermant are awarded to the final year students in the School of Optometry ranking first and second in general proficiency.

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

The 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 once every three years, approximately, as funds permit.

The 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.

The K-W Optical Company Limited Prizes
Awards are made to the two students in each of the second, third and fourth professional years 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.
The Canadian Contact Lens Society Prize (value approximately $100)
The proceeds of a fund invested on behalf of the Canadian Contact Lens Society will be awarded to a final year student in the school of Optometry who shows the greatest proficiency in the theoretical and practical application of Contact Lenses.

The 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 $100 each: one prize is for the first year student, enrolled in Applied Mathematics with Engineering electives; the other is for the third year Applied Mathematics student who ranks first on the final examinations.
No application is necessary.

The Sandford Fleming Academic Achievement Medal
The Sandford Fleming Foundation has established five Medals for graduating students, one in each of the Engineering programmes: Chemical, Civil, Electrical, Mechanical and Systems Design, at the University of Waterloo. In each department, the award is made to the student with the best academic record in the last six academic terms of his undergraduate course.

The Sandford Fleming Co-operative Programme Performance Medal
The Sandford Fleming Foundation has established five medals for graduating students, one in each of the Engineering programmes: Chemical, Civil, Electrical, Mechanical and Systems Design, at the University of Waterloo. This award is made for outstanding overall performance in both the work term industrial experience and the academic programme of co-operative engineering education. The nominees are selected jointly by the Academic Faculty and the Department of Co-ordination.

The Jerome T. Miller Memorial Prize
This book 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 book is to be awarded each year, on the basis of marks, to the student in third year of a programme which combines studies in Chemistry and Physics.

Pennsylvania German Folklore Society of Ontario Prize in German
This prize of $50 will be awarded annually to the student in the Faculty of Arts, born in Canada, who has made the most progress in German during the year.

The Bobby Bauer Memorial Award
The Bobby Bauer Memorial Foundation will make one or more awards annually to students demonstrating outstanding proficiency in Hockey who qualify for admission to a full-time undergraduate programme at a Canadian university.
Application should be made prior to August 31 on forms provided by the Foundation. A letter of reference from a person actively involved in Hockey must accompany each application.
Inquiries and applications should be sent directly to: Bobby Bauer Memorial Foundation, 60 Victoria Street North, Kitchener, Ontario.

The Bruce Wyler Kelly Memorial Prizes
These prizes are awarded in the General Science Programme at the end of second year to two students, one with Biology as the major subject and with the highest standing in Biology, and one with Chemistry as the major subject and with the highest standing in Chemistry. The minimum requirement is B standing in the average of these courses.

The Engineering Institute of Canada Student Prize
The E.I.C. Student Prize is awarded to a Student Member of the Institute in the year prior to the graduating year on the basis of the marks made in his academic year and his activities in the student engineering organization or in the local branch of a recognized engineering society.

The Chemical Institute of Canada Prize
Two awards, one each to a Chemistry and a Chemical Engineering student, are made annually by the Institute. The awards, consisting of an engraved medal and a $25 gift, are given to the student with the highest academic standing in the penultimate year of either course.
No application is necessary.

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

Marj Schaefer Prize in Architecture
An annual award 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.

Vodnoy Clinical Optometry Award for Orthoptics
The gift of Bernard E. Vodnoy, OD., DOS, FAAO. to the final year student who demonstrates proficiency in orthoptics and vision training. The award consists of orthoptic instruments of an approximate value of $250.
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. Students wishing to obtain assistance from one of the following funds should apply to the Awards Office.

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 4 months are available to students in all faculties.

Arts Society Emergency Loans
Short-term, interest-free emergency loans are available to full-time undergraduates who are members of the Arts Society. Loans are to a maximum of $100 for a period of up to 60 days.

The Adelaide Detweiler Student Loan Fund
This loan fund has been established by Mr. J. R. Detweiler in memory of his mother, Adelaide Detweiler, to provide short-term loans, interest free, to students who may be confronted with unexpected expenses during their academic year.

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

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. It is intended to provide short-term loans, interest free, to students who may be faced with unexpected expenses during their academic year.

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 Programme. The Society’s contribution is intended to provide short-term, interest free loans to Mathematics students who have been faced with unexpected expenses during their academic year.

Environmental Studies Society Loan Fund
Short term non-interest bearing 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.

Ginny Lee Memorial Fund
Students’ Council has set aside a sum of money to be used in assisting students by providing interest free, short term loans. It is intended that this fund be used only when other avenues of obtaining assistance have been tried unsuccessfully.

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.

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.

Co-operative Lecture Emergency Loan Fund
This fund was established by Canadian politician T.C. Douglas in 1970. It is intended to provide short term, interest free loans to needy students who have been faced with unexpected expenses during their academic year.

University of Waterloo Loan Fund
Loans up to $200 for a maximum of 90 days are available to full-time undergraduate students experiencing short-term financial difficulty.

The 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 students at the University who are experiencing temporary financial difficulty.
Government Assistance Programmes

The Ontario Student Assistance Programme (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 the student and his/her family. Although assistance is not based on academic standing, students are expected to make satisfactory progress in their studies.

OSAP consists of the following four plans:
1) Ontario Study Grant Plan;
2) Canada Student Loans Plan;
3) Ontario Student Loans Plan;
4) Ontario Special Bursary Plan.

1) Under the Ontario Study Grant Plan, Ontario students may apply for non-repayable grant assistance without having to borrow money first.

2) The main purpose of the Canada Student Loans Plan is to provide assistance in the form of interest-free loans to students who wish to pursue post-secondary studies at the graduate or professional level, or to students 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 60% 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 required.

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

Students from provinces other than Ontario should approach the provincial assistance authority in their home provinces concerning the possibility of assistance from that source.
The Department of Co-ordination and Placement

Co-op Engineering student at work in a machine shop in Elmira.
Department of Co-ordination and Placement

Director
R. J. Wieser, BE (Sask), PEng

Associate Directors
B. A. McCallum, BA (W. Ont.)
J. C. Wilson, BSc, CE (New. Br.), PEng

Operations Analyst
J. R. Culley, BComm (McGill)

The Department of Co-ordination and Placement is responsible for the work terms in the co-operative programmes, and for assisting all students in career planning and obtaining employment on graduation. The staff includes professional personnel having extensive experience related to their fields of service in the Department.

Engineering
Programme Administrator
D. H. Copp, BASc (Toronto), PEng

Liaison Co-ordinator
J. F. Westake, BArch, M Arch, PhD (Waterloo), PEng

Co-ordinators
D. G. S. Anderson, BASc (Toronto), PEng
G. P. Berthiaume, BSc (Manitoba), PEng
J. A. Calder, BASc (Br. Col.), PEng
W. G. Cole, BASc (Toronto), PEng
G. P. Dobbin, BASc (Toronto), PEng
A. T. Girard, BASc (Toronto), PEng
R. A. Grant, BSc (Queen’s), PEng
D. S. Harris, BEng (McGill), PEng
A. L. Lind, BSc (Queen’s), Eng
R. Mateyk, BASc (Toronto), PEng
R. McDowell, BSc (Sask.), PEng
W. A. Runge, BSc (Queen’s), PEng

Applied Science
Programme Administrator
R. A. Pullin, BASc (Toronto)

Co-ordinators
C. Bech-Hansen, BA (Sask.), MSc (Br. Col.)
L. R. Bricker, BSc, MSc (Waterloo)
G. G. Ellsworth, BA (Princeton)

Mathematics
Programme Administrator
R. A. Klawitter, BA (W. Ont.)

Assistant to Programme Administrator
P. C. Wright, BA (Bishop’s), MSc (Guelph)

Co-ordinators
D. J. Beaupre, BComm (Loyola), CA
W. G. Clapham, BMath (Waterloo)
M. O. Deschenes, BA, BEd (Queen’s)
H. W. Fell, BA (Rider)
I. F. Ferguson, BSc (Waterloo)
E. M. Johnson, BA (Queen’s)
R. M. Slator, BSc (Toronto)
S. R. Stankus, BSc (RMC)
G. M. Subasic, BASc (Washington)
E. P. Whelan, BA (Waterloo)

Environmental Studies – Architecture
Programme Administrator
J. W. Hoag, BArch (Toronto)

Co-ordinator
W. G. Dailey, BArch (Liverpool)

Environmental Studies – Geography
Co-ordinator
M. A. McMartin, BA (W. Ont.)

Human Kinetics, Health Studies and Leisure Studies
Programme Administrator
W. B. Fuller, BA (W. Ont.)

Co-ordinators
B. D. Beatty, BSc, MSc (Waterloo), BEd (W. Ont.)
R. A. Caspell, BSc (Waterloo)

Arts
Co-ordinator
M. M. Scandiffio, BA (York), MA (Carleton)

Career Planning and Placement
Administrator
T. H. Fitzgerald, BA (St. Lawrence)

Placement Officer
P. B. Graham, BA (Carleton)

The Co-operative Plan
Co-operative education is based on the principle that during the undergraduate years an academic programme 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.
## How the Co-op System Works

### Arts

<table>
<thead>
<tr>
<th>Programme (By Faculty)</th>
<th>Sept/Dec</th>
<th>Jan/Apr</th>
<th>May/Aug</th>
<th>Sep/Dec</th>
<th>Jan/Apr</th>
<th>May/Aug</th>
<th>Sep/Dec</th>
<th>Jan/Apr</th>
<th>May/Aug</th>
<th>Sep/Dec</th>
<th>Jan/Apr</th>
<th>May/Aug</th>
<th>Footnotes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Economics (Applied)</td>
<td>Regular</td>
<td>off term</td>
<td>2A •</td>
<td>2B •</td>
<td>3A •</td>
<td>3B •</td>
<td>4A •</td>
<td>4B •</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Z</td>
</tr>
<tr>
<td>Economics (Management Accounting, Chartered Accounting)</td>
<td>Reg 1B</td>
<td>•</td>
<td>2A •</td>
<td>2B •</td>
<td>3A •</td>
<td>3B •</td>
<td>4A •</td>
<td>4B •</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>W</td>
</tr>
<tr>
<td>Anthropology, Psychology, Sociology</td>
<td>Regular</td>
<td>off term</td>
<td>2A •</td>
<td>2B •</td>
<td>3A •</td>
<td>3B •</td>
<td>4A •</td>
<td>4B •</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>English</td>
<td>Regular</td>
<td>off term</td>
<td>2A •</td>
<td>2B •</td>
<td>3A •</td>
<td>3B •</td>
<td>4A •</td>
<td>4B •</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Z</td>
</tr>
<tr>
<td>Political Science</td>
<td>Regular</td>
<td>off term</td>
<td>Reg 2B •</td>
<td>3A •</td>
<td>3B •</td>
<td>4A •</td>
<td>4B •</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>V</td>
<td></td>
</tr>
</tbody>
</table>

### Engineering

<table>
<thead>
<tr>
<th>Programme (By Faculty)</th>
<th>Sept/Dec</th>
<th>Jan/Apr</th>
<th>May/Aug</th>
<th>Sep/Dec</th>
<th>Jan/Apr</th>
<th>May/Aug</th>
<th>Sep/Dec</th>
<th>Jan/Apr</th>
<th>May/Aug</th>
<th>Sep/Dec</th>
<th>Jan/Apr</th>
<th>May/Aug</th>
<th>Footnotes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chemical, Civil, Mechanical Stream 8</td>
<td>1A 1B</td>
<td>•</td>
<td>2A •</td>
<td>2B •</td>
<td>3A •</td>
<td>3B •</td>
<td>4A •</td>
<td>4B •</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Y</td>
</tr>
<tr>
<td>Stream 4</td>
<td>1A •</td>
<td>1B •</td>
<td>2A •</td>
<td>2B •</td>
<td>3A •</td>
<td>3B •</td>
<td>4A •</td>
<td>4B •</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Y</td>
</tr>
<tr>
<td>Systems Design</td>
<td>1A •</td>
<td>1B •</td>
<td>2A •</td>
<td>2B •</td>
<td>3A •</td>
<td>3B •</td>
<td>4A •</td>
<td>4B •</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Y</td>
</tr>
<tr>
<td>Environmental Studies</td>
<td>Architecture</td>
<td>Regular</td>
<td>off term</td>
<td>2A •</td>
<td>2B •</td>
<td>3A •</td>
<td>3B •</td>
<td>4A •</td>
<td>4B •</td>
<td>•</td>
<td>5A</td>
<td>5B</td>
<td>X</td>
</tr>
<tr>
<td>Geography</td>
<td>Regular</td>
<td>off term</td>
<td>2A •</td>
<td>2B •</td>
<td>3A •</td>
<td>3B •</td>
<td>4A •</td>
<td>4B •</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Z</td>
</tr>
</tbody>
</table>

### Human Kinetics and Leisure Studies

<table>
<thead>
<tr>
<th>Programme (By Faculty)</th>
<th>Sept/Dec</th>
<th>Jan/Apr</th>
<th>May/Aug</th>
<th>Sep/Dec</th>
<th>Jan/Apr</th>
<th>May/Aug</th>
<th>Sep/Dec</th>
<th>Jan/Apr</th>
<th>May/Aug</th>
<th>Sep/Dec</th>
<th>Jan/Apr</th>
<th>May/Aug</th>
<th>Footnotes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Health Studies</td>
<td>1A 1B</td>
<td>•</td>
<td>2A •</td>
<td>2B •</td>
<td>3A •</td>
<td>3B •</td>
<td>4A •</td>
<td>4B •</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Y</td>
</tr>
<tr>
<td>Kinesiology</td>
<td>1A 1B</td>
<td>•</td>
<td>2A •</td>
<td>2B •</td>
<td>3A •</td>
<td>3B •</td>
<td>4A •</td>
<td>4B •</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Y</td>
</tr>
<tr>
<td>Recreation</td>
<td>1A 1B</td>
<td>•</td>
<td>2A •</td>
<td>2B •</td>
<td>3A •</td>
<td>3B •</td>
<td>4A •</td>
<td>4B •</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Y</td>
</tr>
</tbody>
</table>

### Mathematics

<table>
<thead>
<tr>
<th>Programme (By Faculty)</th>
<th>Sept/Dec</th>
<th>Jan/Apr</th>
<th>May/Aug</th>
<th>Sep/Dec</th>
<th>Jan/Apr</th>
<th>May/Aug</th>
<th>Sep/Dec</th>
<th>Jan/Apr</th>
<th>May/Aug</th>
<th>Sep/Dec</th>
<th>Jan/Apr</th>
<th>May/Aug</th>
<th>Footnotes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Industrial (Actuarial, Business, Computer Sci., Management Acctg., Operations Research, Statistics) Stream 8</td>
<td>1A 1B</td>
<td>•</td>
<td>2A •</td>
<td>2B •</td>
<td>3A •</td>
<td>3B •</td>
<td>4A •</td>
<td>4B •</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Y</td>
</tr>
<tr>
<td>Stream 4</td>
<td>1A •</td>
<td>1B •</td>
<td>2A •</td>
<td>2B •</td>
<td>3A •</td>
<td>3B •</td>
<td>4A •</td>
<td>4B •</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Y</td>
</tr>
<tr>
<td>Chartered Accounting</td>
<td>1A •</td>
<td>1B •</td>
<td>2A •</td>
<td>2B •</td>
<td>3A •</td>
<td>3B •</td>
<td>4A •</td>
<td>4B •</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Y</td>
</tr>
<tr>
<td>Applied Math (Engineering Option)</td>
<td>1A •</td>
<td>1B •</td>
<td>2A •</td>
<td>2B •</td>
<td>3A •</td>
<td>3B •</td>
<td>4A •</td>
<td>4B •</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Y</td>
</tr>
<tr>
<td>Pure Math (with minors)</td>
<td>1A •</td>
<td>1B •</td>
<td>2A •</td>
<td>2B •</td>
<td>3A •</td>
<td>3B •</td>
<td>4A •</td>
<td>4B •</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Y</td>
</tr>
<tr>
<td>Teaching</td>
<td>Regular</td>
<td>off term</td>
<td>2A •</td>
<td>2B •</td>
<td>3A •</td>
<td>3B •</td>
<td>4A •</td>
<td>4B •</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Z</td>
</tr>
</tbody>
</table>

### Science

<table>
<thead>
<tr>
<th>Programme (By Faculty)</th>
<th>Sept/Dec</th>
<th>Jan/Apr</th>
<th>May/Aug</th>
<th>Sep/Dec</th>
<th>Jan/Apr</th>
<th>May/Aug</th>
<th>Sep/Dec</th>
<th>Jan/Apr</th>
<th>May/Aug</th>
<th>Sep/Dec</th>
<th>Jan/Apr</th>
<th>May/Aug</th>
<th>Footnotes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Applied Chemistry Stream 8</td>
<td>1A 1B</td>
<td>•</td>
<td>2A •</td>
<td>2B •</td>
<td>3A •</td>
<td>3B •</td>
<td>4A •</td>
<td>4B •</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Y</td>
</tr>
<tr>
<td>Stream 4</td>
<td>1A •</td>
<td>1B •</td>
<td>2A •</td>
<td>2B •</td>
<td>3A •</td>
<td>3B •</td>
<td>4A •</td>
<td>4B •</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Y</td>
</tr>
<tr>
<td>Applied Physics</td>
<td>1A 1B</td>
<td>•</td>
<td>2A •</td>
<td>2B •</td>
<td>3A •</td>
<td>3B •</td>
<td>4A •</td>
<td>4B •</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Y</td>
</tr>
<tr>
<td>Biology</td>
<td>1A 1B</td>
<td>•</td>
<td>2A •</td>
<td>2B •</td>
<td>3A •</td>
<td>3B •</td>
<td>4A •</td>
<td>4B •</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Y</td>
</tr>
<tr>
<td>Earth Sciences (Applied Geology)</td>
<td>Regular</td>
<td>off term</td>
<td>2A •</td>
<td>2B •</td>
<td>3A •</td>
<td>3B •</td>
<td>4A •</td>
<td>4B •</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Z</td>
</tr>
</tbody>
</table>

* Denotes work term where it appears on the chart.

† These work terms involve 6 months in a Secondary School & 2 months in the summer at Athabasca College of Education, London.

V Admission occurs by January for the 2B term.

U May also be taken as a stream 4 for some students.

W Admission occurs by January for the 1B term. You cannot be admitted to co-op at the beginning of first year.

X The Co-operative programme begins in 2A; however, admission is made to the programme at the time of the initial application to the university.

Y Admission beyond 1A is possible only for the following terms: 1B - Jan. or May, 2B - Sept. or Jan., 3A - Jan.

Z Admission occurs at the time of selection of 2nd year courses. You cannot be admitted to co-op in 1st year.
The motivation, responsibility and opportunity for insight gained through co-operative education can be of inestimable 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, and not in a random and uncertain manner, but within a structure of organized purpose and serious study.

Operation of the Plan
The necessary arrangements for the integration of the work terms, the securing of potential employers of the students, the arranging of interviews, and generally the management of the employment aspect are the responsibilities of the Department of Co-ordination and Placement. The Co-ordinators counsel the students, visit them on the job, assist them to adjust to work situations and encourage professional development.

The Work-Study Sequence
All Year 1 students enrol in September and spend the first term together at the University. As indicated on the chart, (p. 59) they rejoin as a class for the last term to complete their course work and graduate together. In some programmes such as Engineering, Mathematics and Science, 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. All other programmes shown on the chart are single stream programmes where no choice is available in Year 1. Variations may be requested due to academic or work situations in upper years. Precise dates for the beginning and end of various terms are shown in the Academic Calendar.

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 programmes, no guarantee of employment can be made. The employment process is competitive, and academic performance, skills, motivation, maturity, potential, etc., will determine whether a student is offered a job. If a student is unplaced after the interview process, the Department will earnestly attempt to find suitable work experience.

Co-ordination and Placement
Seeking Employment and Employer Interviews

Seeking Employment
Students are expected to seek employment through the interview process arranged by the Department of Co-ordination and Placement. Since channels of communication already exist, students may not seek employment directly with a participating co-operative employer unless specific arrangements are made with the Department. Students who have a job available before entering the co-operative programme must have the position evaluated by the Department before it may be considered to count towards the minimum requirements for graduation. Students intending to find their own jobs may not proceed with the normal application and interview process arranged by the Department.

Release of Information
For those students seeking employment through the interview process, copies of their Co-operative Student Record and academic grades are made available to prospective employers. In addition, resumes provided by students are made available to prospective employers. A file is kept on each co-operative student. This file includes the Co-operative Student Record, interim mark reports, Employer Evaluation of Co-operative Student forms, records of Co-ordinator interviews, etc. These files are confidential but will be made available, upon proof of identification, to each individual student. No information may be removed from the file. Copies of Employers Evaluation of Co-operative Student form will only be released 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 due to 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 programme and placed "On Own" by the Department.

Ranking Employers
Students are required to rank all employers by whom they are interviewed, except as provided under "Deleting Job Choices". Ranking an employer indicates an agreement to work with that employer if placed there by the placement programme. Refusal to accept the job might result in a failed work term, in which case the Co-operative Student Record would have the notation: "Failed work term caused by refusal to honour a previous agreement".
Deleting Job Choices
Normally students may delete up to two job rankings prior to submitting rankings for the placement process. If extenuating circumstances prevail, a student may delete more than two job rankings. In all circumstances, students must discuss the situation with a Co-ordinator prior to eliminating any rankings. Failure to discuss ranking deletions may result in the student being placed "On Own" by the Department of Co-ordination and Placement. Note that there may be instances where a student is not given a job ranking card by the employer because of an obvious mismatch of the student and the job which is discovered at the interview.

Work Terms

Quantity
Upon entry to a co-op programme a student is expected to follow the work-term/academic-term sequence appropriate for that particular programme. In some cases this may include as many as six work terms. 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 programme from the time the programme begins. In those Faculties which offer both the regular and co-operative programmes, the minimum number of related work terms required for a co-operative degree is normally four. In those Faculties offering only the co-operative programme, the minimum number of work terms normally equals the number of work terms available and remaining to the student in the programme from his/her point of entry.

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.

Academic Record for a Student Enrolled in a Co-operative Programme
The mark report of the student's last academic term will be released to the co-operative employer unless the student notifies the Department of Co-ordination and Placement to the contrary prior to the commencement of each work term.

Co-ordination and Placement
Work Terms

Failure to Report to Employer
Failure to report may result in suspension from the programme and is recorded on the Co-operative Student Record form with the statement: "Failed work term caused by refusal to honour previous agreement".

Leaving Employer Without Prior Approval
Leaving a job without prior approval from the Department of Co-ordination and Placement may result in suspension from the programme and is recorded on the Co-operative Student Record form with the statement: "Failed work term caused by student terminating employment without prior approval".

Dismissal With Cause
Dismissal of a student by an employer will be thoroughly investigated by the student's Co-ordinator and may result in a notation on the Co-operative Student Record form: "Failed work term; dismissed for cause". The Department of Co-ordination and Placement may recommend to the Dean of the Faculty that consideration be given to suspending the student from the programme. However, if the investigation reveals no just cause, the student may proceed unhindered and will receive the notation N/A (Not Applicable) under the employer's evaluation.

Commitment
Normally, a minimum of two consecutive work terms with an employer is expected. Provision is allowed for such situations as: one-term jobs, economic uncertainty, relevance of the second term to a student's progress, and Co-ordinator discretion. Non-compliance with this requirement may result in a failed work term with a notation on the Co-operative Student Record: "Failed work term caused by refusal to honour a previous agreement."

Unsatisfactory Performance
Unsatisfactory performance by a student on a work term is investigated by the student's Co-ordinator. As a result of this investigation, if benefits from further professional training are questionable, the student may be required to withdraw from the programme.

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:
This indicates a condition where an on-own term is granted to a student for personal reasons. It may also be used to indicate that a student was unable to obtain suitable employment through the normal placement processes. If the student subsequently finds suitable employment, the Co-operative Student Record will be changed to record this fact.

On Own - Imposed by Department:
This indicates that a student has not complied with a programme regulation, such as a student missing interviews without just cause or failure to discuss deleting job rankings.

Standings and Appeals
Applicable to sections "Seeking Employment and Employer Interviews", and "Work Terms". The Department of Co-ordination and Placement which administers these Regulations and Procedures will first present any notation of "Failed Work Term", "On Own-Imposed by Department," or "Required to Withdraw" (as a result of unsatisfactory work term performance) to the appropriate Faculty examinations, promotions or standings committee for a 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. Where other than four are required by the University, this is stated in the calendar or in the individual student's file. However, employers may require additional reports from students as part of the job. Normally for a report to be considered a satisfactory work report 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", "Satisfactory" or "Unsatisfactory." Provision is made for students to upgrade Unsatisfactory work reports for re-evaluation by the beginning of the next academic term.

Grading Requirements for Co-operative Programmes

Work Terms
Quantity:
Upon entry to a co-op programme a student is expected to follow the work-term/academic-term sequence appropriate for that particular programme. In some cases this may include as many as six work terms. 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 programme, 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 programme from the time the programme begins. In those Faculties which offer both regular and co-operative programmes, the minimum number of related work terms required for a co-operative degree is normally four. In those Faculties offering only the co-operative programme, the minimum number of work terms normally equals the number of work terms available and remaining to the student in the programme 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-ordination and Placement. However, "On Own" conditions do not count toward the minimum requirements for graduation.

Performance Evaluation:
In those programmes with a stated minimum number of work terms, this number is also the minimum number of satisfactory work terms.
In programmes where there is no stated minimum, the number of satisfactory work terms can be one less than the number of work terms remaining in the programme 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 programmes the submission of work reports is a requisite for graduation and generally the minimum number is four, and these four must be graded as satisfactory or better. Provision is made for students to upgrade unsatisfactory reports or submit new reports. Also provided for are situations where there are less than four work terms available to the students, as well as other special conditions 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 programmes, students must be registered as full-time students in the programme in all terms from point of entry through to the final academic term. The only exception occurs in programmes on a credit system where a student may have enough credits to be able to register as a part-time student in the final term.

Students registered in any of the co-operative programmes should obtain the Department of Co-ordination and Placement's booklet "Regulations and Procedures for Co-operative Programmes". The booklet clarifies, emphasizes and supplements the University's requirements for co-op students as outlined in this Calendar.

Co-operative Degree Designation
Since Architecture and Engineering are mandatory co-operative programmes, University of Waterloo graduates in those disciplines are known to have gone through the co-operative system. In programmes 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.

The foregoing has been written with the assistance of the Student Advisory Council to the Department of Co-ordination and Placement. The Council strongly recommends that applicants interested in co-operative education read a brochure designed to supplement the Calendar, entitled “Where it's at with Co-op Education”, before deciding whether such a programme is designed to best further their academic interests. The brochure presents more details about co-op in areas solely relevant to students, and is available from high school guidance departments or from the Department of Co-ordination and Placement.

Career Planning and Placement
Students at all academic levels, regular or co-op, in all faculties, are assisted in determining careers paths and in obtaining employment on graduation. Types of employment and the organizations and agencies compatible with the individual student's needs and abilities are discussed during personal interviews with career advisors.

Group sessions for students are held on job-search techniques, resume writing and how to take an interview. Career talks are held during the academic year and cover many areas of interest to students. These sessions help bridge the gap between the academic environment and the search for employment.

Each year, several hundred employers are invited to conduct on-campus interviews for all graduating students. Employers interested in hiring co-operative graduates interview students during a three-week period in January. Students in regular programmes, and postgraduate students, participate in a two-week interview period in November-December and in the January interviews. Also, summer and part-time employment are available for non co-op students.

The Career Planning and Placement offices are located on the first floor of the Ira G. Needles Hall.
Industrial Advisory Council for Co-operative Engineering and Applied Science

The Industrial Advisory Council of the University of Waterloo was established in 1958 to bring guidance from industry to the University of Waterloo. The Council meets twice each year to discuss problems and make recommendations relative to the University's co-operative programmes in Engineering and Applied Science.

V. R. Duxbury (Chairman)
3M Canada Limited
E. E. Banks (Vice Chairman)
Dow Chemicals of Canada Limited
O. W. McAleny (Secretary)
Bell Canada Limited
J. R. Adare
Canadian Blower/Canada Pumps Limited
W. E. Baigent
Canron Limited
J. Bergsma
Columbus McKinnon Limited
P. J. Boyd
De Leuw Cather Canada Limited
R. A. Carlyle
Inco Metals Limited
Y. C. Chang
Xerox Research Centre of Canada Limited
D. Coleman
NCR Canada Limited
J. R. Coutts
Teklogix Limited
R. E. Dorsay
Imperial Oil Limited
W. Foster
Syncrude Operations Lab
A. R. Harvey
Kimberley-Clark Canada Limited
G. A. Henderson
General Foods Limited
D. M. Hendrick
Kerr Addison Mines Limited
R. C. Hore
Ontario Ministry of the Environment
H. Hurlbut
Labatt Ontario Breweries
A. J. Kingan
Bell Northern Research
E. G. Maclnnis
Department of National Defence
F. J. Mayer
Steel Company of Canada Limited
M. A. F. Murray
Consulting Engineer
D. T. Stevenson
Babcock & Wilcox Canada Limited
W. B. Taylor
Ontario Cancer Institute

Organizations Employing Co-operative Arts Students

Bank of Canada
Bedford Institute of Oceanography
Canadian Broadcasting Corporation
Canadian Labour Congress
The Canadian Press
Classic Bookshops
General Publishing
The Globe & Mail
Government of Canada
Government of Ontario
Government Members Service Bureau
Highway Bookshop
Humber College of Applied Arts & Technology
IBM Canada Limited
Imperial Oil Limited
Kitchener Waterloo Record
Lord Elgin High School
The MacMillan Company of Canada Limited
McClelland and Stewart
McGraw Hill Ryerson Limited
Office of the Leader of the Opposition
Office of the Legislative Assembly
Office of the Premier
Regional Municipality of Durham
J. J. Singer Consulting Economist Limited
**Organizations Employing Co-operative Architecture Students**

<table>
<thead>
<tr>
<th>Adamson Associates</th>
<th>Lingwood &amp; Robertson Architect &amp; Engineer</th>
</tr>
</thead>
<tbody>
<tr>
<td>Air Canada</td>
<td>London Board of Education</td>
</tr>
<tr>
<td>Akitt &amp; Swanston Architects</td>
<td>Lower Trent Region Conservation Authority</td>
</tr>
<tr>
<td>Allen Brown Sherriff Architects</td>
<td>MacDonald &amp; Zuberec</td>
</tr>
<tr>
<td>The Austin Company Limited</td>
<td>Maclean &amp; Associates Architects</td>
</tr>
<tr>
<td>Bruce Bateman Architect</td>
<td>Martin Mendelow &amp; Partners</td>
</tr>
<tr>
<td>Bell Canada</td>
<td>Mathers &amp; Haldenby Architects</td>
</tr>
<tr>
<td>Brant County Board of Education</td>
<td>Matsui Baer Vanstone Architects</td>
</tr>
<tr>
<td>Bregman &amp; Hamann Architects</td>
<td>Meek Klausen Scovage Walker Architects &amp; Engineers</td>
</tr>
<tr>
<td>Brewers Warehousing Company Limited</td>
<td>David Mills Architect</td>
</tr>
<tr>
<td>Karl Briestensky Architect</td>
<td>Minsos Vaitkunas Jamieson Architects</td>
</tr>
<tr>
<td>John Brook Architect</td>
<td>National Research Council</td>
</tr>
<tr>
<td>Brook Carruthers &amp; Shaw Architects</td>
<td>Nightingale &amp; Quigley Architects</td>
</tr>
<tr>
<td>R. V. B. Burgoyne Architect</td>
<td>North York Board of Education</td>
</tr>
<tr>
<td>Robert Burley Architect</td>
<td>Ogus Architect</td>
</tr>
<tr>
<td>Campfens Greer Galloway Architects &amp; Engineers</td>
<td>Page &amp; Steele Architects</td>
</tr>
<tr>
<td>Canadian Correction Services</td>
<td>Parkin Architects, Engineers &amp; Planners</td>
</tr>
<tr>
<td>Canadian Imperial Bank of Commerce</td>
<td>Pawlowski Construction</td>
</tr>
<tr>
<td>Canadian National Railways</td>
<td>Agnew Peckham Associates</td>
</tr>
<tr>
<td>CIAG - The Co-operators</td>
<td>Rafael &amp; Burka Architects</td>
</tr>
<tr>
<td>City of Cambridge</td>
<td>Robinson &amp; Heinrichs</td>
</tr>
<tr>
<td>City of Mississauga</td>
<td>Sheldon Rosen Architect</td>
</tr>
<tr>
<td>Andrew Clarke Architect</td>
<td>William A. Ruth Architect</td>
</tr>
<tr>
<td>Cohos Evamy and Partners</td>
<td>Millet Salter Architect</td>
</tr>
<tr>
<td>Commonwealth Holiday Inns of Canada</td>
<td>Louis Sauer Architect</td>
</tr>
<tr>
<td>Craig &amp; Kohler Architects</td>
<td>Scherrer &amp; Hicks, Chartered Architects</td>
</tr>
<tr>
<td>Crang &amp; Boake Architects</td>
<td>Sheridan College of Applied Arts &amp; Technology</td>
</tr>
<tr>
<td>Dale Chandler Kennedy Architects</td>
<td>Shore Tilbe Henschel Irwin Peters Architects</td>
</tr>
<tr>
<td>Dominik Thompson Laframboise &amp; Mallette Architects</td>
<td>J. E. Sievenpiper Architect</td>
</tr>
<tr>
<td>Dubois &amp; Associates Architects</td>
<td>Smith Mill &amp; Ross Architects</td>
</tr>
<tr>
<td>Dunlop Farrow Aitken Architects &amp; Consulting Engineers</td>
<td>Stahl &amp; Elliot Architects</td>
</tr>
<tr>
<td>Dyer Brown Associates</td>
<td>John Stevens &amp; Associates</td>
</tr>
<tr>
<td>Elliott Stahl and Associates, Architects</td>
<td>Stone &amp; Kohn Architects</td>
</tr>
<tr>
<td>Henry Fliss Architect</td>
<td>Sunoco Inc.</td>
</tr>
<tr>
<td>Jude T. Fusco Associates Incorporated</td>
<td>Sutton &amp; Bell</td>
</tr>
<tr>
<td>Glos Architects Engineers &amp; Planners</td>
<td>Swain &amp; Rupnow Consulting Engineers</td>
</tr>
<tr>
<td>Government of Canada</td>
<td>Tillmann &amp; Lamb Architects</td>
</tr>
<tr>
<td>Government of Northwest Territories</td>
<td>Texaco Inc.</td>
</tr>
<tr>
<td>Government of Ontario</td>
<td>Toronto Malton Implementation Team</td>
</tr>
<tr>
<td>Irving Grossman Architect</td>
<td>Toronto Transit Commission</td>
</tr>
<tr>
<td>Gugula Smedley &amp; Barban Architects &amp; Engineers</td>
<td>University of Western Ontario</td>
</tr>
<tr>
<td>Haas-Ruebsam Limited</td>
<td>Andrew S. Volgyesi Architect</td>
</tr>
<tr>
<td>Peter Hemingway Architect</td>
<td>Walbrook Appointments</td>
</tr>
<tr>
<td>Humber College of Applied Arts &amp; Technology</td>
<td>Mykola Wasylko Architect</td>
</tr>
<tr>
<td>I B I Group</td>
<td>Wilson Newton Roberts Duncan Architects</td>
</tr>
<tr>
<td>Imperial Oil Limited</td>
<td>Carson Woods Architect</td>
</tr>
<tr>
<td>Jackson Ypes &amp; Associates, Architects &amp; Engineers</td>
<td>James Wright Architect</td>
</tr>
<tr>
<td>William R. Jarrett Architect</td>
<td>Wayne Wright Architect</td>
</tr>
<tr>
<td>J. H. Jorden Architects</td>
<td></td>
</tr>
<tr>
<td>William Kachmucky Architect</td>
<td></td>
</tr>
<tr>
<td>David Kenworthy Architect</td>
<td></td>
</tr>
<tr>
<td>Krohn Construction</td>
<td></td>
</tr>
<tr>
<td>Kyles Kyles &amp; Garratt Architects</td>
<td></td>
</tr>
<tr>
<td>Gail E. Lamb Architect</td>
<td></td>
</tr>
<tr>
<td>Robert L. Langlois Architect</td>
<td></td>
</tr>
</tbody>
</table>
Organizations Employing Co-operative Engineering, Applied Sciences & Geography Students

Abacus Industrial Equipment Company Limited
Abex Corporations Limited
Abitibi Forest Products Limited
Abitibi Paper Company Limited
Abitibi Provincial Paper Limited
Acres Consulting Services Limited
The Adams Mine
Addiction Research Foundation
Aero Irrigation Limited
AES Data Limited
Ainley and Associates Limited
Airphoto Analysis Associates
Alberta Environment
Aican Canada Products Limited
Algoma Steel Corp. Limited
Allied Chemical Canada Limited
American Can of Canada Limited
American Hoist of Canada Limited
Armco Canada Petroleum Company Limited
Angelstone Limited
Argo Plastics/Division of Granview Industries Limited
August Apon Associates Limited
Aptec Engineering Limited
Armco Canada Limited
Armbr Materials & Construction Limited
Asco Electric Limited
Associated Test Equipment Limited
Associated Tube Industries Limited
Atlas Steel Company
Atomic Energy of Canada Limited
Automotive Hardware Limited
Babcock & Wilcox Canada Limited
Bank of Nova Scotia
Barringer Research Limited
Bayly Engineering Limited
BDH Chemicals Limited
Beak Consultants Limited
Beaver Engineering Limited
Bekaert Industrial Limited
Bell Canada
Bell Controls Limited
Bell Northern Research
Bennett Paving & Materials Limited
Bestpipe Limited
Bibby Foundry Limited
Bird Construction Company Limited
Black & Decker Manufacturing Company Limited
Black & McDonald Limited
P A Blackburn Limited
Blackstone Industrial Products Limited
H L Blanchford Limited
Bondar-Clegg & Company Limited
Borden Chemical Company (Canada) Limited
Borough of Etobicoke
Bot Construction Company Limited
B P Minerals Limited
B P Oil Limited
B P Refinery Canada Limited
Brant County Board of Education
Bristol-Myers Canada Limited
Building Products of Canada Limited
R J Burnside & Associates Limited
Burroughs Business Machines Limited
Butler Manufacturing Company (Canada) Limited
Butler Metal Products Company Limited
Canada Brick Company Limited/Diamond Clay Division
Canada Glue Company Limited
Canada Machinery Corporation Ltd.
Canada Metal Company Limited
Canada Packers Limited
Canada Sand Papers Limited
Canada Wire & Cable Company Limited
Canadian Bechtel Limited
Canadian Blower/Canada Pumps Limited
Canadian Brass Limited
Canadian Broadcasting Corp.
Canadian Canns Limited
Canadian Carborundum Company Limited
Canadian General Electric Company Ltd.
Canadian Gypsum Company Limited
Canadian Industries Limited
Canadian Instrumentation & Research Limited
Canadian National Railways
Canadian National Telegraph Communications
Canadian Pacific
Canadian Pittsburgh Industries Limited
Canadian Refractories Division Dresser Industries Canada Ltd.
Canadian Standards Association
Canadian Tire Corporation Limited
Canadian Welding Development Institute
Can Am Instruments Limited
Can-Eng Alloys Limited
Canron Limited
Casey Hewson Construction Limited
Catalytic Enterprises Canada Limited
CFTO - Channel 9
Chemetics International Limited
Chipman Chemicals Limited
Chrysler Canada Ltd.
Ciba-Geigy Canada Limited
Cimco Limited
City of Brampton
City of Brantford
City of Burlington
City of Calgary
City of Cambridge
City of Chatham
City of Edmonton
City of Guelph
City of Hamilton
Co-ordination and Placement
Organizations Employing Co-operative Engineering
Applied Sciences & Geography Students

City of Kitchener
City of London
City of Mississauga
City of Niagara Falls
City of Port Colborne
City of Sarnia
City of St. Catharines
City of Sudbury
City of Thunder Bay
City of Toronto
City of Waterloo
City of Welland
City of Windsor
Club House Foods Limited
Cominco Limited
Commercial Enclosed Fuse Company
Comstock International Limited
Conestoga-Rovers and Associates
Consolidated Canadian Faraday Limited
Conspec Power Limited
Control Data Canada Limited
Conwest Exploration Company Limited
V B Cook Company Limited
Corma Incorporated
Corrosion Service Company Limited
Coulter Copper & Brass Limited
County of Brant
County of Hastings
County of Perth
Cox Construction Limited
Crane Canada Limited
Crane Packing Company Limited
Crouse-Hinds of Canada Limited
Cumming-Cockburn & Associates
Daython Walther Company Limited
Decor Metal Products Limited
John Deere Limited
De Leuw Cather Canada Limited
Delta-Benco Cascade Limited
Denison Mines Limited
Diesel Equipment of Canada Limited
Digital Methods Limited
M M Dillion Limited
Dilworth, Secord, Meagher & Associates Limited
Diversey (Canada) Limited
Doehler Canada Limited
Doerner Products Limited
Dome Petroleum Limited
Domglas Limited
Dominion Aluminum Fabricating Limited
Dominion Bridge Company Limited
Dominion Cutout Limited
Dominion Foundries & Steel Limited
Dominion Road Machinery Company Limited
Domtar Limited
Domtar Chemicals Limited
Domtar Construction Materials Limited
Dover Corporation (Canada) Limited
Dufferin Construction Company
Dupont of Canada Limited
Eaton Yale Limited
E C E Group
Ecodyne Limited
Eco-Research Limited
The E B Eddy Company
Eddy Forest Products Limited
N L Ede Limited
Eldorado Nuclear Limited
S & C Electric Canada Limited
Electro & Optical Systems Limited
Ellicott & Company (Canada) Limited
Epitek Electronics Limited
Erco Industries Limited
Ernst Leitz (Canada) Limited
Esso Chemical Canada/Division of Imperial Oil Ltd.
Exco Engineering
The Exolon Company of Canada Limited
Explosafe Division/Vulcan Industrial Packaging Limited
Falconbridge Nickel Mines Limited
Federal Pioneer Limited
Fermar Paving Limited
Ferranti-Packard Limited
Fiberglas Canada Limited
Firestone Canada Limited
Fischbach & Moore of Canada Limited
Fisher Controls Company of Canada Limited
A J Flatman
Fleet Industries Limited
Foster Wheeler Limited
Fowler Construction Company Limited
E S Fox Limited
Foxboro Company Limited
Fraser Company Limited
Funcraft Vehicles Limited
John Gaffney Construction Company Limited
Galtaco Incorp.
Gamsby & Mannerow Limited
Gandalf Data Communications Limited
Garrett Manufacturing Limited
Gaspe Copper Mines Limited
Gellman Hayward & Partners Limited
General Foods Limited
General Motors of Canada Limited
Girdler Industries Incorp.
Glaxo Canada Limited
Golder Associates
B F Goodrich Canada Limited
Goodyear Canada Incorp.
Gore & Storrie Limited
Government of Canada
Government of Northwest Territories
Co-ordination and Placement
Organizations Employing Co-operative Engineering,
Applied Sciences & Geography Students

Government of Ontario
Grand River Conservation Authority
Great Canadian Oil Sands Limited
The Great Lakes Paper Company Limited
A P Green Refractories Canada Limited
GTE Automatic Electric (Canada) Limited
Guelph Hydro
Gulf Minerals Canada Limited
Gulf Canada Limited
Halliday Homes Limited
Hamilton Harbour Commission
Hart Chemicals Limited
Hatch Associates Limited
Hawker Siddley Canada Limited
Hayes-Dana Limited
Hayward Gordon Limited
Homeware Industries Limited
Honeywell Controls Limited
Hothfield Systems Incorp.
C D Howe Company Limited
Hudson Bay Exploration & Development Co. Limited
Hudson Bay Mining & Smelting Company Limited
Hudson Bay Oil & Gas Limited
Huron Steel Fabricators (London) Ltd.
Hymac Company Limited
Hydro-Electric Commission of Cambridge & North Dumfries
Iron Ore Company of Canada
Irving Steel Limited
IST Incorporated
ITT Canada Limited
Jacuzzi Canada Limited
Rolf Jensen & Associates Limited
Johnson Controls Limited
Joy Manufacturing Company (Canada) Limited
Kaiser Aluminum Company
Kappele Wright & MacLeod Limited
Kaptest Engineering Limited
Kaufman Footwear Limited
Kearney-National (Canada) Limited
Keeprite Products Limited
Kellogg's Salada Canada Limited
Kendall Company of Canada Limited
Kerr Addison Mines Limited
Kiiborn Engineering Limited
Kimberly-Clark of Canada Limited
Kimberly-Clark Pulp & Paper Company Limited
Kindred Industries Limited
King Hydraulic Power Limited
Kitchener Chamber of Commerce
Kitchener-Waterloo Hospital
Klockner-Moeller Limited
Koehring-Waterous Limited
Kud Simonsen Industries Limited
Labatt Breweries of Canada Limited
Lackie Bros. Limited
Lakefield District Secondary School
Lakefield College School
Land Ranger

Lear-Siegler Industries Limited
Leigh Instruments Limited
Leitch Video Limited
Levitt Safety Equipment Limited
Lindsay Speciality Products Limited
Linear Technology Incorp.
Litton Systems (Canada) Limited
Loblaws Limited
London Board of Education
London Concrete Machinery Company
Looby Construction Limited
The Lummus Company Canada Limited
Lundy Steel Limited
James F MacLaren Limited
MacMillan Bloedel Research Limited
Madsen Electronics of Canada Limited
Magnetic Coil Limited
Malcolm Condensing Company Limited
 Manitoba Forestry Resources Limited
Marshall Macklin Monaghan Limited
Marsland Engineering Limited
B H Martin Consultants Limited
E S Martin Construction Limited
Massey-Ferguson Industries Limited
Mattaib Mines Limited
McAsphalt Engineering Services
McCormick Rankin & Associates Limited
McGeorge & Barry Limited
McGrath Engineering Limited
Mickelson Associates
Mississauga Precision Limited
Mobil Oil Canada Limited
Mobil Paint Company
Molson's Brewery (Ontario) Limited
Molson's Brewery of Canada Limited
Monarch Fine Foods Company Limited
Monteiq Limited
Monroe Auto Equipment of Canada Limited
Monsanto Canada Limited
Moore Business Forms
Morse Chain
Motorola Canada Limited
MRI Limited
MTD Products of Canada Limited
Municipality of Metro Toronto
National Research Council
NCR Canada Limited
Neelon Limited
Nelco Mechanical Limited
Nestle (Canada) Limited
Noranda Exploration Company Limited
Noranda Mines Limited
Northern & Central Gas Corp. Limited
Northern Telecom Company Limited
North York Hydro Office
Novatronics of Canada Limited
Nucro-Technics Limited
Nuodex Canada Limited
The Ontario Cancer Institute
Ontario Crippled Children’s Centre
Ontario Division of Mines
Ontario Education Communications Authorities
Ontario Geological Survey of Canada
Ontario Hydro
The Ontario-Minnesota Pulp & Paper Company Ltd.
Ontario Northland Railways
The Ontario Paper Company Limited
Ontario Provincial Paper
Ontario Research Foundation
Ortho Pharmaceutical (Canada) Limited
Pacific Petrroleums Limited
Pamour Porcupine Mines Limited
Pan Canadian Petroleum
Papeterie Reed Limited
C C Parker & Associates Limited
Perle Systems Limited
Permali (Canada) Limited
Peto MacCallum Limited
Petrosar Limited
Pigott Construction Company Limited
Pilkington Brothers Canada Limited
Pitts Engineering & Construction Limited
Plax Canada Limited
Playtex Limited
Pneuveyor Systems Limited
Polysar Plastics Limited
Power Truck Industries
Pratt & Whitney Aircraft of Canada Limited
Preston Sand & Gravel Company Limited
The Price Company Limited
Prince George Pulp & Paper Limited
Procor Limited
Procter & Gamble Company of Canada Limited
Procter & Gamble Specialties Limited
Proctor & Redfern Group
Pro-Eco Limited
Provincial Crane Division of Dominion Bridge Co. Ltd.
Public Utilities Commission of Brantford
Public Utilities Commission of Ingersoll
Public Utilities Commission of Woodstock
Pulp & Paper Research Institute of Canada
Rauscher Plating Limited
Raytheon Canada Limited
Rebco Chemicals Limited
Redpath Sugars Limited
Reed Limited
Regional Municipality of Durham
Regional Municipality of Halton
Regional Municipality of Hamilton-Wentworth
Regional Municipality of Niagara
Regional Municipality of Peel
Regional Municipality of Sudbury
Repac Construction & Materials Limited
Richmond Hill Laboratories Limited
Rio Algom Limited
Wm Roberts Electrical & Mechanical Limited
Rockwell International of Canada Limited
Rohm & Haas Canada Limited
Romm Construction Company Limited
Rondar Services Limited
B M Ross & Associates Limited
P S Ross & Partners
Rothsay Concentrates Limited
Roxtone Furniture Limited
Ruff-Clarkson Steel
Nicholas Rusz & Associates Limited
Sasco Canada Limited
Scannex International Limited
J M Schneider Inc.
Scintrex Limited
Seaway/Midwest Limited
G M Sernas & Associates
Shaw Pipe Industries Limited
Shawinigan Engineering Company Ltd.
Sheldons Engineering Limited
Shell Canada Limited
Kenneth Siddall Inc.
Simpsons-Sears Limited
Sinclair Radio Laboratories Limited
Sinclair & Valentine Company of Canada Ltd.
Skega Canada Limited
Skelly & Wallans Landscaping
Snap-On Tools of Canada Limited
Sonotek Limited
Spar Aerospace Products Limited
Sperry Univac Development Manufacturing Ltd.
St. Anne-Nackawic Pulp & Paper Company Ltd.
Standard Brands Limited
Standard Pressure Pipe Company
Stauffer Chemical Company of Canada Ltd.
The Steel Company of Canada Limited
Steep Rock Iron Mines Limited
Stemco Division Garlock of Canada Limited
Stephens-Adamson Division of Allis Chalmers Can. Ltd.
Sterling Varnish Company (Canada) Limited
St. Joseph’s Exploration Company Limited
St. Joseph’s Hospital
St. Lawrence Cement Company Ltd.
St. Mary’s Cement Company
Strathcona Mineral Services Limited
Suico Chemicals Limited
Sunar Industries Limited
Sunnybrook Medical Centre/University of Toronto Clinic
Sun Oil Company Limited
Syncrude Canada Limited
Taylor Instrument Limited
J J Taylor & Sons Limited
Tectrol Incorp.
Co-ordination and Placement
Organizations Employing Co-operative Engineering, Applied Sciences & Geography Students

Teklogix Limited
Telesat Canada
Tembec Forest Products Company Ltd.
Temprite Industries Limited
Temro Automotive Limited
Terra Mining & Exploration Company Limited
Texaco Canada Limited
Texasgulf Canada Limited
Paul Theil Associates
J E Thomas Specialties Limited
Timbergate Engineering Limited
Tonecraft Limited
Torco Engineering Products Division/Toron Building Products
Toronto-Hydro Electric System
Toronto Iron Works Limited
Toronto Malton Implementation Team
Toronto Transit Commission
Tottem Sims Hubicki Associates Limited
Town of East Gwillimbury
Town of Elliot Lake
Town of Fort McMurray
Town of Grimsby
Town of Halton Hills
Town of Markham
Town of Oakville
Town of Pickering
TransCanada Pipelines Limited
Transformer & Switchgear Services Company Ltd.
Transportation Agency of Saskatchewan
Transportation Safety Research Institute
Traugott Construction Limited
Tridon Limited
Trow Group Limited
TRW Canada Limited
Underwood McLellan & Associates Limited
Union Carbide Canada Limited
Union Drawn Steel Company Limited
Union Gas Company of Canada Limited
Union Miniere Explorations & Mining Corp. Ltd.
Uniroyal Chemical – Division of Uniroyal Ltd.
Uniroyal Limited
United Co-operatives of Ontario
United Tire & Rubber Company Ltd.
Unitel Limited
Universities & Colleges
Guelph
Memorial
Royal Military
St. Clair
Toronto
Western Ontario
Urban Transportation Development Corp. Ltd.
Valley Blades Limited
Varian Associates of Canada Limited
Varta Batteries Limited
Vibration Technology

Victaulic Company of Company Limited
Wabco Equipment Canada Limited
Wabush Mines
Walbar Machine Products of Canada Limited
Walker Brothers Quarries
Walter Fedy McCargar Hachborn Consulting Engineers
Jervis B Webb Company of Canada Ltd.
West Industrial Division/Emerson Electric Canada Ltd.
Westeel-Rosco Limited
Western Foundry Limited
Westinghouse Canada Limited
Weston Research Centre
White-Farm Equipment Division White Motor Corp. of Canada Ltd.
Wilk Engineering Limited
Willroy Mines Limited
George Wimpey Canada Limited
R E Winter & Associates Limited
Worthington (Canada) Limited
Xerox of Canada Limited
Xerox Research of Canada Limited
X-Ray Assay Laboratories Limited
York Steel Construction Limited
Yorkville Sound Limited
<table>
<thead>
<tr>
<th>Organizations Employing Co-operative Kinesiology, Recreation &amp; Health Studies Students</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Adolescent Projects Opportunities for Growth</strong></td>
</tr>
<tr>
<td><strong>Adult Occupational Centre</strong></td>
</tr>
<tr>
<td><strong>Alcoholism &amp; Drug Addiction Research Foundation</strong></td>
</tr>
<tr>
<td><strong>Ausable-Bayfield Conservation Authority</strong></td>
</tr>
<tr>
<td><strong>Balmoral Hall</strong></td>
</tr>
<tr>
<td><strong>Bethesda Home</strong></td>
</tr>
<tr>
<td><strong>Blue Hills Academy</strong></td>
</tr>
<tr>
<td><strong>Blue Mountain Resorts Limited</strong></td>
</tr>
<tr>
<td><strong>Bluewater Centre for the Developmentally Handicapped</strong></td>
</tr>
<tr>
<td><strong>Boards of Education</strong></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td><strong>Borough of Etobicoke</strong></td>
</tr>
<tr>
<td><strong>Boyne River Natural Science School</strong></td>
</tr>
<tr>
<td><strong>Brookside School</strong></td>
</tr>
<tr>
<td><strong>Camp Tawingo</strong></td>
</tr>
<tr>
<td><strong>Cecil Facer School</strong></td>
</tr>
<tr>
<td><strong>Chedoke Hospital</strong></td>
</tr>
<tr>
<td><strong>City of Brampton</strong></td>
</tr>
<tr>
<td><strong>City of Burlington</strong></td>
</tr>
<tr>
<td><strong>City of Cambridge</strong></td>
</tr>
<tr>
<td><strong>City of Chatham</strong></td>
</tr>
<tr>
<td><strong>City of Nanticoke</strong></td>
</tr>
<tr>
<td><strong>City of Oakville</strong></td>
</tr>
<tr>
<td><strong>City of Peterborough</strong></td>
</tr>
<tr>
<td><strong>City of Sarnia</strong></td>
</tr>
<tr>
<td><strong>City of St. Thomas</strong></td>
</tr>
<tr>
<td><strong>City of Sudbury</strong></td>
</tr>
<tr>
<td><strong>City of Thunder Bay</strong></td>
</tr>
<tr>
<td><strong>City of Timmins</strong></td>
</tr>
<tr>
<td><strong>City of Waterloo</strong></td>
</tr>
<tr>
<td><strong>City of Welland</strong></td>
</tr>
<tr>
<td><strong>Colleges of Applied Arts and Technology</strong></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td><strong>Carol Currier Residence</strong></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Organizations Employing Co-operative Kinesiology, Recreation &amp; Health Studies Students</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>District Health Councils</strong></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
</tbody>
</table>

**Co-ordination and Placement**

Organizations Employing Co-operative Kinesiology, Recreation & Health Studies Students
Co-ordination and Placement
Organizations Employing Co-operative Mathematics Students

Town of Oakville
Town of Palmerston
Town of Renfrew
Town of Vaughan
Township of Delhi
Travelways Tours
Valleyview Home for the Aged
Victoria Woods Development Corporation
Wellesley Hospital
Wendigo Lake
Wheels Fitness and Racquets Club
Whitby Psychiatric Hospital
Workmen’s Compensation Board
YMCA Kitchener-Waterloo
YMCA Metropolitan Toronto
YM - YWCA Ottawa

Organizations Employing Co-operative Mathematics Students

Abbey Life Insurance Company of Canada
Abitibi Paper Company Limited
AGT Data Systems Limited
The Algoma Steel Corporation Limited
Alphatext Systems Limited
A. E. Ames & Company Limited
Atlas Steels Company
Atomic Energy of Canada Limited
Bailey & Rose Limited
Kenneth W. Ball & Company
Bank of Canada
Bank of Montreal
Bank of Nova Scotia
The Bay
Beaver Engineering Limited
Beaver Lumber Company Limited
The Becker Milk Company Limited
Bell Canada
Bell Northern Research
B-N Software Research Inc.
Boards of Education
   Brant County
   Carleton County
   The Cochrane-Iroquois Falls
   Etobicoke
   Hamilton
   Lincoln County
   North York Borough
   Peel County
   Sault Ste. Marie
   Scarborough
   Waterloo County
   York Borough
Bouris, Wilson, Scott & Proctor
Brunton, Browning, Day & Partners
Buck Lawrence
Budd Automotive Company of Canada Limited
Burns Foods Limited
Burroughs Business Machines Limited
Cadillac Fairview Corporation Limited
Campbell, Lawless & Punchard
Campbell, Sharp, Nash & Field
Canada Building Materials
Canada Permanent Trust Company
Canada Post Gateway Facilities
Canada Printing Ink (Reichold Chemicals)
Canada Systems Group (EST) Limited
Canadian Fram Limited
Canadian Imperial Bank of Commerce
Canadian Industries Limited
Canadian National Telecommunications
Canadian Pacific
Canadian Systems Design
Canadian Tire Corporation Limited
Carling O’Keefe Limited
Co-ordination and Placement
Organizations Employing Co-operative Mathematics Students

CBS Records Canada Limited
CCM
Central Mortgage & Housing Corp.
Cheney, Glenn & Graydon
Chrysler, Shillington & Company
Citicorp Limited
City of Sault Ste. Marie
City of Sudbury
City of Thunder Bay
City of Toronto
Clarke, Henning & Company
Clarke, Starke, & Diegel
Clarkson, Gordon & Company
Cole, Rubin, Finkelstein & Green
Combined Insurance Company of Canada
Commerical Union Assurance Group
Commonwealth Holiday Inns of Canada
Computer Systems Services Limited
Comshare Limited
Comstat Consulting Services Limited
Comtech Group Limited
Confederation Life Insurance Company
Consumers Gas Company Limited
Continental Can Company of Canada Limited
Control Data Canada Limited
Cooper Tool Group Limited
Coopers & Lybrand
Cossar, Hector, Payne & Company
Cox, Hyatt & Company
CP Rail
Crawford Wills & Company
The Crown Life Insurance Company
Cygnet Mini Computers Limited
Data Crown Limited
George Deeth
Deloitte, Haskins & Sells
Delta Benco Cascade Limited
Desmarais, Arsenault & Company
Digital Equipment Limited
Digital Graphics Limited
DMR & Associates
H. R. Doane & Company
Dominion Foundries & Steel Limited
Dominion Life Assurance Company
Dorland & Dorland Company
Douglas Aircraft Company of Canada Limited
Dow Chemical of Canada Limited
Drake Systems
D. A. Dunlop & Company
Dunwoody & Company
Durst Vodden & Bender
Dyad Computer Systems Limited
Eli Lilly & Company Limited
Enns, Graham & Company
Environment Canada
Excelsior Life Insurance Company
Facelle Company Limited
Fiberglas Canada Limited
Financial Post

Ford, Keast, Giles, Smith & Phillips
Foseco Canada Limited
Fox, Glicksman & Company
Gagne & Gagnon
Gardner, McDonald & Company
Gaviller & Company
Geac Computer Corporation Limited
General Foods Limited
General Motors Canada Limited
Gerling Global Life Insurance Company
Global Television Network
The Globe and Mail Limited
Goebelle & Wagner
Goodyear Canada Incorporated
Gore Mutual Insurance Company
Government of Canada
Government of Ontario
Grand & Toy Limited
Greenwood, Meltz, Silverstein & Herlick
Greer, Fleming, Roland & Company
Guardian Insurance Company of Canada
Gulf Oil Canada Limited
Harbinson, Glover & Company
Harding Carpets Limited
Harria Media Services Limited
Samuel Harrison & Company
Andrew Hayes & Associates
Heaton & Hasaal
Hewlett - Packard (Canada) Limited
Hilborn Ellis Grant & Company
Hiram Walker & Sons Limited
Honeywell Information Systems
Hutchins Mullin & Blair
Hyde - Houghton & Company
IBM Canada Limited
Imperial Oil Limited
INCO Limited
The Independent Order of Foresters
INST Incorporated
Jarrett, Gould & Elliott
Anton Jenset & Company
Johnson & Higgins Willis Faber Limited
Johnson, Rickard & Company
Josscelyn, Laughlin, Harper, Tory & Associates
Keenan & Bell
Kelly McKay & Lewis
Kimberly Clark of Canada Limited
Kime & Company
Kralinator Filters Div.
Langhorne & Lynch
Langlois, Hauck & Company
Laura Secord Candy Shops Limited
Lemay & Peacock
Libby, McNeil & Libby of Canada Limited
Loftus A. Allen & Company
London Life Insurance Company
Loram International Limited
Lough Lewis & Associates
MacGillivray & Company
**Co-ordination and Placement**

**Organizations Employing Co-operative Mathematics Students**

<table>
<thead>
<tr>
<th>Company Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mack Trucks Limited</td>
</tr>
<tr>
<td>MacKilican &amp; Associates</td>
</tr>
<tr>
<td>A. F. MacLaren &amp; Company</td>
</tr>
<tr>
<td>Macs Milk Limited</td>
</tr>
<tr>
<td>Manitoba Forestry Resources Limited</td>
</tr>
<tr>
<td>The Manufacturers Life Insurance Company</td>
</tr>
<tr>
<td>Maritime Life Assurance Company</td>
</tr>
<tr>
<td>Maritime Telegraph &amp; Telephone Company Limited</td>
</tr>
<tr>
<td>Warmer Mandelbaum Landau &amp; Rosenberg</td>
</tr>
<tr>
<td>Martin Tilley &amp; Company</td>
</tr>
<tr>
<td>Massey-Ferguson Industries Limited</td>
</tr>
<tr>
<td>McCarney, Swinarton, Newland &amp; Company</td>
</tr>
<tr>
<td>McCay, Duff &amp; Company</td>
</tr>
<tr>
<td>McCluggage &amp; Smith</td>
</tr>
<tr>
<td>McColl, Turner &amp; Company</td>
</tr>
<tr>
<td>McLurkin Schlegel &amp; Associates</td>
</tr>
<tr>
<td>McMahon, Millard, Graham &amp; Kentner</td>
</tr>
<tr>
<td>McPherson, Scott &amp; Cragg</td>
</tr>
<tr>
<td>MFS Limited</td>
</tr>
<tr>
<td>Micom Data Systems Limited</td>
</tr>
<tr>
<td>Microsec Sixty-Nine Limited</td>
</tr>
<tr>
<td>Millard, Rouse &amp; Rosebrugh</td>
</tr>
<tr>
<td>Mobil Oil Canada Limited</td>
</tr>
<tr>
<td>Monsanto Canada Limited</td>
</tr>
<tr>
<td>Montelth Montelth &amp; Company</td>
</tr>
<tr>
<td>Multiple Access Limited</td>
</tr>
<tr>
<td>Municipality of Metropolitan Toronto</td>
</tr>
<tr>
<td>Murray, Rumack, Stern &amp; Cohen</td>
</tr>
<tr>
<td>The Mutual Life Assurance Company of Canada</td>
</tr>
<tr>
<td>National Cancer Institute of Canada</td>
</tr>
<tr>
<td>National Cash Register Company of Canada</td>
</tr>
<tr>
<td>The National Life Assurance Company of Canada</td>
</tr>
<tr>
<td>National Research Council</td>
</tr>
<tr>
<td>National Trust Company</td>
</tr>
<tr>
<td>New Brunswick Telephone Company</td>
</tr>
<tr>
<td>Norren Energy Resources Limited</td>
</tr>
<tr>
<td>Normandin Seguin &amp; Associates</td>
</tr>
<tr>
<td>North American Life Assurance Company</td>
</tr>
<tr>
<td>Northern &amp; Central Gas Corporation Limited</td>
</tr>
<tr>
<td>Office of the Auditor General</td>
</tr>
<tr>
<td>Office of the Provincial Auditor</td>
</tr>
<tr>
<td>Ontario Institute for Studies in Education</td>
</tr>
<tr>
<td>Ontario Hydro</td>
</tr>
<tr>
<td>Ontario Northland Transportation Commission</td>
</tr>
<tr>
<td>Onward Manufacturing Company Limited</td>
</tr>
<tr>
<td>Ortho Pharmaceutical (Canada) Limited</td>
</tr>
<tr>
<td>Oshawa Group Limited</td>
</tr>
<tr>
<td>Partridge, Skene &amp; Company</td>
</tr>
<tr>
<td>Peat, Marwick, Mitchell &amp; Company</td>
</tr>
<tr>
<td>Perlmutter, Shore, Wilkinson &amp; Rogers</td>
</tr>
<tr>
<td>Peterborough Utilities Commission</td>
</tr>
<tr>
<td>Peters Brown &amp; Company</td>
</tr>
<tr>
<td>Petro Canada Exploration</td>
</tr>
<tr>
<td>Petrosar Limited</td>
</tr>
<tr>
<td>Pfeister, Ray, Ariss, &amp; Grein</td>
</tr>
<tr>
<td>Philips Electronics</td>
</tr>
<tr>
<td>Pilkington Glass Limited</td>
</tr>
<tr>
<td>Polysar Limited</td>
</tr>
<tr>
<td>Pope &amp; Starret</td>
</tr>
<tr>
<td>Price-Waterhouse &amp; Company</td>
</tr>
<tr>
<td>Prior Data Sciences Limited</td>
</tr>
<tr>
<td>Procter &amp; Gamble Company of Canada Limited</td>
</tr>
<tr>
<td>Promac Engineering</td>
</tr>
<tr>
<td>Prudascos Data Services</td>
</tr>
<tr>
<td>Quasar Systems Limited</td>
</tr>
<tr>
<td>Reed Paper Limited</td>
</tr>
<tr>
<td>Reid &amp; Bradley</td>
</tr>
<tr>
<td>Rosenberg &amp; Company</td>
</tr>
<tr>
<td>Rosenberg, Fine, Goodfield, Sacks</td>
</tr>
<tr>
<td>Ross, Pope &amp; Company</td>
</tr>
<tr>
<td>PS Ross &amp; Partners</td>
</tr>
<tr>
<td>Roth &amp; Witsel</td>
</tr>
<tr>
<td>Rowntree MacKintosh Company Limited</td>
</tr>
<tr>
<td>The Royal Bank of Canada</td>
</tr>
<tr>
<td>Royal Insurance Group</td>
</tr>
<tr>
<td>Rubbermaid (Canada) Limited</td>
</tr>
<tr>
<td>Ryerson Polytechnic Institute</td>
</tr>
<tr>
<td>Seddington, Greenfield &amp; Company</td>
</tr>
<tr>
<td>Samson Belair &amp; Partner</td>
</tr>
<tr>
<td>Scarborough Public Utilities Commission</td>
</tr>
<tr>
<td>J M Schneider Limited</td>
</tr>
<tr>
<td>SDI Associates</td>
</tr>
<tr>
<td>Secker &amp; Ross</td>
</tr>
<tr>
<td>Selby, Modgett, Bolcr &amp; Company</td>
</tr>
<tr>
<td>IP Sharp Associates Limited</td>
</tr>
<tr>
<td>Shawinigan Engineering Company Limited</td>
</tr>
<tr>
<td>Shell Canada Limited</td>
</tr>
<tr>
<td>Simpson Sears Limited</td>
</tr>
<tr>
<td>Slater Steel Industries Limited</td>
</tr>
<tr>
<td>Smith, Klymas, Selk &amp; Company</td>
</tr>
<tr>
<td>Smith, Nixon &amp; Company</td>
</tr>
<tr>
<td>A. H. Soufrine &amp; Company</td>
</tr>
<tr>
<td>Sperry Univac Computer Systems</td>
</tr>
<tr>
<td>Springer Chapman &amp; Company</td>
</tr>
<tr>
<td>The Steel Company of Canada Limited</td>
</tr>
<tr>
<td>Stille &amp; Sutton</td>
</tr>
<tr>
<td>Sudbury Hydro</td>
</tr>
<tr>
<td>Sun Oil Company Limited</td>
</tr>
<tr>
<td>Systemhouse Limited</td>
</tr>
<tr>
<td>Systems Approach Limited</td>
</tr>
<tr>
<td>Systems Dimensions Limited</td>
</tr>
<tr>
<td>Tax Time Services</td>
</tr>
<tr>
<td>Teleglobe Canada</td>
</tr>
<tr>
<td>Telesat Canada</td>
</tr>
<tr>
<td>Tessier, Smith &amp; Partners</td>
</tr>
<tr>
<td>Texaco Canada Limited</td>
</tr>
<tr>
<td>Texasgulf Canada Limited</td>
</tr>
<tr>
<td>Thorne Riddell &amp; Company</td>
</tr>
<tr>
<td>Tomenson Alexander Limited</td>
</tr>
<tr>
<td>The Toronto Dominion Bank</td>
</tr>
<tr>
<td>Toronto Hydro - Electric Systems</td>
</tr>
<tr>
<td>Toronto Mutual Life Insurance Company</td>
</tr>
<tr>
<td>Toronto Transit Commission</td>
</tr>
<tr>
<td>Touche, Ross &amp; Company</td>
</tr>
<tr>
<td>TransCanada Pipelines Limited</td>
</tr>
</tbody>
</table>
Transport Canada
Travelers of Canada
TRW Data Systems
Union Carbide Canada Limited
United Co-operatives of Ontario
Universities & Colleges
   Alaska
   Ashbury
   Laurentian
   Loyalist
   Pepperdyne
   Sheridan
   Wilfrid Laurier
   York
The Upjohn Company of Canada
G. H. Ward & Partners
Warner-Lambert Canada Limited
George A. Welch & Company
Welsh & Galloway
Wilkinson & Company
Williams Birkbeck & Company
Winspear, Higgins, Stevenson & Company
Wood Brown & Associates
Woods, Gordon & Company
Workmen's Compensation Board
Xerox of Canada Limited
York Ryerson Computing Centre
3M Canada Limited
5100 Support Group Limited
The University Libraries

The Arts Library - Card Catalogue Area
The University Libraries

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

Assistant to the Librarian – Administration
A. Dunnet, BBA (New Br.)

Administrative Assistant to the University Librarian
N. L. Prince, BA (McMaster)

Business Administrator
J. Jorgensen, BA (Toronto)

Systems Development Librarian
G. Damon, BA (Maine), MSLS (Case Western)

Special Collections Librarian
S. Bellingham, BA (Wat. Luth.), MLS (W. Ont.)

Support Services

Associate Librarian for Support Services
C. D. Emery, BA (Durham), ALA

Acquisitions Department Head
E. Waterman, BA (McMaster), BLS (Toronto)

Cataloguing Department Head
W. Oldfield, BA (Wat. Luth.), MLS (W. Ont.)

Chief Cataloguer
C. Hagstrom, BA (Lakehead), MA, MLS (W. Ont.)

Cataloguers
H. Calogendis, BA, MLS (McGill)
A. Chan, BA (Hong Kong), MLS (W. Ont.)
Y. Gordon, BA (Manitoba), BLS (Toronto)
R. Lamb, BA (Guelph), MLS (W. Ont.)
M. Wan, BSc (Hong Kong), MA, MLS (W. Ont.)

Serials Department Head
B. Bruder, BA (Wat. Luth.)

Cataloguer
J. Kuhn, BA, MA (Creighton), MLS (W. Ont.)

Reader Services

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

Dana Porter Arts Divisional Library
Circulation Department Head
E. Reaman, ATCM, BA (McMaster), BLS (Toronto)

Reference & Collections Development Department Head
T. Eadie, BA, MA (Queen’s) MLS (W. Ont.)

Reference & Collections Development Librarians
J. Addico, BA (Phillips), MA (Northwestern), MLS (W. Ont.)
M. Aquan-Yuen, BA, MLS (Toronto)
J. Beglo, BA (Wat. Luth), MLS (Toronto)
M. Blok, BA (Waterloo), MLS (W. Ont.)
R. Crusz, BA (Ceylon), BLS (Toronto), MA (Waterloo)
D. Fitzpatrick, BA, MA (Windsor), MLS (Toronto)
A. Lakos, BA (Jerusalem), MLS (Br. Col.)
S. MacKinnon, BA (Mount Allison) BLS (McGill)
S. Slade, BA (Victoria), BLS (Br. Col.)

Government Publications Department Head
M. Genoe, BA, MA (Waterloo), MLS (W. Ont.)

Librarians
J. Boettger, BA (Waterloo), BLS (Br. Col.)
K. J. Ryans, BA (Queen’s), MLS (Toronto)

Orientation Librarian
G. Meek, BA (McMaster), MA, MLS (W. Ont.)

Engineering, Mathematics and Science Divisional Library
Assistant Librarian for the Engineering, Mathematics and Science Divisional Library
C. Presser, AB (Hunter), MLS (Pratt)

Circulation Department Head
V. Mixer, AB (Hanover)

Reference & Collections Development Department Head
F. Abrams, BA (Sir G Wms), MLS (McGill)

Reference & Collections Development Librarians
N. Bastedo, BA (Rollins), MS (Toronto), MLS (W. Ont.)
W. Macpherson, BSc, MLS (Dalhousie)
D. Morton, BSc, MLS (W. Ont.)
J. Parrott, BSc (Queen’s), MSc. BLS (Toronto)
I. Rodin, BSc (McGill), MLS (W. Ont.)
B. Toth, BA (Queen’s) MLS (McGill)

University Map Library Librarian
R. Pinnell, BSc, MSc (Toronto), MLS (W. Ont.)
The University Library

The Library is central to the academic programmes of the University. Its function is to provide books, journals and other library materials to support these programmes. The library staff, aided by the university community, works to make the library system a base for teaching, study and research. The University Library is composed of two divisional libraries, the Dana Porter Arts Library, and the Engineering, Mathematics and Science Library; one branch library, the University Map Library and two reading rooms, the Architecture Reading Room and the Optometry Reading Room.

The Dana Porter Arts Library, situated in the centre of the campus and rising to a height of ten storeys, is the focal point of the University. The lower floors house the main reader services departments and support services. Reader services, located on the first floor, include a large reserve reading room with seating for 160 readers, a rare book room, listening room with facilities for both phonodiscs and audio cassettes and eight typing cubicles. Upon entering the Library on the second floor the public catalogue, the circulation counter and the information desk are all immediately visible and close at hand. Also on the main floor is the current periodical reading room, the inter-library loan office and the reference collection. The periodical and newspaper collections and microforms are located on the third floor. Government publications are located on the fifth floor. The upper floors (six through ten) house the circulating book collection and seating for more than 1,400 readers.

The Arts Library collection numbers over 1,200,000 items including books, pamphlets, theses, microforms, documents, reports, sound recordings and other material. The library subscribes to over 5,000 periodicals and 60 newspapers both important elements of the collection.

The Engineering, Mathematics and Science Library occupies the fourth floor of the Mathematics and Computer Science Building. The three principal reader services - the catalogue, the circulation counter and the information desk are visible from the entrance to the Library. Seating is provided for 740 readers.

The EMS Library collection numbers over 230,000 items including books, microforms, documents, technical reports and maps. The Library subscribes to over 4,000 current periodicals.

The University Map Library is housed on the main floor of the Environmental Studies Building. It is the principal University centre for the provision of service relating to cartographic material. The collection consists of 40,000 maps 725 atlases and 14,000 aerial photographs. Like the Arts and EMS libraries, its resources are available to all members of the University.

The Architecture and Optometry Buildings house the two official Reading Rooms. They contain the bulk of the Library's collection in their respective fields.

The staff of the University Library is engaged in obtaining material, in processing it for the collections, and in providing access to the collections. During the day and the evening, reference and circulation staff are on duty to assist in making use of collections, facilities and services. Week nights the Arts and EMS libraries are open for use under the custodianship of library attendants.

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

The University Library offers a full range of orientation and instructional services designed to introduce new 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.
Faculty of Arts

Psychology Department - student in Early Childhood Education Programme working with preschoolers
The Faculty of Arts

The main objective of the Faculty of Arts is to provide the student with a liberal arts education. A liberal arts education 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.

Qualified women and men are encouraged to apply.

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 Year 5 and for those not currently registered in Ontario Year 5. See Chapter 2 for details. Admission requirements for part-time students are the same as for full-time students.

Applicants who wish to study full-time must submit their applications through the Ontario Universities' Application Centre (OUAC).

Applicants for part-time, non-degree, or correspondence courses may obtain application forms from the Registrar's Office (Needles Hall) at the University of Waterloo.

2) Transfer Credit
Generally transfer credit is given for pertinent courses in which a grade of 60% or better was obtained. Students transferring from other institutions 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 student's University of Waterloo average.

Students transferring from Faculties within the University may elect to transfer previous UW courses in which they earned marks of at least 60% (C–). These courses will not be counted in the students' cumulative average. Or such students may elect to transfer all attempted courses (passed and failed). Under this option, these courses will be counted in the students' cumulative average.

Arts Programmes

1) General Programmes

a) With a Major
A General Bachelor of Arts (B.A.) degree is offered by the University in the following major disciplines:

- Anthropology
- Classical Civilization
- Drama and Theatre Arts
- Economics
- English
- Fine Arts (Art)
- Fine Arts (Music)
- French
- Geography (See Note)
- German
- Greek
- History
- Latin
- Medieval Studies
- Political Science
- Philosophy
- Psychology
- Religious Studies
- Russian
- Social Development Studies
- Sociology
- Spanish

There are no minors or double majors in General Programmes.

Note
Students interested in programmes in Geography in the Faculty of Arts should ensure that they take the appropriate Geography courses in Year 1. Admission to Geography programmes in the Faculty of Arts is competitive and will be limited to 25 per year. Participants in Geography programmes will not normally be permitted to switch faculties after they have entered second year. For additional information see pages 145-150.

Year 1
Students in Year 1 normally choose 5 credits (5 full courses or 10 half courses) for the year (2.5 credits per term). The usual pattern of courses is 2 from Group A and 2 from Group B (see Degree Requirements), with 1 or 2 more as electives. (Students are advised that a 6 course work load is quite heavy.) At the end of Year 1, students who wish to major choose one of the disciplines listed above as their major field of study.

Note
"Courses" refers to courses which extend for one full academic year (September through April). "Half courses" last only one academic term – fall, winter, or spring. Two half courses are the equivalent of one full course. One full course carries one credit; one half course carries one half credit.
b) Non-Major
Students with interests in a variety of disciplines may choose an individualized programme rather than major in a single discipline. Any normal first-year Arts programme will satisfy the needs of a student contemplating a General Arts (non-major) Programme. The programme of non-major General Arts students must be arranged through the Arts Faculty Undergraduate Office.

2) Honours Programmes
a) Regular Programmes
An Honours Bachelor of Arts degree is offered by the University in the following disciplines:

<table>
<thead>
<tr>
<th>Discipline</th>
<th>Discipline</th>
</tr>
</thead>
<tbody>
<tr>
<td>Anthropology</td>
<td>Latin</td>
</tr>
<tr>
<td>Classical Studies</td>
<td>Medieval Studies</td>
</tr>
<tr>
<td>Drama and Theatre Arts</td>
<td>Philosophy</td>
</tr>
<tr>
<td>Economics</td>
<td>Political Science</td>
</tr>
<tr>
<td>English</td>
<td>Psychology</td>
</tr>
<tr>
<td>Fine Arts</td>
<td>Religious Studies</td>
</tr>
<tr>
<td>French</td>
<td>Russian</td>
</tr>
<tr>
<td>Geography</td>
<td>Social Development</td>
</tr>
<tr>
<td>German</td>
<td>Studies</td>
</tr>
<tr>
<td>History</td>
<td>Sociology</td>
</tr>
<tr>
<td></td>
<td>Spanish</td>
</tr>
</tbody>
</table>

Almost any 2 of the programmes may be combined or 1 of them may be combined with a number of programmes offered in other faculties for a Joint Honours degree. Joint Honours Programmes may also be arranged by consultation between the student and the departments concerned. Descriptions of the single Honours Programmes and each discipline's requirements for Joint Honours Programmes can be found in the section entitled "Departmental Programmes" beginning on p. 87.

Note 1
In Year 1 a student must normally complete the introductory course in which he will specialize in later years.

Note 2
Type A Teaching Certificate
Admission to the Type A Certification programme at the Ontario Colleges of Education requires the completion of a programme of at least twenty University credits, including one or two specialist fields in which the student has obtained at least second class (honours) or equivalent standing. A programme of twenty credits and one specialist field must include at least nine credits in the field. A programme of twenty credits and two specialist fields must include fourteen credits in the two combined fields, with at least six in each field. Information regarding approved specialized fields can be obtained from the Ontario Ministry of Education.

b) Co-operative Programmes
A Co-operative Programme is an Honours Programme that allows the student to integrate work experience with his academic programme. (For a detailed description of the co-operative plan, see Chapter 5.) Beginning at the end of Year 1 the co-op student alternates 4 month terms on campus for academic studies with 4 months off campus for practical training in business, industry, or government.

Co-operative Honours Programmes are now offered in the Behavioural Sciences, Economics, English, and Political Science, which lead to the following degrees:

- Co-op Honours Anthropology
- Co-op Honours Applied Economics
- Co-op Honours Economics with Management Accounting Option
- Co-op Honours Economics with Chartered Accountancy Option
- Co-op Honours English
- Co-op Honours Political Science
- Co-op Honours Political Science Administrative Studies Option
- Co-op Honours Psychology
- Co-op Honours Sociology

Co-operative Programmes are open to full-time students only.

3) Minor Programmes
Students enrolled in Honours Programmes in Arts or other faculties may elect a minor in an Arts discipline. A minor programme in Arts requires the successful completion of at least 5 credits in the minor discipline with an overall cumulative average of 65% in those credits. Students should consult with departmental undergraduate advisors for details of more specific requirements.

A minor only is available in Italian. There are no major programmes in these subjects.

4) Canadian Studies Option
Students in many Honours and General Programmes within Arts may choose an option in Canadian Studies which is designated on the diploma. The programmes with this option are:

<table>
<thead>
<tr>
<th>Discipline</th>
<th>Discipline</th>
</tr>
</thead>
<tbody>
<tr>
<td>Economics</td>
<td>History</td>
</tr>
<tr>
<td>English</td>
<td>Political Science</td>
</tr>
<tr>
<td>French</td>
<td>Sociology</td>
</tr>
<tr>
<td>Geography</td>
<td></td>
</tr>
</tbody>
</table>

For detailed information refer to "Canadian Studies" in the section entitled "Departmental Programmes", and the Canadian Studies section in Chapter 14 of the Calendar.
5) Peace and Conflict Studies Option
Students in many Honours and General Programmes within Arts may choose an option in Peace and Conflict Studies which is designated on the diploma. The participating departments include:

- Anthropology
- History
- Philosophy
- Political Science
- Psychology
- Religious Studies
- Sociology

After these times, 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 case with reasons showing that such a change in his programme will serve his academic interests.

d) Courses offered during the Summer Session may be added or dropped during the first week in which the course begins only with the signature of the instructor of the course and the Undergraduate Officer of the student's major department, and thereafter only with the permission of the Examinations and Standings Committee.

e) 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.

The Faculty of Arts recommends that its students take at least one course in mathematics or the natural sciences.

Note 1
From time to time, due to space limitations, students admitted to the University or otherwise in good standing, cannot be granted course and programme selections of their choice.

Note 2
Each student's programme must be approved on or before registration date by a faculty advisor from the Faculty of Arts.

Note 3
Students interested in Social Development Studies should consult the Undergraduate Officer at Renison College before selecting a Year 1 programme.

7) Course and Programme Changes

a) Changes in courses or programmes must be submitted for approval to the appropriate Undergraduate Officer.

b) Courses may be added during the first three weeks of the term in which they begin only with the signature of the instructor of the course and 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.

Students in the General Programme may graduate as non-majors upon completion of a minimum of 15 credits with a passing mark in each including:

i) a minimum of 7.5 credits beyond the 100 level,
ii) courses from no more than 7 disciplines. The Faculty of Arts Groups A, B, and C requirements (see below) must also be met.

A cumulative average of 65% is required for graduation.
Students in an Honours Programme must complete 20 to 24 credits (as specified in a Departmental Honours Programme), with a passing mark in each and an overall cumulative average of 60% and a cumulative average in the honours discipline of 75%. The Faculty of Arts Groups A, B, and C requirements (see below) must also be met. Students are asked to refer to “Departmental Programmes” for other departmental requirements.

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.

1) English Language Proficiency Programme
Over the past several years the Faculty of Arts has become concerned that some students 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 Programme. This programme 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 receive individual help with their writing problems.

All students whose initial registration in degree programmes 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.

Note
When students who are completing all their Arts degree requirements through Correspondence courses or at off-campus centres have reached the halfway point toward the General B.A. degree - that is, when they have finished half of their 15 credits - they will be required to sit the English Language Proficiency Examination during a normally scheduled examination time at a convenient location.

2) Groups A, B, and C Requirements
All Arts students must meet the Faculty of Arts Groups A, B, and C requirements. Group A comprises courses in the humanities, Group B comprises courses in the social sciences, and Group C comprises courses in Canadian Studies.

Group A (i) English, History, Philosophy
Group A (ii) French, German, Greek, Italian, Latin,
Polish, Russian, Spanish, Ukrainian (See Notes)
Group A (iii) Classical Civilization, Drama, Fine Arts, Religious Studies
Group B Anthropology, Economics, Geography, Political Science, Psychology, Sociology.
Group C Courses in Canadian Studies. See Note 3 for the approved list of courses which satisfy this requirement.

Before being admitted to the degree, an Arts student in either a Major or an Honours Programme must complete with passing marks a minimum of 3 full credits from Group A, a minimum of 2 full credits, not both in the same subject, from Group B, and a minimum of 1 full credit from Group C. The student should note that Group A is further sub-divided into Group A(i), Group A(ii), and Group A(iii). Of the 3 full credits from Group A, the student must complete with passing marks:
- a minimum of 1 full credit from Group A(i)
- a minimum of 1 full credit from Group A(ii)
Group C comprises courses that are also in Group A and Group B. A student may, therefore, use the same credit to meet the Group C requirement as he uses to meet part of either the Group A or Group B requirement.

An Arts student in a Non-Major Programme must complete with passing marks a minimum of 2 full credits, not both in the same subject from Group A, a minimum of 2 full credits, not both in the same subject from Group B, and a minimum of 1 full credit from Group C.

Note 1
Other foreign languages may be used to meet the Group A (ii) requirement; Religious Studies 105: Elementary Hebrew; Religious Studies 106: New Testament Greek; Arts 190/191: Introductory Chinese; Arts 290/291: Intermediate Chinese.

Note 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 one of the following courses: French 291/292, German 271/272, Russian 271/272, Spanish 215/216, Classical Civilization 201/202 or Italian 212J. 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.
Note 3
The following courses may be used to satisfy the Group C requirement:

Anth 205 (0.5) Anthropology of Race and Racism in Canada
Anth 241 (0.5) The Contemporary Canadian Indian Scene
Anth 333 (0.5) Canadian Communities and Planned Change
Anth 334 (0.5) Ethnicity and Ethnic Diversity in Canada
Cd St 201 (0.5) Social Regionalism
Cd St 202 (0.5) Cultural Regionalism
Drama 351 (0.5) Canadian Drama (cross-listed as English 316)
Econ 263 (0.5) Economic History of Canada
Econ 364 (0.5) Contemporary Canadian Problems 1
Engl 205R (0.5) The Canadian Short Story
Engl 214 (0.5) Themes in Canadian Literature
Engl 313 (0.5) Canadian Literature to 1920
Engl 314 (0.5) Canadian Poetry Since 1920
Engl 315 (0.5) Canadian Prose Since 1920
Engl 316 (0.5) Canadian Drama
Fine 316 (0.5) Canadian Native Art
Fine 317 (0.5) Canadian Art
Fr 273 (0.5) Aspects of Quebec
Fr 274 (0.5) Survey of French-Canadian Literature
Fr 375 (0.5) Contemporary French-Canadian Novel
Fr 471 (0.5) French-Canadian Poetry
Fr 472 (0.5) Contemporary Quebec Theatre
Geog 322 (0.5) Geographical Study of Canada
Geog 341 (0.5) Historical Geography of Canada 1
Geog 342 (0.5) Historical Geography of Canada 2
Geog 422 (0.5) Canada
Hist 204 (0.5) Canadian Urban History
Hist 204K (0.5) Canada: The Problem of Quebec
Hist 225 (1.0) Canadian Culture and Society
Hist 265 (1.0) Canadian History
Hist 267A (0.5) Canadian Minorities 1
Hist 267B (0.5) Canadian Minorities 2
Hist 273 (1.0) History of French Canada
Hist 275 (1.0) Twentieth Century Canada
Hist 381 (1.0) Studies in Canadian Regionalism
Hist 386 (0.5) Ontario History to Confederation
Hist 387 (0.5) Ontario History Since Confederation
Hist 389 (1.0) Canada in World Affairs: The Twentieth Century
Phil 225 (0.5) Social and Political Philosophy: Canadian Problems
P Sci 260 (1.0) Canadian Government and Politics
P Sci 341 (0.5) Provincial Politics
P Sci 342 (0.5) Politics in Quebec
RS 264 (0.5) Religion in Canada 1
R S 265 (0.5) Religion in Canada 2
Soc 201 (0.5) Canadian Society: Structure and Development
Soc 260 (0.5) French-English Relations in Canada
Soc 262 (0.5) Population in Canadian Society
Soc 300 (0.5) Canadian Social Institutions
Soc 351 (0.5) Research Seminar in Canadian Society
Soc 352 (0.5) Seminar in Nationalism and Ideology in Canada and Quebec

Examinations and Standings

The following regulations govern final examinations and standings in the Faculty of Arts. These regulations also apply to part-time students and special programmes. Further details concerning University Examination Regulations can be found in Chapter 1, pg. 17.

1) Final Examinations

a) The Faculty constitutes the examining body for all examinations. When a final written examination is required it is normally held at the end of the course. Oral examinations may be required at the discretion of individual departments. The normal time for written examinations is three hours.

b) In all courses each student is required to submit, in such form and at such time as may be determined by the instructor, evidence of satisfactory participation in term work. The marks obtained for such work during term may be used, in part or in whole, in determining grades. 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.

c) Failure to write an examination may be considered a failure to pass. A student who defaults a final examination, except for a properly certified reason, shall have no make-up examination privileges. If a student failed to write for medical reasons, a Doctor's certificate, covering the precise period of absence must be filed in the Registrar's office within a reasonable period of time after the examination should have been written.

d) No instructor shall be permitted to administer – and no student shall be required to sit – final examinations in the formal lecture period.
2) Grading System

a) 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 striking averages, the following weights will be assigned to grades received in individual courses:

\[
\begin{align*}
A+ & : 95 \\
B+ & : 78 \\
C+ & : 68 \\
D+ & : 58 \\
F+ & : 46 \\
A & : 89 \\
B & : 75 \\
C & : 65 \\
D & : 55 \\
F & : 38 \\
A- & : 83 \\
B- & : 72 \\
C- & : 62 \\
D- & : 52 \\
F- & : 32
\end{align*}
\]

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 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.

b) 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 and add period.

In satisfaction of the minimum degree requirements students in general programmes may present up to three full course equivalents with a grade of Credit (Cr) in courses outside their major. Students in Honours Programmes may present up to four full course equivalents 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 Type A Specialist Fields.

An incomplete "INC" may be assigned by an instructor in exceptional circumstances, with the consent of his 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 for a half-course and seven months for a full course.

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.

3) Course Load

Regular full-time students in both General and Honours Arts programmes normally register for 2.5 or 3 credits each academic term. Full-time students in General Arts Programmes may register for more than 3 credits per academic term only with the consent of the Examinations and Standings Committee. Full-time students in Honours Arts programmes may not enrol in more than one half-credit course per academic term in excess of the number specified for their programme (see Departmental Honours Programmes) except with the permission of the Examinations and Standings Committee.

4) Part-time Studies

Students may pursue degree studies part-time (in both General and Honours Programmes) by enrolling in regularly scheduled day courses as well as evening or Saturday courses. In addition, courses may be taken in the six week summer programme or by correspondence. There is no distinction between part-time and full-time students as to admission requirements, grading practices, or promotion policies.

5) Standing

a) To be considered in good standing in a General programme, 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. If at any time a student's overall average falls between 55 and 60%, or the major or non-major average below 65%, the student will be granted conditional status for one year. 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.

b) To be considered in good standing in an Honours programme, 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 programme 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 (a) above will apply. If subsequently the student raises the average to the required level, he may, through his Department Chairman, petition the Examinations and Standings Committee to review his case.
Even while otherwise in good standing, a student who fails two or more full courses in any academic year may be required to withdraw if the Examinations and Standings Committee considers that the student will not profit by further study.

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, his previous course work does not count in his cumulative average; however, all previous course attempts remain recorded on his University transcript.

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.

If a 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 Society. 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.

Grade Appeal Procedures

a) If a student wishes to appeal a course grade, 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 his appeal.

Whether or not a student wishes to proceed informally or formally, he may secure advice and assistance in his appeal either from the Undergraduate Office of the Faculty of Arts or from officers of the Arts Society.

b) The review procedures adopted by departments and colleges 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:
Departmental Programmes

Anthropology

General B.A. in Anthropology
The student must pass five credits in anthropology. Four of these anthropology credits must be in 200-level courses or above. One half credit must be taken in an advanced (200-level or above) course in each of the four sub-disciplines within anthropology (socio-cultural anthropology, archaeology, linguistics, and physical anthropology). Anth 103 or Anth 104 may fill the linguistics portion of this last requirement.

Honours Anthropology
The student must pass ten credits in anthropology. Nine of these anthropology credits must be in 200-level courses or above. One credit must be taken in advanced (200-level or above) courses in each of the four sub-disciplines within anthropology (socio-cultural anthropology, archaeology, linguistics, and physical anthropology). Anth 103 and/or Anth 104 may be used to fill all or part of this linguistics requirement. The honours student’s programme must also include a credit in anthropological theory (400-level theory oriented courses). The anthropology honours student needs 20 credits to graduate.

Anthropology Joint Honours Programmes
The recommended anthropology programme for joint honours includes seven credits in anthropology. Six anthropology credits must be in 200-level courses or above, one half credit must be taken in an advanced (200-level or above) course in each of the four sub-disciplines within anthropology (socio-cultural anthropology, archaeology, linguistics, and physical anthropology). Anth 103 or Anth 104 may serve to meet this last requirement. The joint honours student’s programme must also include a credit in anthropological theory (400-level theory oriented courses).

The student should consult the recommended programmes of other departments to determine their requirements. The joint honours student completes 22 credits before graduation.

Joint Honours Programmes have been approved for Anthropology and Biology, Classical Studies, English, French, Geography, German, History, Man-Environment Studies, Political Science, Psychology and Sociology.

Note 1
Joint Honours students with Anthropology and Geography or Anthropology and Man-Environment Studies must fulfill the requirements of the Faculty of Arts for the B.A. degree or of the Faculty of Environmental Studies for the B.E.S. Geography Requirements will be found under Geography Joint Honours Programmes.

Note 2
Students intending to qualify for the Type A Certificate for teaching high school must elect a minimum of nine courses in the specialist field (Anthropology is not a recognized specialist field).

Note 3
Students are advised to consult the undergraduate officers of both Departments before formulating their programme of study.

Minor in Asian Studies

To meet requirements for a minor in Asian Studies, a student must complete 5 credits from the following list of courses with a cumulative average of 65%. At least 3 of the credits must be from 3 different discipline areas of Anthropology, Sociology, Philosophy, Political Science, History, Religious Studies, and Chinese language and literature courses under the Arts listing. Courses in the minor cannot also count in the honours discipline.

Anth 236J Social and Cultural Change in South East Asia
Arts 190/191 Introductory Chinese
Arts 220R/221R Chinese Thought and Culture
Arts 290/291 Intermediate Chinese
Arts 320R/321R Special Topics in Chinese Thought and Culture
Arts 391/392 Classical Chinese
Arts 393/394 Taoism
Arts 395/396 Confucianism
Arts 397A/397B Directed Readings in Chinese Classic Literature
Hist 103/104 The Emergence of the Third World
Hist 269R History of Modern Revolution
Hist 282 East Asian History
Hist 354A Mao and the Chinese Revolution
Hist 440 Senior Seminar on Far East Asian History
Phil 385/386 Oriental Philosophy
P Sci 102 Imperialism in International Relations (section taught by A. Kapur)
P Sci 281/282 International Politics 1 and 2 (section taught by A. Kapur)
RS 110 Religions of Mankind 1
RS 211 Religion in Japan
RS 213 Hinduism
RS 214 Buddhism in India and South-East Asia
RS 215A Religion in China 1
RS 215B Religion in China 2
RS 216A Islam: "Religion Perfected""RS 216B Islamic Civilization
RS 269 Myths and Symbols of the Religions of India
RS 313 Modern Religious Movements in India
RS 314 Zen Buddhism
RS 334 Islamic Theology, Philosophy and Mysticism
RS 353 Ethics in Indian Thought
Soc 203 Introduction to Comparative Social Thought
Canadian Studies

The General Arts Degree (Canadian Studies)
A student takes fifteen courses with at least five of them in his major. The student would also take six courses in Canadian Studies (or seven if the French course is taken in Year one). Students would take Cd St 201/202 and 300 as part of the Canadian Studies package.

A Minor in Canadian Studies
The Minor consists of five courses, two of which would be Cd St 201/202 and Cd St 300, with the other three being selected from three different disciplines but all from designated Canadian Studies courses. A French language course is strongly recommended.

Honours Programmes in Canadian Studies
Recommended Programme

Year 1
A) 2 courses
English 101
History 123

B) 2 courses
Economics 101/102
Geography 101/102
Political Science 101/102
Introduction to Sociology 101

C) 1 course
A course given in French such as 151/152, 192, or 198/199. (A course in French language is strongly recommended. In rare circumstances, however, a student unable to fulfil this recommendation may be allowed to substitute a third course from the group B social sciences list above).

Year 2
Canadian Studies 201/202
The equivalent of three full courses in the student’s major subject one of which should specifically deal with Canada (see note 2).

The equivalent of one other full course chosen from among those specifically recommended for students concentrating their programme in Canadian Studies (see note 3).

Year 3
Canadian Studies 300
The equivalent of three full courses in the student’s major subject, one of which should specifically deal with Canada (see note 2).

The equivalent of one other full course chosen from among those specifically recommended for students concentrating their programme in Canadian Studies (see note 3).

Year 4
Canadian Studies 400
The equivalent of three full courses in the student’s major subject, one of which should specifically deal with Canada (see note 2).

The equivalent of one other full course chosen from among those specifically recommended for students concentrating their programmes in Canadian Studies (see note 3).

Note 1
Students may choose straight or double honours in History, Economics, Political Science, Geography, Urban and Regional Planning, Sociology, French, English or Anthropology. The student is granted, upon successful completion of the 22-course programme, an Honours B.A. in his major subject with the subtitle of Canadian Studies.

Note 2
Students following a double honours programme will normally take the equivalent of two full courses in each of their major departments, one of which in each case should be the principal Canadian course at the 200, 300, or 400 level.

Note 3
Each of the participating departments has designated its principal Canadian course at the 200, 300 and 400 levels but students may choose from among any of the Canadian content courses listed in Chapter 14 of the Calendar. Many 300 and 400 level courses have specific prerequisites and it is often desirable to use the electives to pursue work in a particular discipline. Students following double honours programmes should reduce the number of electives at each level by one.

Classical Studies (Department of Classics & Romance Languages)

(Latin, Greek, Classical Studies, Classical Civilization) General Programmes
Students choosing a three-year General programme in Latin must complete five Latin credits (or equivalent - normally not more than one of the five may be a Classical Civilization credit). Students choosing a three-year General programme in Greek must complete five Greek credits (or equivalent - normally not more than one of the five may be a Classical Civilization credit). Students choosing a three-year General programme in Classical Civilization must complete five Classical Civilization credits (or equivalent - normally not more than one of the five may be a Latin or Greek credit).
Note
Knowledge of neither Latin nor Greek is required to obtain a General degree in Classical Civilization.

Honours Programmes

Honours Classical Studies
Recommended Programme

<table>
<thead>
<tr>
<th>Year</th>
<th>Courses</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Greek 100, or Latin 100, or Latin 150&lt;br&gt;C Civ 101/102&lt;br&gt;Three additional credits</td>
</tr>
<tr>
<td>2</td>
<td>Latin 150, or one other credit in Latin at 200 level, or one credit in Greek at 200 level&lt;br&gt;C Civ 251/252, 265/266&lt;br&gt;Two additional credits</td>
</tr>
<tr>
<td>3</td>
<td>One credit in Greek or Latin at senior level&lt;br&gt;C Civ 271/272, 351/352&lt;br&gt;Two additional credits</td>
</tr>
<tr>
<td>4</td>
<td>Two credits in Classical Civilization&lt;br&gt;Three additional credits</td>
</tr>
</tbody>
</table>

Note 1
In the joint honours programme in Classical Studies, two credits out of eight must be from either Greek or Latin or both. Before graduation 22 full credits must be completed.

Note 2
Students are advised that History 340 is acceptable for Classics credit.

Joint Honours Classical Studies
Recommended Programme

<table>
<thead>
<tr>
<th>Year</th>
<th>Courses</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Greek 100 or Latin 100, or Latin 150&lt;br&gt;C Civ 101/102&lt;br&gt;Three additional credits</td>
</tr>
<tr>
<td>2</td>
<td>Latin 150, or one other credit in Latin at 200 level, or one credit in Greek at 200 level&lt;br&gt;C Civ 251/252, 265/266&lt;br&gt;Three additional credits</td>
</tr>
<tr>
<td>3</td>
<td>C Civ 271/272, 351/352&lt;br&gt;Three additional credits</td>
</tr>
<tr>
<td>4</td>
<td>One credit in Classical Civilization&lt;br&gt;Five additional credits</td>
</tr>
</tbody>
</table>

Drama and Theatre Arts Group

Note 1
In the single honours programme in Classical Studies, three credits out of ten must be either Greek or Latin or both.

Note 2
Students are advised that History 340 is acceptable for Classics credit.

Minor Programme
A minor programme is offered in Classical Civilization. Students interested in planning a sequence of five credits to complement their major field of study are encouraged to consult the Undergraduate Advisor in Classics. All minor programmes must be approved by the Division of Classics. Minor programmes in Greek and Latin are also available.

Drama and Theatre Arts Group General Programme

1) A total of fifteen courses (30 half courses) including Faculty of Arts Groups A, B, and C courses required with an overall cumulative average of at least C—and a cumulative major average of C.
2) At least six (twelve half courses) of the student’s courses must be in Drama and Theatre Arts.
3) Drama 101 is the required pre-requisite for most Drama and Theatre Arts courses.
4) In addition students must satisfy the following requirements:
   A) Drama 102
   B) Drama 243
   C) Three of Drama 251, 252, 253, 254, 255, English 362, 363, 190 (See Note).
   D) Drama 371 or Drama 372
   E) Drama 409
   F) Any four other Drama courses or other approved courses in related departments.
A student who has taken English 362/363 may not also take English 190.

Honours Drama and Theatre Arts

1) A total of twenty courses (forty half courses) including Faculty of Arts Groups A, B, and C requirements with an overall cumulative average of at least C— and a cumulative major average of at least B.
2) At least ten of the students courses (twenty half courses) must be in Drama and Theatre Arts.
3) Drama 101 is the required pre-requisite for most Drama and Theatre Arts courses.
4) In addition students must satisfy the following requirements:
   A) Drama 102
   B) Drama 243
   D) Drama 371 and Drama 372
   F) Drama 409
   G) Drama 499 (See Note 3).
   H) Any four other Drama courses or other approved courses in related departments.

Note 1
See Faculty of Arts requirements for other required classes.

Note 2
The Honours B.A. programme in Drama will enable the student to proceed towards the Ontario College of Education Type A Certificate provided at least two full courses in another teaching subject are acquired (see current calendar requirements).

Note 3
For a description of Drama 499 see Course Descriptions.

Joint Honours Programmes, Drama and Theatre Arts

1) Seven and a half of the student’s courses (fifteen half courses) must be in Drama and Theatre Arts.
2) Drama 101 is the required pre-requisite for most Drama and Theatre Arts courses.
Students in Year 1 are required to notify the department of their intention to go into either of the Chartered Accountancy or Management Accounting Options by December 15 of the IA term. However, those for the Applied Economics Option must notify their intention by March 15.

**Advanced Standing Examinations**
Early in the fall term the Department of Economics administers a test in Economics 101/102 for students who have completed Economics in Year 5 and also Economics 191/192 for students who have completed Accounting in Year 5. Any student who scores at least 70 per cent in either of these tests will be exempted, without any credit accumulated, from Economics 101/102 and/or Economics 191/192 respectively and may register for Economics 201/202 and/or Economics 291/292.

**General Economics**
Students proceeding to a General Arts degree with a major in Economics are required to take as part of their programme Economics 101/102 or 100a/100b, 201, 202, 231 plus either 211 or 221 and at least four half courses in Economics at the 300 level or above.

**Honours Programmes**

**Prerequisite**
It is desirable, but not mandatory, that students planning to enter Honours Economics should offer a minimum of one Ontario Year 5 credit in Mathematics or the equivalent.

**Honours Economics (Regular, Non Co-op)**
Twenty full-course credits are required for the degree. Of these, a minimum of nine full credits must be in Economics. The required Economics courses are Economics 101/102 or 100a/100b, 201, 202, 211, 211, 231, 301, 302, 401, 402. In addition students must select one of Economics 191, 241, and 263, and an additional half course in Economics from courses numbered above 300.

**Note**
It is recommended that students in Year 1 adopt the following program:
Economics 101/102 or 100a/100b,
Political Science 101, 102
English 109 or 150
Philosophy 140
Two electives

*Students without Ontario Year 5 Mathematics or equivalent should select Mathematics 101/102 as an elective.

**Honours Programmes with Special Options**

**Honours Economics with Applied Economics Option (Co-op)**
The required Economics courses are:
Economics 101, 102 or 100a, 100b, 191, 192, 201, 202, 211, 221, 231, 241, 263, 301, 302, 321, 401, 402, 421, 422. In addition students are required to do one additional half course numbered above 300.

**Note**
Students in this programme will be required to do a minimum of one full credit in Mathematics above the level of mathematics 101, 102 plus Statistics 500.

Twenty-two full course credits are required. The recommended first year course selection includes Economics 101, 102, 191, 192
Computer Science 112 and 115 or 180 and 150
English 109 or 150
Students without Ontario Year 5 Mathematics or equivalent should also select Mathematics 101, 102.

**Honours Economics with Chartered Accountancy Option (Non Co-op and Co-op)**
At the end of this programme the student will have completed all of the formal university training required by the Canadian Institute of Chartered Accountants. The other principal requirements for the C.A. certificate are a minimum of two years of work for a public accounting firm and successful completion of the Provincial Institute’s examinations. Twenty-two courses are required in order to receive the degree of Honours Economics with the C.A. option. The following are the required Economics courses.

**Analytical Economics:** Economics 101, 102, 201, 202, 211, 221, 231, 301, 302, 341.
**Principles of Accounting and Management:** Economics 191, 192, 193, 194, 291, 292, 293, 294, 391, 392, 393, 394, 491, 492, 493.

**Note**
Students are required to take one additional half course in Economics at the 300 level.
Honours Economics Management Accounting Option
(Non Co-op and Co-op)
Students specializing in management accounting can qualify for twelve R.I.A. exam exemptions, with an opportunity, while still enrolled at University, to write three H.I.A. Uniform National Examinations.

Twenty two courses are required for the degree.

The following are the required courses in Economics and Accounting:

Analytical Economics: Economics 101, 102, 201, 202, 211, 221, 231, 301, 302, plus two half courses numbered above 300.


In addition students will be required to take Management Science 44.

Joint Honours Programmes
The core courses in economics for any joint honours programme normally are: Economics 101/102 or 100a/100b, 201, 202, 211, 221, 231, 301, 302, 401, 402. At least one and a half other Economics courses (three half courses).

In addition, students must meet the requirements of the other department, as well as the Faculty of Arts Groups A, B, and C requirements. Selection of courses will be made with the assistance of the appropriate undergraduate officers. For Joint Honours Programmes, 22 courses are required.

Joint Honours programmes have been approved with Environmental Studies, Geography, German, Political Science, Sociology, Mathematics, and Russian.

The following notes pertain:

Note 1
Economics and Geography
The degree requirements of the Faculty of Arts must be met for the B.A. Degree and those of the Faculty of Environmental Studies for the B.E.S. Degree. Students must take Economics 221 or Environmental Studies 271 and the above core courses.

Note 2
Students are advised to consult the undergraduate officer of both Departments before formulating their programme of study.

Note 3
Economics and Political Science
Economics 263 must be taken along with the above core courses.

Note 4
Economics and Mathematics
Substitute Economics 311, 321 for Economics 211, 221. Economics 421, 422 to be included in the above core courses. Students in Years 1 and 2 may take this programme 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 programme must then be approved by the Economics Department or by an appropriate department of the Faculty of Mathematics.

Note 5
Economics and Sociology
Students may take either Economics 221 or Sociology 202.

Minor in Economics for Honours Students in other Departments
Economics 101/102 or 100a/100b, 201, 202, 231, either 211 or 221, plus two additional courses in Economics (four half courses).

English

General Programme
To fulfill the requirements for a General degree in English, a student must gain a total of 15 credits, of which at least 6 must be English Major credits, as follows:

1) 101 or 102 (or equivalent) (See Note 7)
2) 251 (Practice and Theory of Criticism) (See Note 2)
3) one credit from 310, 350, 362, 363 (Major Figures)
4) one credit from 305, 330, 373, 375, 410, 430, 451 (Language, and Periods of British Literature)
5) and 6) two other English Major credits (See Note 4)

Honours Programme: Regular
An English Honours student must earn a minimum of 20 credits before graduation, and these must include at least 10 English Major credits. These 10 credits, usually divided 1-3-3-3 among the four years, are as follows:

1) 101 or 102 (or equivalent) (See Note 7)
2) 251 (Practice and Theory of Criticism) (See Note 2)
3) one credit from 310, 350, 362, 363 (Major Figures)
4) one credit from 305, 330, 373, 375 (Language and Early Literature)
5) one credit from 305, 330, 340, 430, 451 (Periods of British Literature)
6) one credit from 202, 203, 204, 206, 211, 212, 230, 231, 232, 233 (Genres and Themes)
7) one credit from 313, 314, 315, 316, 415, 343, 344, 345, 346, 347 (North American Literature)
8) 9) and 10) three other English Major credits (See Notes 3, 4 and 5)
Honours Programme: Co-operative

The programme leading to the Degree of Bachelor of Arts in Honours English (Co-operative Programme) is designed for students who intend to enter careers in business, industry, government, or the communication media. Qualified students will ordinarily be admitted to the programme after completion of their first two academic terms at the University of Waterloo and will proceed through the Honours English B.A. Programme consisting of six further terms of study on campus and five paid work terms with participating employers in the media, business, government, and industry.

The academic requirements of the co-operative programme are essentially those of the regular Waterloo Honours B.A. in English.

Students who complete the programme will have had a total of twenty months of practical and relevant work experience for which they will have received payment. They will have been employed in areas in which they intend to pursue their careers. They will have had the opportunity to choose appropriate elective courses or groups of courses in areas relevant to their careers. Finally, they will have qualified for a University of Waterloo Honours B.A. Degree in English.

Joint Honours Programmes

An English Joint Honours student must earn at least 22 credits in all, of which at least 8 must be English Major credits, as follows:

1) 101 or 102 (or equivalent) (See Note 1)
2) 251 (Practice and Theory of Criticism) (See Note 2)
3), 4) and 5) one credit from each of three of the following categories:
   a) 310, 350, 362, 363 (Major Figures)
   b) 305, 373, 375 (Language and Early Literature)
   c) 330, 410, 430, 451 (Periods of British Literature)
   d) 202, 203, 204, 206, 211, 212, 230, 231, 232, 233 (Genres and Themes)
   6), 7), and 8) three other English Major credits (See Notes 3, 4, and 5)

Minor Programme for Students in Other Disciplines

Five English credits are required, as follows:
1) 101 or 102 (or equivalent) (See Note 1)
2) 251 or 150 and 151 (See Note 2)
3) one credit from 305, 310, 330, 350, 362, 363
4) and 5) two other English Major credits

Note 1
Although 101 or 102 is recommended for the first year, a student may gain an English Major credit from the following English courses instead of 101 or 102 without formal permission from the Department: 108, 190, 211, 212, 230, 231. A student may use only one English credit from courses at the 100-level to fulfill the minimum English requirements. Some English courses do not count as English Major credits; in other words they do not fulfill the English requirements for a degree in English (see English Undergraduate Course Descriptions).

Note 2
English 251 is strongly recommended for second year.

Note 3
An English Honours student must earn at least 6 English Major credits numbered 300 or above. English Joint Honours students must gain at least 4 English Major credits numbered 300 or above, and must maintain a minimum average of 70% (with no more than three half-course equivalent grades below B–) in the English component of their programmes together with an average of at least 75% in both areas of specialization combined. An English Honours student whose major average is below 74.5% at the end of the third year will normally be advised to graduate with a General degree, provided the requirements for it have been met.

Note 4
All students in Arts must earn a) the equivalent of one credit either in a language other than English or in a foreign culture, b) two credits from Group B, and c) one credit from Group C (see Degree Requirements, p. 82). The Department of English recommends Classical Civilization 265 and 266 in addition.

Students in the General Programme must gain either a) a minimum of 8 credits beyond the 100-level, or b) credits from no more than 7 subject fields.

Note 5
English Honours students should confer with their advisors in order to draw up programmes that fulfill official requirements and satisfy the students' own needs and interests as well. For example, students who plan to go on to graduate work would be wise to choose the following English courses: 101; 251; 362/363; 373; 305 or 310; two of 410, 430, 451, 460; one pair from among 211/212, 230/231, 232/233, 343 and one of 313/314/315/316; 330 or 350. These students might also choose to take 400; or two more courses from 305, 310, 330, 350, 410, 451, 460; or one of the above and two of 344/345/346/347. On the other hand, students who plan to teach high school are advised to take: 101; 251; 373 or 375; 362/363; one of 330, 410, 430, 461; one pair from among 211/212, 230/231, 232/233, 343/344; two of 313/314/315/316; 415; 400; one more from 305, 310, 330, 350, 373, 375, 410, 430, 451, 460.
Fine Arts (Art)

General Programme
15 credits
A & B requirements 4 credits
120/121 & additional 2 half study courses 2 credits
110/111 & additional 2 half art history courses 2 credits
4 half courses at 3rd year level of which 2 half courses
are studio and 2 half courses are art history 2 credits
electives 4 credits

Note
Fine 390, 391, 392, 393 may be taken only as electives.

Honours Programme (Studio Option)
20 credits
A, B, and C requirements at least 5 credits
120/121, 224/225, 324 plus
3 half courses in drawing 4 credits
110/111 and 6 additional half courses
in art history 4 credits
Of these six half courses:
one (1) from 212, 213, 216, 217
two (2) from 210, 211, 214, 215, 316, 317
319 and one from 313, 319A, 319B
4 half courses in major area of printmaking, painting,
sculpture, or additional drawing including
490/491 2 credits
electives 5 credits

Honours Programme (Art History Option)
20 credits
A, B, and C requirements at least 5 credits
120/121, and 2 additional studio half courses 2 credits
110/111 and 12 additional half courses in art history.
Of these 12 half courses:
three (3) from 212, 213, 216, 217
three (3) from 210, 211, 214, 215, 316, 317
390A and two from 313, 319, 319A, 319B 7 credits
490/491 1 credit
electives 5 credits

Note
310/311 are particularly recommended.

Honours Programme (Film Studies Option)
20 credits
A, B, and C requirements at least 5 credits
120/121, 120/121 2 credits
470/471, 490/491 2 credits
10 half courses in film history; the following six half
courses are required: 5 credits
244/245, 370/371, 344/345
electives 6 credits

Note
One full course in film-making is recommended for
students taking the Film Studies Option. Other film
history courses available on campus are strongly
recommended.

To graduate with an Honours degree in Fine Arts, it is
necessary to complete Fine Arts 490/491. Admission to
this course is by portfolio or art history presentation,
submitted after successfully completing 3rd year. This is
to ensure that students are capable of carrying out their
proposed course of study.

All other 4th year courses are open to students who
have completed 3rd year courses or are otherwise qualified.

Note
Fine 390, 391, 392, 393 may be taken only as electives.

Fine Arts (Music)

Requirements for Fine Arts General Programme in
Music
To fulfill the requirements for a general degree in Fine
Arts in Music, students must take an equivalent of 14
half courses in Music including 150G/151G, 250G/251G, 254G/255G, and 351G/352G. Besides,
students must demonstrate competence on one
instrument (including voice) equal to Grade 10 standing
at the Toronto Conservatory of Music. The remaining
music courses must be selected in consultation with the
Music Faculty.

Requirements for Fine Arts Minor Programme in Music
A minor programme in Music requires 10 half courses in
Music including 150G/151G, 2 of 254G, 255G, 351G or
352G plus any 6 other half courses including the option
of Music Studio in voice, piano, woodwind, etc.

French (Department of Classics and
Romance Languages)

General Programme in French
Students in the three year general programme in French
must complete six credits in French of which at least
three full credits are on the 300 or 400 levels.

Honours Programme in French
Students in the honours programme in French must
complete before graduation the equivalent of ten
credits in French of which at least six full credits are on
the 300 or 400 levels.
Recommended Programme

Year 1
French 191
Four more credits

Year 2
A minimum of French 250H or its equivalent, French 231, French 253, French 274, plus another half credit in French
Two more credits

Year 3
A minimum of French 300 or its equivalent, French 342, French 363, French 375, plus an additional half credit in French
Two more credits

Year 4
A minimum of French 401/402 or their equivalent, plus two additional credits in French
Two more credits

Note 1
To establish a Minor in a sister discipline, the student must complete five full credits (or equivalent) in that discipline.

Note 2
With the permission of the department, the student may spend the third year enrolled in an acceptable university in France or in the Province of Quebec.

Note 3
A total of 20 credits must be successfully completed before graduation.

Note 4
Students in Year 4 must have the permission of the department to enrol in French courses on the 100 or 200 level.

French in Joint Honours Programmes
The Department of Classics and Romance Languages recognizes combined honours programmes in French and the following disciplines:

- Classical Studies: Philosophy
- English: Political Science
- German: Psychology
- History: Russian
- Latin: Sociology
- Mathematics: Spanish

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

Students registered in a joint honours programme involving French must complete the equivalent of eight credits in French (in the case of Political Science only seven credits are required) of which at least 4 credits in French are on the 300 or 400 levels.

Recommended Programme

Year 1
French 191
Four more credits

Year 2
A minimum of French 250H or its equivalent, French 231, French 253, French 274, plus another half credit in French

Year 3
A minimum of French 300 or its equivalent, French 342, French 363

Year 4
A minimum of French 401/402 or their equivalent, plus two additional credits in French

Note 1
A total of 22 credits must be successfully completed before graduation.

Note 2
Students in Year 4 must have the permission of the department to enrol in French courses on the 100 or 200 level.

Minor Programme in French
A minor programme in French will consist of five credits in French Language and/or Literature. Students must demonstrate written and oral ability in French equal to that expected in French 300.

Geography

Admission to the programmes in Geography in the Faculty of Arts is gained in second year. Those interested should ensure that they take the appropriate Geography courses in first year. Admission to the Geography programmes in the Faculty of Arts is competitive and will be limited to 25 per year. Participants in Geography programmes will not normally be permitted to switch faculties after they have entered second year.
General Geography

Year 1
Geog 102 Introduction to Physical Geography
Geog 110 Tutorial in Geography
and one but no more than two of:
Geog 101 Introduction to Human Geography
Geog 125R Introduction to the "Third World"
Geog 126R Development in the "Third World"
Geog 127 Regional Problems of Europe
Env St 195B Introduction to Environmental Problems
Additional courses should be selected so that the student has 5 full credits by the end of Year 1.

Year 2
Env St 200 Field Ecology
Geog 201 Some Basic Topics of Climatology and Geomorphology
Geog 202 Some Basic Topics of Economic and Urban Geography
and one of:
Geog 203 Some Basic Topics of Cultural and Regional Geography
Geog 204 Soviet Union
Geog 205 Africa
Geog 220 World Regional Geography
Additional courses should be selected so that the student will have completed 10 credits by the end of Year 2.

Year 3
Geog 381 The Nature of Geography
Additional courses should be selected so that the student will have completed 15 credits in all, of which 5 are in Geography/Environmental Studies, by the end of Year 3.

Note 1
A student must complete at least 4 credits in courses designated as Geography courses (i.e., Calendar pages 311-317).

Honours Geography

Year 1
Geog 102 Introduction to Physical Geography
Geog 110 Tutorial in Human Geography

and one of but no more than two of

Geog 101 Introduction to Human Geography
Geog 125R Introduction to the "Third World"
Geog 126R Development in the "Third World"
Geog 127 Regional Problems of Europe
Env St 195B Introduction to Environmental Problems

Additional credits should be chosen after consultation with the department so that the student has 6 full credits.

Art
Departmental Programmes
Geography

Year 2
Env St 200 Field Ecology
Geog 201 Some Basic Topics of Climatology and Geomorphology
Geog 202 Some Basic Topics of Economic and Urban Geography
Geog 260 Introduction to Cartography and Map Analysis
Geog 275 Introductory Air Photo Analysis and Remote Sensing
Env St 271 Introduction to Quantitative Research Methods

and one of

Geog 203 Some Basic Topics of Cultural and Regional Geography
Geog 204 Soviet Union
Geog 205 Africa
Geog 220 World Regional Geography

and additional credits so that a student should have completed by end of the second year, 11 full credits.

Year 3
Geog 381 The Nature of Geography
Geog 390 Senior Honours Essay Research Proposal
Geog 391 Field Research

and one of

Geog 316 Multivariate Statistics
Geog 317 Nonparametric Statistics
Geog 318 Spatial Analysis
One credit of Geography electives.
Two credits chosen after consultation with the Department.

Year 4
Geog 490 Seniors Honours Essay
and additional credits so that a student should have a minimum of 21 full credits, of which at least 9 are in Geography/Environmental Studies.
For additional information see Note on p. 80.

Note 1
A student must complete at least 7 credits in courses designated as Geography courses (i.e., pp. 311-317).
Geography Joint Honours Programmes

The Department of Geography offers Joint Honours Programmes in conjunction with a number of other departments across the campus. The Bachelor of Arts degree with joint honours will be awarded to students registered in the Faculty of Arts who meet the general requirements of that faculty in addition to the specific requirements of the Joint Honours Programmes approved by the Department of Geography and the Departments of Anthropology, Canadian Studies, Economics, English, French, History, Germanic and Slavic Languages, Mathematics, and Political Science. The Bachelor of Environmental Studies degree will be awarded to students registered in the Faculty of Environmental Studies who pursue a similar course of study and who meet the general requirements of that Faculty.

The Department of Geography is prepared to work out other programmes for keenly interested students who otherwise meet Honours standards.

Students enrolled in Joint Honours Programmes are required to obtain at least seven course credits in Geography: students intending to qualify for the Type A Certificate for teaching secondary school require a minimum of nine credits in Geography, or if offering 2 subjects, 14 credits in those subjects, of which a minimum of six must be offered in each subject.

Course requirements for the Joint Honours Programme are identical with those of the Geography Honours programme above with the exception that where both Departments participating in the programme require courses of similar content, a student shall meet that requirement in one Department only. This might be expected to apply in the case of technique courses, field research and the Senior Honours Essay; students should obtain clarification from the Undergraduate Officers of the respective departments before registration.

Completion of this programme will lead to the Bachelor's degree of the Faculty in which the student is registered and students should ensure that they meet all other requirements of that Faculty.

German

Note
During the first two years German courses are divided into two streams which allow for sequential development.

The two streams (A and B) are arranged according to a student's background in the language.

Stream A
Students with little or no knowledge of German

First Year
German 101/102, or
German 105/106, or
German 111/112

Second Year
German 201/202, or
German 211/212
German 231/232

In third year both streams merge, although Stream A students may take Stream B courses at the 200 level.

Honours German

Year 1
German 101/102, 121/122 or 151/152
Four additional full courses

Year 2
Three full courses in German
Two additional full courses

Year 3
Three full courses in German
Two additional full courses

Year 4
Three full courses in German
Two additional full courses

Note 1
Before graduation students must complete the Group A, B and C requirements listed on page 83.

Note 2
A minimum of 20 full courses must be successfully completed before graduation, of which 10 full credits must be in German.
Note 3
With the permission of the department the student may spend one of the senior years at a university of a German-speaking country, preferably at the University of Mannheim in the Departmental Programme.

Waterloo in Germany Programme
The Department offers a yearly programme of studies at the University of Mannheim on the Rhine. The programme is open to students entering third and fourth 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 (Oct. 15 to Feb. 15) is April 1. The application deadline for those who wish to begin their studies in the Summer Semester (Apr. 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.

German Joint Honours Programmes
English and German
Economics and German
French and German
German and Classics
German and Drama
German and Environmental Studies
German and History
German and Mathematics
German and Political Science
German and Russian
Philosophy and Literature (German)
German and Geography

Other joint honours programmes may be arranged by consultation between the student and the departments concerned.

Note 1
A student in a Joint Honours Programme must complete a minimum of 22 full credits before graduation, including eight full credits in German.

General Programme in German
Students choosing a three-year general programme in German must complete six full credits in German before graduation.

Greek (Department of Classics and Romance Languages)

Minor Programme
A minor programme is offered in Greek. Students interested in planning a sequence of five credits to complement their major field of study are encouraged to consult the Undergraduate Advisor in Classics. All minor programmes must be approved by the Division of Classics.

Note 1
All Honours History candidates must complete 10 full History courses with a B average, as follows: normally one Introductory History course, plus at least eight Honours History (or programme) courses, and one other History course (which may be either a programme or non-programme course). History 250 is highly recommended. The Honours History courses must be selected to ensure development and breadth. To ensure development they must include at least four courses in the 300 and 400 range, at least two of which must be Senior Seminars. To ensure breadth they must include at least one full course from each of the columns as follows:

<table>
<thead>
<tr>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
</tr>
</thead>
<tbody>
<tr>
<td>251/252</td>
<td>262/264</td>
<td>266</td>
<td>277</td>
</tr>
<tr>
<td>258A/258B</td>
<td>269R</td>
<td>266</td>
<td>282</td>
</tr>
<tr>
<td>260</td>
<td>355/356</td>
<td>267A/267B</td>
<td>291</td>
</tr>
<tr>
<td>340</td>
<td>357/358</td>
<td>268A/268B</td>
<td>354A/354B</td>
</tr>
<tr>
<td>343G/344G</td>
<td>359/360</td>
<td>273</td>
<td>370</td>
</tr>
<tr>
<td>347G/348G</td>
<td>362</td>
<td>275</td>
<td>372</td>
</tr>
<tr>
<td>363</td>
<td>364A/365R</td>
<td>295</td>
<td>374G</td>
</tr>
<tr>
<td>Classics 365/366</td>
<td>366A/366B</td>
<td>352</td>
<td>390</td>
</tr>
<tr>
<td>361</td>
<td>368</td>
<td>381A/381B</td>
<td>394</td>
</tr>
<tr>
<td>363</td>
<td>368B</td>
<td>382</td>
<td></td>
</tr>
<tr>
<td>395</td>
<td>369</td>
<td>386/387</td>
<td></td>
</tr>
<tr>
<td>397</td>
<td>388</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>389</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>392</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>393</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Note 2
In addition to the departmental requirements for history courses, candidates must also have completed, preferably by the end of 3rd year, the Faculty of Arts Groups A, B, and C requirements with the following variation; one non-history course in humanities (A) must be above the 1st year level. The foreign language substitute (culture course) is considered to be at 1st year level. Also, students who plan to enter graduate school are strongly advised to develop facility in a language other than English.

Note 3
Graduation in this programme qualifies a student for admission to the Type A course in History at a College of Education in Ontario.

Note 4 - Minor
It is possible for Honours students from another faculty or Arts discipline to take a minor in History. A minor consists of 5 History courses, of which one must be a Level 2 programme course and not more than one may be at the 100 level.

History Joint Honours Programmes
1) An introductory History Course (preferably a Level 1 programme course).

2) Four Honours History courses selected from the 200 or 300 range in consultation with a department advisor. These courses must be selected from at least two of the ABCD columns (see above, "Honours History, Note 1"), and at least one of them must be in the 300 range.

3) Two Senior Seminars (History 400-455).

4) A minimum of 22 courses are required for all joint honours programmes with History. The A, B and C requirements of the Faculty of Arts must be fulfilled.

Combined programmes presently exist with Philosophy, Geography, German, Russian, English, Political Science, Sociology, Anthropology, Religious Studies, Classics, Fine Arts, Psychology, and French. The History Department is prepared to consider others for keenly interested students who otherwise meet Honours standards.

Not all joint Honours programmes fulfill the Ministry of Education’s requirements for a Type A certificate. Students should consult with the departmental advisor.

Italian (Department of Classics and Romance Languages)

Minor Programme
A minor programme in Italian is available. Interested students should see the Advisor for Italian at St. Jerome’s College.

Latin (Department of Classics and Romance Languages)

Honours Latin
Recommended Programme

<table>
<thead>
<tr>
<th>Year</th>
<th>Courses</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Latin 100 or 150, One Classical Civilization credit, Three additional credits</td>
</tr>
<tr>
<td>2</td>
<td>Two credits in Latin (or equivalent), One Classical Civilization credit, Two additional credits</td>
</tr>
<tr>
<td>3</td>
<td>Two credits in Latin (or equivalent), One Classical Civilization credit, Two additional credits</td>
</tr>
<tr>
<td>4</td>
<td>Two credits in Latin (or equivalent), Three additional credits</td>
</tr>
</tbody>
</table>

Note
Before graduation, it is recommended that students complete Latin 251/352. Normally not more than three Classical Civilization credits are permitted to complete the total of ten credits required for Honours Latin.

Joint Honours Latin
Students choosing a Joint Honours programme involving Latin must complete the equivalent of eight credits in Latin (normally not more than two Classical Civilization credits are permitted to complete the total of eight credits required for Joint Honours Latin). Before graduation 22 full credits must be completed; it is recommended that students complete Latin 251/352 before graduation.

Minor Programme
A minor programme is offered in Latin. Students interested in planning a sequence of five credits to complement their major field of study are encouraged to consult the Undergraduate Advisor in Classics. All minor programmes must be approved by the Division of Classics.
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 B.A. in Medieval Studies. Such a degree is designed to provide a general awareness of our cultural heritage. In addition, the programme is flexible enough to prepare students for careers in teaching, or for the pursuance of a graduate degree.

The Medieval Studies Programme is administered jointly by the English Department at St. Jerome's College (Dr. D. Letson) and by the Department of Classics and Romance Languages (Dr. P. Forsyth). Interested students may call or write either of these advisors for further information.

The General Programme
For the core of a Medieval Studies Programme, each student must take seven credits from a list of approved courses; including at least one credit from each of four of the eight subject fields specified.

The Honours Programme
For the core of the Medieval Studies Programme, each student must take eight credits from a list of approved courses; including at least one credit from each of five of the eight subject fields specified.


Peace and Conflict Studies

Peace and Conflict Studies ("PACS") is an interdisciplinary programme of study which may be chosen by students in conjunction with a major in some other department. It provides a course of study for those who have a special interest in the causes and conditions of international, inter-group, or interpersonal conflict, and in approaches to conflict resolution or management. The PACS option 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 programme is administered by Conrad Grebel College in co-operation with participating departments in the University of Waterloo. The participating departments presently include Anthropology, History, Philosophy, Political Science, Psychology, Religious Studies, and Sociology.

Program Options

There are three different options open to students participating in the PACS Programme: 1) General Program, 2) Honours, and 3) Minor. Successful completion 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 Programme will take the PACS Core Courses as well as a specified number of "PACS Content Courses" offered by their own and other departments. In every case students must fulfill all the requirements for the major in their own department.

1) The General Arts Degree (Peace and Conflict Studies)
In addition to fulfilling the requirements for the major (normally including at least five full credits in the major field), the general arts student must meet the following PACS requirements:
a) PACS 201, 202, 301, and 302
b) Three full credits chosen from the PACS Content Courses offered by either the department in which the student majors, or any other departments.

The general arts degree option in Peace and Conflict Studies is available to those majoring in any department in the Faculty of Arts, including non-participating departments. (See note)

2) Honours Programme (Peace and Conflict Studies)
A student may choose straight or joint honours in any of the participating departments. The student is granted, upon completion of his 22-credit programme (23-credit if joint honours), an Honours B.A. in his subject area with the subtitle Peace and Conflict Studies.

In addition to fulfilling the degree requirements in his department, each student must meet the following PACS requirements in his 4-year period of study:
a) PACS Core Courses 201, 202, 301, 302, 498, 499.
(The PACS 498 requirement may be met by the successful completion of any Honours Research Course 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) Three full credits chosen from among the PACS Content Courses offered by the student's department (four full credits if joint honours). These courses may also be used to meet the department's honours requirements if approved as such by the department. (See note 1).
c) One and one-half credits chosen from among the PACS Content Courses offered in any department. (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 five full credits chosen from among the courses approved for PACS credit in any department, and must include PACS 201, 202, 301, and 302.

Note
Each of the participating departments has designated certain course offerings as Peace and Conflict Studies content courses. These courses are listed in Chapter 14 of the Calendar. 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.

Philosophy

General Degree in Philosophy
fifteen full courses of which five must be in Philosophy including:
   a) one of 140, 145, 241, 242, 243, or 340
   b) 221
   c) one full course equivalent from 280/281, 282/283, 284/285, or 390/391

Students registered at St. Jerome’s in General Philosophy must take fifteen full courses of which five must be in Philosophy including:
   a) one of 200J, 140, 145, 241, 242, 243, or 340
   b) 218J, or 221
   c) one full course equivalent from 280/281, 282/283, 284/285, or 390/391

Minor
five full course equivalents in Philosophy approved by the Department

Honours Degree in Philosophy
twenty full courses are required of which ten must be in philosophy including:
   a) one of 241, 242, 243, or 340
   b) 221/222
   c) 280/281, 282/283
   d) 499

Students registered at St. Jerome’s in Honours Philosophy must take twenty full courses ten of which must be in Philosophy including:
   a) one of 241, 242, 243, or 340
   b) 218J, or 221, and 222
   c) 280/281, and 282/283
   d) 499J or 499
   e) College students are expected to take 450J

Philosophy Joint Honours Programmes
these usually consist of seven full courses in Philosophy and seven full courses in the other subject. A total of twenty-two courses is required. The Philosophy courses ordinarily include:
   a) one or two of 140, 241, 242, 243, or 340 (depending on the Programme)
   b) 221/222
   c) 280/281, 282/283
   d) a Philosophy course which is relevant to the other subject (e.g. Aesthetics for Philosophy and English)
   e) A senior honours essay is written in either Philosophy 499 or in the other subject.

   There are currently joint honours programmes in Philosophy and the following: Economics, English, History, Literature (French, German, or Russian), Mathematics, Political Science, Psychology, Religious Studies, and Sociology.

   The Undergraduate Advisor in Philosophy should be consulted for details of these and other Philosophy programmes.

   Students registered at St. Jerome’s in a Philosophy Joint Honours Programme may substitute St. Jerome’s Philosophy Courses in the same way as for the Philosophy Honours Programme.

Political Science

While students in Arts do not choose a major until the end of the first year, many have some idea of the area in which they wish to study. Those students who intend to major in Political Science may wish some guidance in the selection of the first year courses. The Department would recommend the following programme for such students:

Political Science 101/102
Economics 101/102 or Economics 100a/100b
Sociology 102/205
History - the equivalent of one credit
One other credit, chosen from Group A

   By no means should the above recommendations be considered mandatory: while these courses constitute, on the whole, the best overall background for the study of politics, students who wish to pursue interests in other disciplines are free to do so.

   The Department of Political Science offers a series of undergraduate programmes designed to meet the needs of students with varying interests. Requirements for each programme 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
9 - reserved for special courses not dealing with a particular field of the discipline.

1) General Programme
Students choosing a three-year General programme in Political Science will normally complete, before graduation, the equivalent of five full courses in Political Science beyond the 100 level, of which there must be at least one-half credit from each of four different fields of the discipline as defined above. At least two credits must be taken at the 300 level or higher.

2) Honours Programme
Students choosing an Honours programme in Political Science must complete, before graduation, the equivalent of nine credits in Political Science beyond the 100 level, of which four must be from different fields of the discipline as defined above. At least two credits must be taken at the 400 level.

Honours Political Science
Recommended Programme

Year 1
Political Science 101/102
The equivalent of four other credits

Year 2
The equivalent of three credits in Political Science
(see note)
The equivalent of two other credits

Year 3
The equivalent of three credits in Political Science
(see note)
The equivalent of two other credits

Note
Among the nine Political Science credits above the 100 level, students must select four credits from the different fields of the discipline and two credits must be taken at the 400 level.

Honours Political Science
(Administrative Studies Option)

This programme consists of courses which would ordinarily lead to an Honours degree in Political Science, together with the following core courses:

1) Economics 101/102 or Economics 100a/100b
2) Economics 191
3) Economics 192
4) Psychology 333 or Management Science 44 or Sociology 231
5) English 210

An Honours Programme with the Administrative Studies Option, in addition to the core courses, must include:

1) The equivalent of at least three credits in Political Science beyond the 100 level, selected from courses which have been designated as Administrative Studies courses by the Department; and
2) The equivalent of at least two credits beyond the 100 level not in Political Science, selected from courses which have been designated as Administrative Studies courses by the Department.

Various Continuations of Honours Political Science
(Administrative Studies Option) after Year 1

Year 2
1/2 credit
1/2 credit
3 credits
Economics 191
English 210
from the major subject, one of which must be in a designated Administrative Studies course electives.

Year 3
2 credits
Total 6 credits
Arts
Departmental Programmes
Political Science

3) Co-operative Programme in Honours Political Science

The programme leading to the Degree of Bachelor of Arts in Honours Political Science (co-operative programme) 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 programme after completion of their first two academic terms. The programme consists of six further academic terms and a minimum of four paid work terms with participating employers.

The academic requirements of the co-operative programme are identical with those of the regular Honours programme in political science. The programme is open to students enrolled in either the regular Honours Political Science programme or Honours Political Science (Administrative Studies Option).

The first work term of the co-operative programme occurs after the successful completion of Year 2 courses. At the beginning of the third year students will have the option of either continuing the pattern of alternating work terms or working for a full year basis before returning to campus for the last two academic terms.

4) Joint Honours Programme

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 programme.

It is possible to combine the Political Science joint honours requirements (see Chapter 7) with the requirements made by Anthropology, Economics, English, French, Geography, History, Man-Environment, Philosophy, Psychology or Sociology. In a joint honours programme involving a Department in another Faculty, as in the Political Science and Man-Environment programme, students will fulfill the degree requirements of the Faculty in which they are registered. For a joint honours programme in any other discipline, please consult the Political Science Department and the other department concerned.

Students choosing a joint Honours programme involving Political Science must complete, before graduation, the equivalent of six credits in Political Science beyond the 100 level of which there must be at least one-half credit from each of four different fields of the discipline as defined above.

Political Science Joint Honours Programme
Recommended Programme

Year 1
Political Science 101/102
Introductory course in the other discipline
The equivalent of three other credits

Year 2
The equivalent of two credits in Political Science (see note)
The equivalent of two credits in the other discipline
The equivalent of two other credits

Year 3
The equivalent of two credits in Political Science (see note)
The equivalent of two credits in the other discipline
The equivalent of two other credits

Year 4
The equivalent of two credits in Political Science, at least one of which must be at the 400 level (see note)
The equivalent of two credits in the other discipline
The equivalent of one other credit

Note
Among the six Political Science credits above the 100 level, students must select at least one-half credit in each of four different fields of the discipline. For further information on this please consult the Department.
Joint Honours Political Science
(Administrative Studies Option)

The programme consists of the successful completion of courses which would ordinarily lead to a Joint Honours degree in Political Science and another discipline and the following core courses:

1) Economics 101/102 or Economics 100a/100b
2) Economics 191
3) Economics 192
4) Psychology 333 or Management Science 44 or Sociology 231
5) English 210

In addition a Joint Honours Programme with the Administrative Studies Option must include:

1) The equivalent of at least two credits beyond the 100 level in each of the student's major subjects selected from courses in those subjects which have been designated as Administrative Studies courses by the Department; and
2) The equivalent of at least two credits beyond the 100 level not in either of the student's major subjects selected from courses which have been designated as Administrative Studies courses by the Department.

Various Continuations of Joint Honours Political Science (Administrative Studies Option)

<table>
<thead>
<tr>
<th>Year 2</th>
<th>1/2 credit</th>
<th>1/2 credit</th>
<th>4 credits</th>
<th>1 credit</th>
<th>Total 6 credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Economics 191</td>
<td>English 210</td>
<td>two in each of the major subjects; one of each major subject must be an Administrative studies course</td>
<td>elective</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Year 3</th>
<th>1/2 credit</th>
<th>1/2 credit</th>
<th>4 credits</th>
<th>1 credit</th>
<th>Total 6 credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Economics 192</td>
<td>Psychology 333 or Sociology 231 (unless Management Science 44 is to be taken in Year 4)</td>
<td>two in each of the major subjects; one of each major subject must be an Administrative Studies course</td>
<td>elective, chosen from designated Administrative Studies courses not in the major subjects</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

5) Minor Programme

Any student in an honours programme may qualify for a minor in Political Science by completing the equivalent of 5 credits in Political Science before graduation with a cumulative average of 65 (C) or better. Courses must be selected to meet the following requirements:

a) at least one half credit in each of three different major subjects;
b) the equivalent of at least one credit above the 200 level.

Students interested in a minor in Political Science are advised to consult with the Department's Undergraduate Officer. In addition, it is now possible for students in co-op studies in Arts, Mathematics, Science, Engineering, or Recreation to add a wide range of Political Science courses to their programmes.

Note

Students who have completed no fewer than six credits in Political Science in a joint honours programme or 9 credits in Political Science in an honours Political Science programme are now eligible to enter studies leading to an Ontario secondary school 'Type A' teaching certificate in Political Science.

Graduate Programme

The Department of Political Science offers a programme leading to the degree of Master of Arts. The programme consists of the equivalent of two full courses and a thesis, or the equivalent of three full courses and a cognate essay, or four full credits. Highly personalized, flexible instruction is also offered in the form of reading courses. For more information, please consult the Graduate Calendar or the Political Science Department.
Psychology

**General Programme**
Students choosing a three-year General programme in Psychology must complete Psychology 101, 102, 201, 301, a minimum of three additional Psychology credits, and of the remaining ten credits, a minimum of eight credits in Departments other than Psychology (see also the Arts Faculty General Programme requirements).

**Honours Programme**
Students choosing the Honours programme in Psychology must complete, before graduation, the equivalent of nine credits in Psychology. Before entering the fourth year of the programme, all students must complete Psychology 201, 202, 301 and one research half credit from each of the following groups:

- Group 1: 293, 295, 297
- Group 2: 393, 395, 397

In the fourth year, all students must complete Psychology 498 or 499. A recommended programme is outlined below.

### Recommended Programme

- **Year 1**
  - Psychology 101/102
  - The equivalent of four additional credits.

- **Year 2**
  - Psychology 201/202
  - The equivalent of one credit in Psychology (see note 1)
  - The equivalent of three additional credits

- **Year 3**
  - Psychology 301
  - The equivalent of two and one half additional credits in Psychology (see note 1)
  - The equivalent of two additional credits

- **Year 4**
  - Psychology 498 or 499
  - The equivalent of two additional credits in Psychology (see note 2)
  - The equivalent of two additional credits

### Note 1
Honours students are required to complete one research half credit from each of the following groups before entering the fourth year of the programme.

- Group 1: 293, 295, 297
- Group 2: 393, 395, 397

### Note 2
Honours students should include at least two fourth-year seminars in their programme.

---

Honours Psychology with Early Childhood Education and Care Option
Students choosing the Honours Psychology Programme with Early Childhood Education and Care Option fulfill all the requirements listed under the Honours Programme above. In addition, students must be accepted into the option at the beginning of the third year and must have completed the following courses prior to the fourth year: Psychology 101, 201, 202, 203 or 207, 211, 212, 293 or 295, 301, 311, 312, 321, 341, 393, Health Studies 140, and Recreation 200. In the fourth year students must complete Psychology 421, 453, 498 or 499, Dance 364, Health Studies 345 and Sociology 216. Before graduation each student must complete a minimum of twenty-two credits. Of these twenty-two credits a minimum of nine credits must be in Psychology with letter grades (Psychology 321 and 421 are offered on a Credit-Fail basis only).

At the end of this programme the student 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.

### Recommended Programme

- **Year 1**
  - Psychology 101/102
  - The equivalent of four additional credits

- **Year 2**
  - Psychology 211/203 or 207
  - Psychology 212/312, 201/202
  - Health Studies 140
  - The equivalent of two and one half additional credits

- **Year 3**
  - Psychology 301, 311/341, 321
  - Psychology 393/293 or 295
  - Recreation 200
  - The equivalent of two additional credits

- **Year 4**
  - Psychology 421
  - Psychology 498 or 499
  - Psychology 453/Dance 364
  - Health Studies 345
  - Sociology 216
  - The equivalent of one additional credit

### Note
Students must obtain a minimum of 9 Psychology credits with letter grades to meet the requirements for the honours degree. Psychology 321 and Psychology 421 are offered on a Credit-Fail basis only.
Psychology Joint Honours Programmes
Students choosing a Joint Honours Programme involving Psychology must complete the equivalent of seven full credits in Psychology and an Honours thesis course. Unless other arrangements are approved by the Department, all students in Joint Honours Programmes must complete the following courses before entering the fourth year.

Psychology 201, 202, 301 and one research half credit from each of the following groups:

Group 1: 293, 295, 297
Group 2: 393, 395, 397

In the fourth year, all students must complete Psychology 498 or 499, or the Honours Thesis course in the related discipline.

Joint Honours programmes other than those already approved may be arranged by consultation with the Psychology Department and the Department concerned.

Approved joint honours programmes presently exist with Anthropology, Classical Studies, Drama, Economics, English, French, Geography, German, History, Man-Environment, Mathematics, Philosophy, Political Science, Religious Studies, Russian, Social Development Studies, Sociology, Spanish and Statistics.

Honours Psychology with a B.Sc. Degree
An Honours Psychology degree programme is also available in the Faculty of Science. See Chapter 13.

Minor Programme
The Department offers a minor programme in Psychology. Any student interested in planning a sequence of five credits to complement his/her major field of study is encouraged to consult the Undergraduate Officer. All minor programmes must be approved by the Department.

Religious Studies
Purpose of the Programme in Religious Studies:

a) to expose the student 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 him 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 him to the distinctive features of one or more religious traditions and to the methods for their systematic study.

A) General in Religious Studies
Students majoring in Religious Studies must have their programmes approved by the undergraduate officer. Each student is required to take any 100-level R.S. course in the first year and two R.S. courses in each of the two subsequent years. One of these courses must be R.S. 200 and at least three of the five required R.S. courses should be above the 100-level. These courses should be selected from at least two of the following four main categories of approaches to the study of religious phenomena (the decade grouping of the numbering scheme will guide the student in making this selection):

Course Categories and Numbering Scheme
1) Studies in Religious Texts 00-09
2) Studies in the History of Religions
   A) 10-19 History of Religions
   B) 20-29 History of the Christian Church
3) Theological-Philosophical Studies
   A) 30-39 Theological
   B) 40-49 Philosophical
   C) 50-59 Ethics
4) Cultural Studies
   A) 60-69 Religion and Culture
   B) 70-79 Religion and the Social Sciences

B) Honours Religious Studies

Year 1
Any five first-year courses that meet the general requirements of the Faculty of Arts and include one of the following full-course equivalents in R.S.:
103/104, 110/111, 130/131, or 160/161

Years 2, 3 and 4
R.S. 200, which is a requirement for all students majoring in Religious Studies, plus eight other full R.S. courses (or the equivalent) and six electives.
The R.S. courses are to include:

a) Two full courses (or the equivalent) from either one of the following groups and one from the other:
   - Group 1
     - Hinduism
     - Buddhism
     - Chinese and Japanese Traditions
   - Group 2
     - Judaism
     - Christianity
     - Islam

b) Three full-courses (or the equivalent) at the 300-level or above

c) At least one Senior Seminar.

Note
Total number of courses for the degree, twenty.

C) Religious Studies Joint Honours Programmes
The Religious Studies requirements in Joint Honours Programmes are the same as the Honours Programme except for the overall number of R.S. courses; Honours requires 10, Joint Honours 7.

Religious Studies has Joint Honours Programmes with Classics, English, Fine Arts, History, Philosophy, Psychology, Social Development Studies, and Sociology.

D) Minor in Religious Studies
The requirements for a Minor in Religious Studies are as follows:
1) successful completion of a minimum of five R.S. courses with a cumulative average of at least 65% (as provided for in Faculty regulations),
2) selection of these five courses from at least two of the categories outlined in the requirements for the General Degree.
3) taking of three of the required five courses above the 100-level.

Note
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

Honours Russian

<table>
<thead>
<tr>
<th>Year</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Russian 101/102 or equivalent</td>
<td>Four additional full credits</td>
</tr>
<tr>
<td>2</td>
<td>Three full credits in Russian</td>
<td>Two additional full credits</td>
</tr>
<tr>
<td>3</td>
<td>Three full credits in Russian</td>
<td>Two additional full credits</td>
</tr>
<tr>
<td>4</td>
<td>Three full credits in Russian</td>
<td>Two additional full credits</td>
</tr>
</tbody>
</table>

Note 1
Before graduation students must complete the Groups A, B, and C requirements listed on page 83.

Note 2
A minimum of 20 full credits must be completed before graduation, of which ten full credits must be in Russian.

Russian Joint Honours Programmes
Drama and Russian
Economics and Russian
English and Russian
Environmental Studies and Russian
French and Russian
German and Russian
Geography and Russian
History and Russian
Mathematics and Russian
Philosophy and Russian
Political Science and Russian

Other Joint Honours programmes may be arranged by consultation between the student and the departments concerned.

Note 1
A student in a Joint Honours Programme must complete a minimum of 22 full credits before graduation, including eight full credits in Russian.

General Programme in Russian
Students choosing a three-year general programme in Russian must complete six full credits in Russian before graduation.
Social Development Studies

Social Development Studies are integrated multi-disciplinary programmes providing a liberal education with concentration in certain pure and applied social sciences. The inter-related courses of the programme 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. As part of the programme the College offers its own courses in Interdisciplinary Social Science, Psychology, Social Work and Sociology. Students select other courses from the departments of the University or the other colleges to serve particular needs and interests. In the programme particular attention is given to the development of human personality in the context of the major social institutions and our major 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 the 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.

These programmes stand as a sound liberal and general education. However, they also provide an excellent background for further study in professions such as Social Work, education, religion, the Ministry, Law or Journalism, and for work in various helping professions, community organizations, communications and international service organizations.

The General Programme

The general programme normally extends over six academic terms (usually three years) of full-time study but may also be completed by part-time students. Courses are available in both day and evening periods. Students registered in the programme must complete:

1) A minimum of 15 full credits in total;
2) The normal Group A, B, and C requirements of the Faculty of Arts;
3) A minimum of 7 full credits from the core area courses listed below with the following stipulations:
   a) In the first year a student must register in the fall term for the introductory courses (120 level) in sociology, psychology and interdisciplinary social science. In the winter term which follows, the student must register in SocWk 120R, ISS 121R and Psych 120R. In the second year all students are required to take a full credit in social research (i.e., ISS 250R-251R). A student is required to complete a minimum of 2 full courses from the list in each year that he/she is registered in the three-year programme.

   b) The 7 credits must be distributed over at least 3 of the 4 core areas with a maximum of 3 full credits within a single area counting towards the requirement.

4) After meeting these minimum requirements, the student may elect his/her remaining courses from the general arts offerings of Renison or any Department of the University.

5) Transfer students from other programmes, faculties or universities must comply with all requirements as set out above. In special cases they may petition for equivalent credit for courses taken elsewhere which are similar to core area courses. Petitions should be directed in writing to the Registrar.

6) For further information consult the Registrar, Renison College, Waterloo, Ontario N2L 3G4.

Core Area Courses

<table>
<thead>
<tr>
<th>Interdisciplinary Social Science</th>
<th>Social Work</th>
<th>Sociology</th>
<th>Psychology</th>
</tr>
</thead>
<tbody>
<tr>
<td>ISS 120R</td>
<td>SocWk 120R</td>
<td>Soc 120R</td>
<td>Psych 120R</td>
</tr>
<tr>
<td>ISS 121R</td>
<td></td>
<td>Soc 121R</td>
<td>Psych 121R</td>
</tr>
<tr>
<td>ISS 220R</td>
<td>SocWk 220R</td>
<td>Soc 220R</td>
<td>Psych</td>
</tr>
<tr>
<td>ISS 221R</td>
<td></td>
<td>Soc 221R</td>
<td>220R</td>
</tr>
<tr>
<td>ISS 250R</td>
<td>SocWk 250R</td>
<td>Soc 250R</td>
<td>Psych</td>
</tr>
<tr>
<td>ISS 251R</td>
<td></td>
<td>Soc 251R</td>
<td>221R</td>
</tr>
<tr>
<td>ISS 320R</td>
<td>SocWk 320R</td>
<td>Soc 320R</td>
<td>Psych</td>
</tr>
<tr>
<td>ISS 341R</td>
<td></td>
<td>Soc 341R</td>
<td>322R</td>
</tr>
<tr>
<td>ISS 343R</td>
<td>SocWk 343R</td>
<td>Soc 343R</td>
<td>323R</td>
</tr>
<tr>
<td>ISS 350 (a-f)</td>
<td>SocWk 350R</td>
<td>Soc 350R</td>
<td>324(R)</td>
</tr>
<tr>
<td>ISS 399R</td>
<td></td>
<td>Soc 399R</td>
<td>367R-369R</td>
</tr>
<tr>
<td>ISS 399R</td>
<td></td>
<td>Soc 399R</td>
<td>367R-369R</td>
</tr>
<tr>
<td>ISS 399R</td>
<td></td>
<td>Soc 399R</td>
<td>367R-369R</td>
</tr>
<tr>
<td>ISS 399R</td>
<td></td>
<td>Soc 399R</td>
<td>367R-369R</td>
</tr>
<tr>
<td>ISS 399R</td>
<td></td>
<td>Soc 399R</td>
<td>367R-369R</td>
</tr>
<tr>
<td>ISS 399R</td>
<td></td>
<td>Soc 399R</td>
<td>367R-369R</td>
</tr>
<tr>
<td>ISS 399R</td>
<td></td>
<td>Soc 399R</td>
<td>367R-369R</td>
</tr>
<tr>
<td>ISS 399R</td>
<td></td>
<td>Soc 399R</td>
<td>367R-369R</td>
</tr>
<tr>
<td>ISS 399R</td>
<td></td>
<td>Soc 399R</td>
<td>367R-369R</td>
</tr>
<tr>
<td>ISS 399R</td>
<td></td>
<td>Soc 399R</td>
<td>367R-369R</td>
</tr>
<tr>
<td>ISS 399R</td>
<td></td>
<td>Soc 399R</td>
<td>367R-369R</td>
</tr>
<tr>
<td>ISS 399R</td>
<td></td>
<td>Soc 399R</td>
<td>367R-369R</td>
</tr>
<tr>
<td>ISS 399R</td>
<td></td>
<td>Soc 399R</td>
<td>367R-369R</td>
</tr>
<tr>
<td>ISS 399R</td>
<td></td>
<td>Soc 399R</td>
<td>367R-369R</td>
</tr>
<tr>
<td>ISS 399R</td>
<td></td>
<td>Soc 399R</td>
<td>367R-369R</td>
</tr>
<tr>
<td>ISS 399R</td>
<td></td>
<td>Soc 399R</td>
<td>367R-369R</td>
</tr>
<tr>
<td>ISS 399R</td>
<td></td>
<td>Soc 399R</td>
<td>367R-369R</td>
</tr>
<tr>
<td>ISS 399R</td>
<td></td>
<td>Soc 399R</td>
<td>367R-369R</td>
</tr>
<tr>
<td>ISS 399R</td>
<td></td>
<td>Soc 399R</td>
<td>367R-369R</td>
</tr>
<tr>
<td>ISS 399R</td>
<td></td>
<td>Soc 399R</td>
<td>367R-369R</td>
</tr>
<tr>
<td>ISS 399R</td>
<td></td>
<td>Soc 399R</td>
<td>367R-369R</td>
</tr>
<tr>
<td>ISS 399R</td>
<td></td>
<td>Soc 399R</td>
<td>367R-369R</td>
</tr>
<tr>
<td>ISS 399R</td>
<td></td>
<td>Soc 399R</td>
<td>367R-369R</td>
</tr>
<tr>
<td>ISS 399R</td>
<td></td>
<td>Soc 399R</td>
<td>367R-369R</td>
</tr>
<tr>
<td>ISS 399R</td>
<td></td>
<td>Soc 399R</td>
<td>367R-369R</td>
</tr>
<tr>
<td>ISS 399R</td>
<td></td>
<td>Soc 399R</td>
<td>367R-369R</td>
</tr>
<tr>
<td>ISS 399R</td>
<td></td>
<td>Soc 399R</td>
<td>367R-369R</td>
</tr>
<tr>
<td>ISS 399R</td>
<td></td>
<td>Soc 399R</td>
<td>367R-369R</td>
</tr>
<tr>
<td>ISS 399R</td>
<td></td>
<td>Soc 399R</td>
<td>367R-369R</td>
</tr>
<tr>
<td>ISS 399R</td>
<td></td>
<td>Soc 399R</td>
<td>367R-369R</td>
</tr>
<tr>
<td>ISS 399R</td>
<td></td>
<td>Soc 399R</td>
<td>367R-369R</td>
</tr>
<tr>
<td>ISS 399R</td>
<td></td>
<td>Soc 399R</td>
<td>367R-369R</td>
</tr>
<tr>
<td>ISS 399R</td>
<td></td>
<td>Soc 399R</td>
<td>367R-369R</td>
</tr>
<tr>
<td>ISS 399R</td>
<td></td>
<td>Soc 399R</td>
<td>367R-369R</td>
</tr>
<tr>
<td>ISS 399R</td>
<td></td>
<td>Soc 399R</td>
<td>367R-369R</td>
</tr>
<tr>
<td>ISS 399R</td>
<td></td>
<td>Soc 399R</td>
<td>367R-369R</td>
</tr>
<tr>
<td>ISS 399R</td>
<td></td>
<td>Soc 399R</td>
<td>367R-369R</td>
</tr>
<tr>
<td>ISS 399R</td>
<td></td>
<td>Soc 399R</td>
<td>367R-369R</td>
</tr>
<tr>
<td>ISS 399R</td>
<td></td>
<td>Soc 399R</td>
<td>367R-369R</td>
</tr>
<tr>
<td>ISS 399R</td>
<td></td>
<td>Soc 399R</td>
<td>367R-369R</td>
</tr>
<tr>
<td>ISS 399R</td>
<td></td>
<td>Soc 399R</td>
<td>367R-369R</td>
</tr>
<tr>
<td>ISS 399R</td>
<td></td>
<td>Soc 399R</td>
<td>367R-369R</td>
</tr>
</tbody>
</table>
Arts
Departmental Programmes
Sociology

The Honours Programme
The honours programme normally extends over eight academic terms (usually four years) of full-time study. Requirements for the honours programme are:
1) a minimum of 21 full credits in total while maintaining an overall average of at least C – and a cumulative average of B in the core area courses of the programme;
2) the normal "Groups A, B, and C" requirements of the Faculty of Arts, University of Waterloo;
3) a minimum of 9 full credits within the core areas of the programme;
4) a minimum of four full credits related to one of the multidisciplinary theme areas. (see note 1)

Year 1
Fall: Interdisciplinary Social Science 120R, Psychology 120R, Sociology 120R
Winter: Social Work 120R, Psychology 121R, ISS 121R.
The equivalent of two additional credits

Year 2
Interdisciplinary Social Science 250R/251R
At least two half courses from among:
Interdisciplinary Social Science 220R, 221R
Social Work 220R, 221R, 222R
Sociology 220R, 221R, 205(R)
The equivalent of two credits from chosen theme area (see note 1)
The equivalent of 1.5 additional credits

Year 3
Interdisciplinary Social Science 320R, Social Work 326R
At least two half courses from among:
Social Work 320R, 321R, 322R
Sociology 325R/326R, 327R/328R
Psychology 322R, 323R
The equivalent of two credits from chosen theme area (see note 1)
The equivalent of 1.5 additional credits.

Year 4
Interdisciplinary Social Science 469R, 499R
The equivalent of three additional credits

Note 1
Students in the Honours Social Development Studies Programme are required to complete four full credits from a theme area of study which has been selected in consideration of the students own needs and plans. The suggested theme areas are: "Home and School", "Work", "Community", "Mental Health".
In consultation with Renison's Undergraduate Officer, courses are chosen in such a manner as to explore the theme area in depth, looking at the historical, institutional, and cross-cultural aspects, and examining value systems and patterns of change.

Social Development Studies Joint Honours Programme
Social Development Studies Requirements
1) Four introductory half courses in the core area: ISS 120R, Psych 120R, Soc 120R, Soc Wk 120R;
2) Methodology: ISS 250R/251R;
3) ISS 320R, plus 2.5 credits at the 200 level or above;
4) A Senior Seminar, ISS 469, or a Senior Honours Essay, ISS 499R.

Note
The student will be expected to develop an elective theme area of three full course equivalents. There is a joint honours programme with Religious Studies and Psychology.

The requirements for the joint honours programme with Psychology vary in that Psych 101 and Psych 102 may be substituted for Psych 120R and Psych 121R; ISS 250R for Psych 283; ISS 251R for one of Psych 393, 395 or 397. In 4th year ISS 469R is required plus one of ISS 499R, Psych 498 or Psych 499.

Sociology
General Sociology
Students who take the three-year general programme with a major in Sociology must successfully complete the following five full credits in Sociology:
A half credit introduction to Sociology (Soc. 101)
A half credit in sociological methods
(one of Soc 321, 323 or 324)
A half credit in sociological theory
(one of Soc 295, 331 or 425)
At least three and one half additional credits in Sociology
Students are strongly encouraged to elect Soc 202, Sociological Statistics, although this is not required.

Honours Sociology
Recommended Programmes

Year 1
Sociology 101
One other half credit in Sociology at 200 level
Four elective full credits (or equivalent half credits)

Year 2
Sociology 202
Two full credits in sociology (or equivalent half credits)
Two and one half elective credits (or equivalent half credits)
Arts
Departmental Programmes
Spanish

Year 3
Sociology 321/322
Two full credits in sociology (or equivalent half credits)
Two elective full credits (or equivalent half credits)

Year 4
Sociology 425/426
Sociology 499
One full or two half credits in Sociology
Two elective full credits (or equivalent half credits)

Note 1
Students may elect Honours Sociology (Canadian Studies) by fulfilling the Honours requirements in Sociology and the requirements listed under Canadian Studies in this Calendar.

Note 2
The Department of Sociology is a participating Department in the Co-operative Programme in the Behavioural Sciences. This is an Honours programme 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 programme should consult with the Department's Co-op advisor sometime in their first year so that they may select their courses to maximum advantage.

Sociology Joint Honours Programmes
Sociology has joint honours programmes with the following: Anthropology, Classics and Romance Languages, Economics, English, History, Philosophy, Political Science, Psychology, Mathematics and Recreation. The usual recommended programme in Sociology for joint honours is seven and one half credit equivalents distributed as follows: a half credit in introductory sociology (101); a half credit in statistics (202); two half credits in research methods (321/322); two half credits in sociological theory to be chosen from 331, 402, 425, 426; the equivalent of three and one-half credits of electives in Sociology; and an honours thesis course (499) or the equivalent in the related department.

Note 1
For requirements in joint honours with History, Philosophy, Psychology and Mathematics see the Department Undergraduate Officer.

Note 2
In the joint honours programme with French (Classics and Romance Languages) Soc 202 may be replaced by an elective in Sociology.

Spanish (Department of Classics and Romance Languages)

General Programme in Spanish
Students choosing a three-year general programme in Spanish must complete Spanish 191/192. 251/252 and at least three full credits at the 300 level for a total of six credits.

Honours Programme in Spanish
Students in the honours programme in Spanish must complete before graduation the equivalent of ten credits of which at least six full credits are at the 300 or 400 levels.

Honours Spanish
Recommended Programme

Year 1
Spanish 191/192 (students with little or no Spanish will take Spanish 101/102 in the first year and Spanish 191/192 and 255/256 in the second year).
Four more credits

Year 2
A minimum of three full credits or equivalent in Spanish including 255/256.
Two more credits

Year 3
A minimum of three full credits or equivalent in Spanish.
Two more credits

Year 4
A minimum of three full credits or equivalent in Spanish including 498 and one-half credit in Medieval Spanish and one-half credit in 20th-Century Peninsular Literature taught at Wilfrid Laurier University.
Two more credits

Note 1
Before graduation, the student must complete a minimum of ten full credits or equivalent in Spanish of which the following credits are obligatory: 255/256, 498, and one-half credit Medieval Spanish, one-half credit 20th-Century Peninsular Literature. If the student intends to enter the teaching profession, 191/192, 251/252, and 351/352 must be completed.

Note 2
To establish a Minor in a sister discipline, the student must complete five credits in that discipline. Students registering in Honours Spanish are strongly advised to minor in another language.
Note 3
With the permission of the Division, the student may spend the third year enrolled in an acceptable university in Spain or in Spanish America.

Note 4
A total of 20 credits must be successfully completed before graduation.

Note 5
The degree requirements of the Faculty of Arts (see page 82-84) must be met for the B.A. degree.

Note 6
Students in Year 4 must have the permission of the Division to enrol in Spanish courses on the lower levels.

Spanish Joint Honours
The Department of Classics and Romance Languages recognizes combined honours programmes in Spanish and the following disciplines:
Classical Studies
English
French
German
History
Latin
Sociology

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

Recommended Programme (Spanish)

Year 1
Spanish 191/192, (students with no high school Spanish will take Spanish 101/102 in the first year and Spanish 191/192 in the second year).

Year 2
Three full credits or equivalent in Spanish including 255/256.

Year 3
Two full credits or equivalent in Spanish.

Year 4
Two full credits or equivalent in Spanish including 498 and one-half credit in Medieval Spanish, and one-half credit in 20th-Century Peninsular Literature taught at Wilfrid Laurier University.
Faculty of Engineering

Chemical Engineering Lab
The Co-operative Engineering Programme

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 programme 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 programme covers almost five calendar years, comprising eight terms each of about four months' duration of university work on the campus which are pursued alternatively 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."

While co-operative programmes have been offered in many other countries, and the inherent advantages are well recognized, the co-operative Engineering programme at the University of Waterloo is unique in Ontario and was, until recently, unique in Canada.

The engineering curricula at the University of Waterloo provides a sound basis in Mathematics and Pure Science and in Engineering Science and Design. The first year of the programme is common for all programmes except Chemical Engineering and Systems Design. A substantial part of the work of the first and second years is common to all programmes.

Starting with the second year (first year for Chemical Engineering and Systems Design) students elect one of the five principal divisions of engineering. The curriculum for each of the five basic programmes combines required "core" subjects essential to the field, and "elective" subjects permitting considerable diversity in individual programmes 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 programme is given in Chapter 5, as well as specific requirements as noted in the examinations and promotions section of this chapter.

Degrees

The Degree of Bachelor of Applied Science (B.A.Sc.) is awarded by the University in the following undergraduate programmes:

Chemical Engineering
Civil Engineering
Electrical Engineering
Mechanical Engineering
Systems Design Engineering

Admission

All programmes entail 4-2/3 calendar years of undergraduate study on the co-operative system.

The Degrees of Master of Applied Science (M.A.Sc.) and Doctor of Philosophy (Ph.D.) 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.

Applicants from Ontario Year 5

Applicants must present 6 credits; five of those must be: Relations and Functions, Calculus, Algebra, as well as Chemistry and Physics in their overall Year 5 programme. Students with high overall standing who are missing one or two of the five specific Year 5 requirements are encouraged to contact the Admissions Officer no later than January (for September admission). Applicants will be evaluated and advised on possible courses of action required to meet our specific requirements.

Admission as an Adult Student

It is recommended that applicants attempt to obtain standing in Ontario Year 5 Mathematics and Science courses or their equivalent. The university has developed special pre-university mathematics and science 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 Admissions Officer for the Faculty of Engineering.
Admission to Advanced Standing
Because of the co-operative nature of the Engineering programme, no student will be admitted above Year 3, term A level. Any student thus admitted will be required to register in the January term and to complete a minimum of three satisfactory work terms. 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

Note
The Faculty of Engineering has revised its examinations and promotions procedures and the following regulations went into effect beginning with those students entering Year 1 Engineering in the Fall 1978 term. Students who entered the Engineering programme prior to September 1978 will be governed by the regulations as laid out in the 1977-78 calendar. New students will be governed by the regulations which apply to the class to which they are admitted.

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 the work for that course. 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 effects on the student's progress in the programme are as follows:

Promoted - proceed to next term
Promoted (Aegrotat) - proceed to next term
*Proceed on Probation - proceed to next term
Required to Repeat Term - No Penalty - may repeat in next available term
**Required to Repeat Term - must stay out 2 terms before repeating
Voluntary Withdrawal - readmission possible only through letter of application to Admissions Committee at any time after the term in which the student withdraws
Must Withdraw from Engineering - readmission possible only through application to Admissions Committee after at least 3 terms out and with new evidence of ability to succeed in programme
Decision Deferred - may not proceed until status cleared
Recommended for BASc Degree at (Spring/Fall) Convocation - (First/Second/Third) Class Honours - programme successfully completed

The procedures through which promotion decisions are made are as follows:

At the end of each term, examining faculty members submit grades for that term's courses. Each department then reviews the performance of students registered in that department and makes promotion recommendations to the Examinations and Promotions Committee. The Engineering Examinations and Promotions Committee considers the evidence on which the departments have based their promotion 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 students through the Registrar's Office. All recommendations to award degrees must be approved by Senate.

The rules which are applied when the student's performance is assessed are as follows:
1) To continue in the degree programme, a student must have a term average of 50% or better. Except in 1A, a student receiving an average below 50% who has never before in the programme 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.
2) Excluding terms when a student is allowed to repeat without penalty, the programme must be completed in no more than ten academic terms (i.e. no more than two repeated terms) and no term be repeated more than once.
3) To be unconditionally promoted in the programme, a student must have a term average of 60% or better and fewer than two grades below 50.
4) A student with a term average of over 60% and two or more course grades below 50 will normally be allowed to proceed on probation. Probationary status will be cleared by achieving an unconditional promotion at the end of the probationary term. A student on probation who receives an average over 60% and two or more course grades below 50 will be required to repeat the term.
5) A student with a term average of 50 - 59% will be required to repeat the term except in 1A when the student will be allowed to proceed on probation.
6) A student on a repeat term who does not achieve an unconditional promotion will be required to withdraw from the programme.
7) A student may withdraw voluntarily from the programme at any time prior to four weeks before the commencement of the final exam period in the term by giving written notification of the withdrawal. Students in 1A may withdraw at any time in that term.

*Not used in final term
**Not used in 1A
8) A student may be required to withdraw from the programme at any time if, in the opinion of the Faculty, the student is unlikely to benefit from further participation in the programme or if the student leaves the programme without notification and fails to write examinations.

9) Students who have successfully met all the requirements of the programme and have been recommended for a BASc degree will have First, Second or Third Class Honours standing designated according to the cumulative 3A - 48 average.

10) 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.

11) 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, however, will be reported on a student's transcript. Normally students will be expected to register for the minimum number of courses specified by the calendar for the appropriate term.

12) There are no supplemental examinations except in the last term of the programme. A minimum grade is not normally required in any one subject, although individual departments may designate minimum grade requirements in certain courses. Also, there are individual department rules regarding the grading and averaging of non-technical elective courses.

13) Students who are required to repeat a term will normally be required to repeat all of the work of the failed term. Where timetables permit, repeating students may be excused from repeating individual courses in which good marks have been obtained and permitted to register in other appropriate courses, at the discretion of the student's department.

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

<table>
<thead>
<tr>
<th>Grade</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>AEG</td>
<td>Aegrotat - Student was ill according to medical evidence but has satisfactory understanding of the course.</td>
</tr>
<tr>
<td>CR</td>
<td>Credit Granted - Performance was satisfactory.</td>
</tr>
<tr>
<td>NCR</td>
<td>No Credit Granted - Performance was unsatisfactory.</td>
</tr>
</tbody>
</table>

INC - Incomplete - The course work is incomplete and the student has permission to extend the work beyond the term. If six months have elapsed since the end of the term, a grade must be submitted.

DNW - Did Not Write - The student did not withdraw from the course and was not eligible for an Incomplete grade, and did not submit sufficient of the necessary 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 purposes of reporting and averaging according to the following table:

<table>
<thead>
<tr>
<th>Grade</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>A+</td>
<td>95</td>
</tr>
<tr>
<td>B+</td>
<td>78</td>
</tr>
<tr>
<td>C+</td>
<td>68</td>
</tr>
<tr>
<td>D+</td>
<td>58</td>
</tr>
<tr>
<td>F+</td>
<td>46</td>
</tr>
<tr>
<td>A</td>
<td>89</td>
</tr>
<tr>
<td>B</td>
<td>75</td>
</tr>
<tr>
<td>C</td>
<td>65</td>
</tr>
<tr>
<td>D</td>
<td>55</td>
</tr>
<tr>
<td>F</td>
<td>38</td>
</tr>
<tr>
<td>A-</td>
<td>83</td>
</tr>
<tr>
<td>B-</td>
<td>72</td>
</tr>
<tr>
<td>C-</td>
<td>62</td>
</tr>
<tr>
<td>D-</td>
<td>52</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 doctor's certificates and similar supporting 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 within three weeks of receipt of the mark report. Appeals being launched later than six months after the end of the term being appealed will not be considered.

16) Changes to a student's original registration form may be permitted at the discretion of a student's department. All such arrangements must be indicated and approved before the end of the normal "Change Period", which is a period of three weeks at the beginning of each term. After the end of the three week period, only exceptional cases for change will be considered.

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) Each Engineering student is required to submit a minimum of four satisfactory work reports prior to graduation. For those students admitted to advanced standing into 2B or 3A with only 3 work terms remaining, only 3 satisfactory work reports would be required.
2) All work reports shall be submitted to the Department of Co-ordination on the first day of lectures for the academic term following the work term and subsequently distributed to departments within 1 week. Failure to comply with the deadline will result in no work report credit for that term.

3) Work reports shall be compulsory for all students in their first work term and these reports shall be assessed by the Department of Co-ordination. 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-ordination.

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 the additional reports and the evaluations of these reports will be added to their work term record. Students may be required to submit work reports to employers.

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 re-written and re-submitted during the academic term. Students with unsatisfactory work reports may be required to take formal instruction in technical report writing.

7) Continued registration in later academic terms depends on satisfactory work-term performance and/or reports. Students with an "NCR" designation on any work report will not be promoted until they have cleared this condition. (see booklet on Regulations & Procedures for co-operative programmes).

The General Studies Programme in Engineering
The Canadian Accreditation Board of the Canadian Council of Professional Engineers has recommended the inclusion of "...a minimum of one-half year of appropriate humanities and social sciences" in Canadian Engineering curricula as a basis for the accreditation of a degree programme. The Engineering Faculty Council and the Senate of the University approved the underlying principles of a "General Studies Programme" in the Spring of 1977, as a response to that requirement.

"General Studies", as an integral component of Engineering education at Waterloo, is intended to provide some understanding of the wider humanistic and societal context within which an Engineering career must grow and interact.

Students in the Faculty of Engineering, beginning with the class entering in Fall, 1977, must complete, as a part of the B.A.Sc. requirements, a programme consisting of five courses in humanities and social sciences, to be selected from course lists published by the Faculty, such that at least two of the courses are advanced level courses in the same, or closely related, subject area.

The course lists, published each year, will be divided into: List A - introductory, no-prerequisite courses; List B (Options) - recommended sequences in a range of coherent options, containing at least two advanced level courses; List B (Other Courses) - other advanced level courses from among which students may devise their own appropriate sequence. Any choices other than those from the published lists require the approval of the student's departmental advisor.

Academic Programmes
The core programmes for each of the five major divisions of engineering provide the foundation for professional activity in any field of engineering interest. A wide variety of elective courses are available in Engineering, Science, Mathematics, the Humanities, and Social Sciences, from which optional programmes may be developed under the guidance of faculty advisors.

For further enlargement of the programmes, refer to the Faculty chapters in this calendar.

Year 1 Engineering Programmes
All students enrolling in Year 1 are required to choose one of the following three programmes:

a) General Engineering
b) Chemical Engineering
c) Systems Design Engineering

At the completion of the first year, students in the General Engineering programme are required to select one of the following major divisions of engineering for the second year of study.

Civil Engineering
Electrical Engineering
Mechanical Engineering

Students enrolling in General Engineering must register in the courses indicated in the following table:

Term 1A
Mathematics 110a (see course description on page 352)
Mathematics 114 (see course description on page 352)
Ch E 102 (see course description on page 356)
Physics 11 (see course description on page 394)
Gen E 115 (see course description on page 310)
Term 1B
Mathematics 110b (see course description on page 352)
Gen E 114 (see course description on page 310)
Gen E 121 (see course description on page 310)
Gen E 122 (see course description on page 310)
One technical option from the following:
Civ E 116 (see course description on page 260)
El E 116 (see course description on page 289)
ME 116 (see course description on page 375)
One General Studies elective to be chosen from the list of recommended courses which will be published each year.

Students enrolling in Chemical Engineering register for the same courses as above except in the 1A term they take Ch E 100 (see course description on page 356) in lieu of Gen E 115, and Ch E 101 in the 1B term.

Students enrolling in Systems Design should refer to page 438 for the Systems Design course listings.

Students in Civil Engineering and Systems Design may transfer to Civil, Electrical or Mechanical Engineering (see booklet entitled Admissions Information '79 for conditions of transfer and make-up requirements).

Note
Detailed course descriptions commence in Chapter 14. Courses beginning with Gen E (General Engineering) can be found on page 310.

Chemical Engineering

The basic objective of the undergraduate programme is to provide the student with an education appropriate for a career in the chemical industry, or for future studies in Science or Engineering, or other professions such as Medicine, Law, Business, etc. To be most effective in a rapidly changing technological age, the programme deals primarily with scientific and engineering principles. In the early years chemistry, physics and mathematics form the foundations. In the senior years, subjects such as economic analysis and pollution control enable the student to reach a more relevant understanding of his earlier studies. Specialization is available through the following six options.

Biochemical and Food Engineering
This option deals with the processing of systems where biochemical phenomena are important. It is concerned with waste treatment, food processing and fermentation operations which manufacture microbial products such as alcoholic beverages, yeasts, antibiotics, vitamins, and enzymes. The usefulness of these studies is obvious in a world with increasing food and health problems, and for the Canadian economy in which agricultural products play a significant role.

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

Pollution Control Engineering
This option presents aspects of waste treatment and pollution abatement techniques which are becoming increasingly important for the proper function of technology in a quality conscious society.

Polymer Science and Engineering
This option has a wide scope, but special emphasis is placed on the physics and physical chemistry of polymers, and on the modifications of polymer structure by physical or chemical means. At present, a significant percentage of the Ontario chemical industry is directed towards polymers (plastics, elastomers, synthetic fibres).

Transport Processes
This option is a further development of a core area of chemical engineering. Within it, aspects of fluid flow, heat transfer, mass transfer and reaction kinetics, which are important in most chemical and allied industries, are studied.
Mathematical Analysis and Control
This option also deals with the further development of a core area of chemical engineering. It involves studies in optimal control, economic and process optimization, and simulation.

Guide to Undergraduate Chemical Engineering Course Numbers

The code for the course numbers is consistent with the graduate course numbers and is as follows:

**First digit (1-5)**: year
- 1-4: Year of study, core courses
- 5: Fourth year, elective courses

**Second digit (0-8)**: subject matter
- 0: General Engineering
- 1: Transport Processes
- 2: Mathematics, Control, Economics
- 3: Chemistry, Kinetics, Catalysis
- 4: Polymer Science and Engineering
- 5: Extractive and Process Metallurgy
- 6: Biochemical and Food Engineering
- 7: Ecology, Environmental Engineering
- 8: Projects, Seminars, etc.

**Third digit (0-9)**: term
- Even numbers: first term
- Uneven numbers: second term

A) Core Courses (Beyond Year 1)

<table>
<thead>
<tr>
<th>Course No.</th>
<th>Course Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ch E 220</td>
<td>Applied Mathematics 1</td>
</tr>
<tr>
<td>Ch E 230</td>
<td>Physical Chemistry 1</td>
</tr>
<tr>
<td>Ch E 232</td>
<td>Inorganic Chemistry 1</td>
</tr>
<tr>
<td>Chem 26</td>
<td>Organic Chemistry 1</td>
</tr>
<tr>
<td>Math 210</td>
<td>Calculus 2 (For Chemical Engineers)</td>
</tr>
<tr>
<td>Ch E 221</td>
<td>Transport Processes 1 (Fluid Mechanics)</td>
</tr>
<tr>
<td>Ch E 231</td>
<td>Physical Chemistry 2</td>
</tr>
<tr>
<td>Ch E 233</td>
<td>Physical Chemistry Laboratory</td>
</tr>
<tr>
<td>Chem 36</td>
<td>Organic Chemistry 2</td>
</tr>
<tr>
<td>Math 216</td>
<td>Differential Equations</td>
</tr>
<tr>
<td>Ch E 312</td>
<td>Transport Processes 2 (Heat Transfer)</td>
</tr>
<tr>
<td>Ch E 320</td>
<td>Applied Mathematics 2</td>
</tr>
<tr>
<td>Ch E 330</td>
<td>Chemical Engineering Thermodynamics</td>
</tr>
<tr>
<td>Ch E 332</td>
<td>Inorganic Chemistry 2</td>
</tr>
<tr>
<td>Ch E 334</td>
<td>Instrumental Methods of Chemical Analysis</td>
</tr>
<tr>
<td>Ch E 313</td>
<td>Transport Processes 3 (Mass Transfer)</td>
</tr>
<tr>
<td>Ch E 315</td>
<td>Chemical Engineering Laboratory</td>
</tr>
<tr>
<td>Ch E 331</td>
<td>Chemical Reaction Engineering</td>
</tr>
<tr>
<td>Ch E 420</td>
<td>Process Dynamics and Control 1</td>
</tr>
<tr>
<td>Ch E 422</td>
<td>Engineering Economics</td>
</tr>
<tr>
<td>Ch E 482</td>
<td>Technical Seminar and Process Design</td>
</tr>
<tr>
<td>Ch E 280</td>
<td>General Awareness Seminar</td>
</tr>
<tr>
<td>281, 380, 381</td>
<td></td>
</tr>
<tr>
<td>460, 481</td>
<td></td>
</tr>
<tr>
<td>Ch E 007</td>
<td>General Awareness Seminar</td>
</tr>
</tbody>
</table>

B) Elective Courses

In addition to the core courses listed above, a minimum of 13 elective courses must be taken beyond Year 1. The usual sequence of technical (T) and General Studies (GS) electives is as follows:

<table>
<thead>
<tr>
<th>Term</th>
<th>GS</th>
<th>T</th>
<th>Free (GS or T)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2A</td>
<td>1</td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>2B</td>
<td>1</td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>3A</td>
<td>1</td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>3B</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>4A</td>
<td>2</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>4B</td>
<td>4</td>
<td>1</td>
<td>1</td>
</tr>
</tbody>
</table>

*must include one of Ch E 581 (counts as two courses), Ch E 583, Ch E 585.

Four to six of these courses may be chosen from social sciences, humanities, languages and other non-technical subjects. Four of the courses together with the general studies course in the 1 B term must satisfy the General Studies Programme requirements described on p. 117.

The remaining seven to nine courses must be technical electives which must include either the seventh option group listed below or one of the first six option groups listed plus one of Ch E 583 and Ch E 585. The other technical electives may be chosen from other Chemical Engineering courses or from other science or engineering courses according to interest, but the choice must be approved by the Associate Chairman (Undergraduate Studies).

The three technical electives for each of the seven Chemical Engineering option groups are identified below. Within each option group, the first course is normally taken in the 3B or 4A term and the other two courses are normally taken in the 4B term.

1) Transport Processes
- Ch E 510 Prediction of Physico-Chemical Properties
- Ch E 515 Two-Phase Flow Operations
- Ch E 517 Performance of Separation Processes

2) Mathematical Analysis and Control
- Ch E 520 Chemical Engineering Analysis
- Ch E 521 Process Dynamics and Control 2
- Ch E 523 Process Control Laboratory

3) Polymer Science and Engineering
- Ch E 540 Introduction to Polymer Science
- Ch E 541 Physical Chemistry of Polymers
- Ch E 543 Polymer Laboratory

4) Extractive and Process Metallurgy
- Ch E 550 Introduction to Extractive Metallurgy
- Ch E 551 Metallurgical Chemistry
- Ch E 553 Principles of High Temperature Extractive Metallurgy
5) Biochemical and Food Engineering
Ch E 560 Introduction to Biochemical Engineering
Ch E 561 Fermentation Operations
Ch E 563 Food Processing

6) Pollution Control Engineering
Ch E 570 Air Pollution
Ch E 560 Introduction to Biochemical Engineering
Ch E 571 Water Pollution

7) Research/Design Option
Ch E 580 Research-Design Project 1
Ch E 581 Research-Design Project 2
(worth 2 courses)

Other Research and/or Design Projects
Ch E 583 Process Systems Design
Ch E 585 Technical Elective Project

A student may acquire a B.A.Sc. in Chemical Engineering with an option in Management Sciences by taking eight specific M Sci courses as electives (see listing under equivalent with M Sci 21 and M Sci 23, respectively.

The six other courses use 6 of the minimum 13 elective course choices (3 GS and 3 T). The student must achieve a grade of at least 50% in each of the 8 courses and must obtain an average of 60% or more in these courses in order to receive recognition for satisfactorily completing the Option.

Academic Programme for Each Term (1978-79)

Year 2A, Fall and Winter
Math 210, Chem 36, Ch E 220, Ch E 230, Ch E 232, Ch E 280, General Studies elective

Year 2B, Spring and Fall
Math 216, Chem 36, Ch E 211, Ch E 231, Ch E 233, Ch E 281, General Studies elective

Year 3A, Winter and Spring
Ch E 312, Ch E 320, Ch E 330, Ch E 332, Ch E 334, Ch E 380, General Studies elective

Year 3B, Fall and Winter
Ch E 313, Ch E 315, Ch E 331, Technical elective, Ch E 381, General Studies elective

Year 4A, Spring and Fall
Ch E 420, Ch E 422, Ch E 482, Ch E 480, 2 Technical electives, Free elective

Year 4B, Winter
Either Ch E 481, Free elective, 2 Technical electives, Ch E 581; or Ch E 481, Free elective, 3 Technical electives, Ch E 583 or Ch E 585.

All courses indicated above for which numeric grades are received are included in determining the term average and rank in class. Grades for courses in excess of those indicated above are recorded but not included in determining the term average.

Detailed course descriptions are given in Chapter 14.

Civil Engineering

Civil Engineers plan, design, and supervise the construction of such facilities as bridges, buildings, railways, highways, dams, water supply streams, and waste disposal systems. The curriculum provides a modern approach to the subject based on a thorough grounding in mathematics, natural sciences, and socio-economic concepts.

Although complete professional specialization can be achieved only in postgraduate study and in engineering practice, the student can find opportunity to pursue advanced undergraduate study in a variety of areas. For example:

a) Structural Engineering – intended for students primarily interested in design and construction of structures; emphasis is placed on a broad foundation in mechanics and behaviour of materials.

b) Environmental Health Engineering – the major attention in this option is given to studies of water and air resources supply, treatment and disposal, industrial hygiene, radiation protection, control of communicable diseases and environmental sanitation and design of municipal facilities.

c) Transportation Engineering – is intended for the student interested in the planning, design, construction, traffic operation and evaluation of streets, highways, airports, and transit. Emphasis is placed on planning, design, operation and evaluation, particularly as related to demands.

d) Geotechnical Engineering – is designed to provide the student with an understanding of the engineering properties of soils and enable him to appreciate the methods behind the design of foundations of structures, earth retaining structures, earth dams, and highway pavements.

e) Engineering Mechanics – for students with a strong interest in a rigorous study of mechanics and related fields, leading to an understanding of advanced structural analysis and serving as a preparation for graduate study in structural engineering, hydraulics, mechanics of solids and fluids, or properties of materials.
Hydraulic Engineering - is intended for the student interested in the planning, design and operation of water supply and water resources management.

Experimental Mechanics - for students with an interest in the experimental investigations of static and dynamic response of structures and machines, in theory and technique of experimental methods and in the rheology of materials used in experimental mechanics.

Materials - is intended to provide the student interested in structural engineering, mechanics or properties of materials with a background in materials science.

A) Core Programme

Civil Engineering Core Courses

Civ E 116 Engineering Concepts 2
Civ E 200 Civil Engineering Project 1
Civ E 203 Statics
Civ E 204 Dynamics
Civ E 205 Mechanics of Deformable Solids 1
Civ E 221 Calculus
Civ E 222 Differential Equations
Civ E 224 Probability and Statistics
Civ E 265 Structure and Properties of Materials
Civ E 280 Fluid Mechanics
Civ E 291 Survey Camp
Civ E 292 Engineering Economics
Civ E 294 Thermal Sciences
Civ E 298 Seminar
Civ E 299 Seminar
Civ E 300 Civil Engineering Project 2
Civ E 303 Structural Analysis 1
Civ E 304 Structural Analysis 2
Civ E 313 Structural Concrete Design 1
Civ E 342 Transport Engineering 1
Civ E 343 Transport Engineering 2
Civ E 353 Soil Mechanics
Civ E 354 Foundation Engineering
Civ E 375 Sanitary Engineering
Civ E 381 Hydraulics
Civ E 398 Seminar
Civ E 399 Seminar
Civ E 400 Civil Engineering Project 3
Civ E 413 Structural Steel Design
Civ E 453 Engineering Geology
Civ E 486 Hydrology
Civ E 491 Engineering Law
Civ E 498 Seminar
Civ E 499 Seminar

B) Elective Courses

Elective courses may be selected from the following list, in accordance with the academic programme for the term, and in consultation with the Civil Engineering Faculty advisor.

Civ E 306 Mechanics of Deformable Solids 2
Civ E 344 Urban and Regional Engineering
Civ E 383 Water Distribution and Collection Systems

Civ E 403 Structural Analysis 3
Civ E 404 Structural Analysis 4
Civ E 405 Structural Dynamics and Stability
Civ E 414 Structural Concrete Design 2
Civ E 415 Structural Systems
Civ E 430 Experimental Mechanics
Civ E 440 Urban Traffic Management
Civ E 442 Pavement Structural Design
Civ E 444 Urban Transport Planning
Civ E 454 Geotechnical Engineering
Civ E 472 Wastewater Treatment
Civ E 473 Pollution in the Aquatic Environment
Civ E 480 Basic Principles of Water Resources
Civ E 493 Engineering in the Canadian North
Civ E 496 Project Management
Civ E 497 Engineering Optimization and Analysis

A limited number of elective courses may be taken from the offerings of other Departments. These must be chosen from a select list of such courses approved by the Civil Engineering Department.

C) Other Courses

Civ E 110, Urban Transport Problems and Prospects

Civ E 110 is not intended for Civil Engineering students at any level. The offering of this course is contingent upon sufficient demand and/or available teaching resources.

Academic Programme for Each Term

Year 1B (Winter and Spring terms)
Civ E 116, plus other Year 1 courses

Year 2A (Fall and Winter terms)
Civ E 203, Civ E 204, Civ E 221, Civ E 224, Civ E 265, Civ E 292, Civ E 298
Civ E 291†

Year 2B (Spring and Fall terms)
Civ E 200, Civ E 205, Civ E 222, Civ E 280, Civ E 294, Civ E 299; one elective in the Social Sciences and Humanities
Civ E 291†

Year 3A (Winter and Spring terms)
Civ E 303, Civ E 313, Civ E 342, Civ E 353, Civ E 381, Civ E 398; one elective in the Social Sciences and Humanities

Year 3B (Fall and Winter terms)
Civ E 300, Civ E 304, Civ E 343, Civ E 375, Civ E 399; one elective chosen from Civ E 306, Civ E 344 or Civ E 383
**Year 4A (Spring and Fall terms)**

Civil E 413, Civ E 453, Civ E 486, Civ E 498: two electives chosen from Civ E 403, Civ E 414, Civ E 440, Civ E 472 or Civ E 496; one elective in the Social Sciences and Humanities

**Year 4B (Winter term)**

Civil E 400, Civ E 491, Civ E 499; three electives chosen from Civ E 404, Civ E 405, Civ E 415, Civ E 430, Civ E 442, Civ E 444, Civ E 454, Civ E 473, Civ E 480, Civ E 493 or Civ E 497: one elective in the Social Sciences and Humanities

*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 B.A.Sc. in Civil Engineering with an Option in Management Sciences by taking 8 M Sci courses (see p. 125) as electives. Note that M Sci 21 and M Sci 23 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 an average of 60% or more in these courses.

*A student who wishes to follow the Management Science Option, must declare his intent before embarking on his 2B term and must obtain the approval of the Civil Engineering Department.*

---

**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 common Year 1 programme in Engineering, the programme in Electrical Engineering consists of prescribed core courses and a minimum of nine technical electives (taken during the last two terms): these technical electives include the possibility of 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 programme 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 programme 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 1) - unless admitted to advanced standing, as defined in the Calendar (see page 115).

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 A average in the previous term.

The promotion criteria will be as laid down in the Faculty rules (see page 115).

**Electrical Engineering, with an Option in Management Sciences**

A student may acquire a B.A.Sc. in Electrical Engineering with an Option in Management Sciences by taking eight MSci courses (see p. 125) as electives. Credit for M Sci 21 is equivalent to Credit for El E 316. The student must achieve a grade of at least 50% in each of the 8 courses and must obtain an average of 60% or more in these courses in order to receive recognition for satisfactorily completing the option.

**Academic Programme 1979-80.**

**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.
### Term 2A, Fall and Winter

<table>
<thead>
<tr>
<th>Course No.</th>
<th>Name</th>
<th>C</th>
<th>T</th>
<th>L</th>
</tr>
</thead>
<tbody>
<tr>
<td>EI E 201</td>
<td>Seminar</td>
<td>1</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>EI E 205</td>
<td>Advanced Calculus for Electrical Engineers 1</td>
<td>2</td>
<td>2</td>
<td>—</td>
</tr>
<tr>
<td>EI E 222</td>
<td>Introduction to Digital Computers</td>
<td>2</td>
<td>1</td>
<td>2*</td>
</tr>
<tr>
<td>EI E 233</td>
<td>Physical Electronics</td>
<td>3</td>
<td>1</td>
<td>—</td>
</tr>
<tr>
<td>EI E 241</td>
<td>Electric Networks 1</td>
<td>3</td>
<td>2</td>
<td>—</td>
</tr>
<tr>
<td>EI E 293</td>
<td>Instrumentation &amp; Measurement 1</td>
<td>1</td>
<td>1</td>
<td>4*</td>
</tr>
<tr>
<td>M Sc 23</td>
<td>Engineering &amp; Managerial Economics</td>
<td>3</td>
<td>1</td>
<td>—</td>
</tr>
</tbody>
</table>

### Term 2B, Fall and Spring

<table>
<thead>
<tr>
<th>Course No.</th>
<th>Name</th>
<th>C</th>
<th>T</th>
<th>L</th>
</tr>
</thead>
<tbody>
<tr>
<td>EI E 202</td>
<td>Seminar</td>
<td>1</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>EI E 206</td>
<td>Advanced Calculus for Electrical Engineers 2</td>
<td>2</td>
<td>2</td>
<td>—</td>
</tr>
<tr>
<td>EI E 261</td>
<td>Energy Processing &amp; Conversion</td>
<td>3</td>
<td>1</td>
<td>—</td>
</tr>
<tr>
<td>EI E 271</td>
<td>Electric &amp; Magnetic Fields</td>
<td>3</td>
<td>1</td>
<td>—</td>
</tr>
<tr>
<td>EI E 294</td>
<td>Instrumentation &amp; Measurement 2</td>
<td>1</td>
<td>1</td>
<td>3*</td>
</tr>
<tr>
<td>M Sc 50</td>
<td>Thermodynamics</td>
<td>3</td>
<td>—</td>
<td>1</td>
</tr>
</tbody>
</table>

**General Studies elective**

### Term 3A, Winter and Spring

<table>
<thead>
<tr>
<th>Course No.</th>
<th>Name</th>
<th>C</th>
<th>T</th>
<th>L</th>
</tr>
</thead>
<tbody>
<tr>
<td>EI E 301</td>
<td>Seminar</td>
<td>1</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>EI E 316</td>
<td>Probability &amp; Statistics</td>
<td>2</td>
<td>2</td>
<td>—</td>
</tr>
<tr>
<td>EI E 323</td>
<td>Principles of Digital Circuits and Systems</td>
<td>2</td>
<td>1</td>
<td>2*</td>
</tr>
<tr>
<td>EI E 342</td>
<td>Electric Networks 2</td>
<td>2</td>
<td>2</td>
<td>—</td>
</tr>
<tr>
<td>EI E 351</td>
<td>Electronic Devices</td>
<td>2</td>
<td>1</td>
<td>3*</td>
</tr>
<tr>
<td>EI E 362</td>
<td>Energy Conversion</td>
<td>2</td>
<td>1</td>
<td>3*</td>
</tr>
</tbody>
</table>

**General Studies elective**

### Term 3B, Fall and Winter

<table>
<thead>
<tr>
<th>Course No.</th>
<th>Name</th>
<th>C</th>
<th>T</th>
<th>L</th>
</tr>
</thead>
<tbody>
<tr>
<td>EI E 302</td>
<td>Seminar</td>
<td>1</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>EI E 317</td>
<td>Signal Analysis Methods</td>
<td>2</td>
<td>1</td>
<td>—</td>
</tr>
<tr>
<td>EI E 352</td>
<td>Electronic Circuits</td>
<td>2</td>
<td>1</td>
<td>3*</td>
</tr>
<tr>
<td>EI E 372</td>
<td>Transmission Lines &amp; Electromagnetic Fields</td>
<td>2</td>
<td>1</td>
<td>3*</td>
</tr>
<tr>
<td>EI E 380</td>
<td>Introduction to Systems &amp; Control</td>
<td>2</td>
<td>2</td>
<td>3*</td>
</tr>
</tbody>
</table>

**Non-technical elective**

### Term 4A, Fall and Spring

<table>
<thead>
<tr>
<th>Course No.</th>
<th>Name</th>
<th>C</th>
<th>T</th>
<th>L</th>
</tr>
</thead>
<tbody>
<tr>
<td>EI E 401</td>
<td>Seminar</td>
<td>1</td>
<td>—</td>
<td>—</td>
</tr>
</tbody>
</table>

**General Elective**

Five Technical Electives from the following:
- EI E 418 Communication Systems
- EI E 425 Systems Simulation
- EI E 427 Digital Hardware
- EI E 435 Semiconductors Devices
- EI E 446 Linear Systems
- EI E 454 Nonlinear Electronic Circuits
- EI E 463 Power Electronics
- EI E 474 Antenna & Propagation Engineering
- EI E 481 Control Systems
- EI E 499A Project

**General Elective**

Four technical electives from the following:
- EI E 407 Numerical Methods
- EI E 419 Digital Communications
- EI E 426 Software Engineering
- EI E 434 Quantum Electronics and Magnetics
- EI E 436 Semiconductors Devices 2
- EI E 443 Electric Networks 3
- EI E 453 Linear Electronic Circuits 2
- EI E 459 Sound, Noise and Electroacoustics
- EI E 464 High Voltage & Insulation Engineering
- EI E 465 Power Systems
- EI E 473 Microwave Engineering
- EI E 482 Control Systems 2
- EI E 499B Project

**Service Courses**

M E 2A  | EI E 14  | Electrical Engineering 1
M E 3A  | EI E 32  | Electrical Engineering 2

*Indicates laboratory every second, every third week, or open lab. See Course Descriptions.

†The general elective can be any course that is not a repeat of course material.
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 programmes. 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 Waterloo, Oakville and London, 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 Faculty of Engineering.

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 boundaries between pure research, applied research and professional practice become indistinct when the aim is to discover imaginative new ways to solve complex management problems. The research activities of the faculty members fall into three major categories: operations research, applied economics, and organizational behaviour. A major aim of the Department is to strengthen and develop these fields of study.

Degrees Conferred
The department confers degrees only at the graduate level (the M.A.Sc. and Ph.D.). At the undergraduate level it provides, for a student progressing to a B.A.Sc. in any other department of the Faculty of Engineering, the opportunity to take an option in Management Sciences.

Undergraduate Academic Programme
As mentioned above, 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
Electrical Engineering
Mechanical Engineering
Systems Design

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. It aims to impart a training that will be useful for problem-solving capability in the long run: also, it lets the student acquire certain skills which should help widen the scope of his immediate employment.

Students taking the Option may advance to the M.A.Sc. in Management Sciences within three academic terms following the completion of the B.A.Sc.

The Option consists of eight courses (see course descriptions in Chapter 14), two in each of the following areas:

a) Probability and Statistics
   M Sci 21 Probability and Statistics 1
   M Sci 31 Probability and Statistics 2

b) Economics
   M Sci 23 Managerial and Engineering Economics 1
   M Sci 43 Managerial and Engineering Economics 2

c) Operations Research
   M Sci 46 Operations Research 1
   M Sci 47 Operations Research 2

d) Decision Analysis and Organizational Behaviour
   M Sci 44 Organizational Behaviour 1
   M Sci 53 Organizational Behaviour 2

The designation of an Option in Management Sciences will be shown on the student’s transcript when he:
(1) achieves a grade of at least 50% in each of all eight courses (see above) or their equivalents as specified by the Department of Management Sciences, and
(2) obtains an average of 60% or more in these courses.

A student may take any number of courses in the Option as electives, provided that the appropriate prerequisites are satisfied. However, the designation of an Option in Management Sciences will not be shown on the transcript of a student who does not take all the eight courses specified above.

In addition to the Option courses, there is one other course offered by the department, namely M Sci 48 Introduction to Production Management, that is available as an elective to all undergraduate engineering students.

In order to facilitate the taking of all eight courses in the Option the student should proceed according to the following schedule beginning in the 2A term:

"Prerequisites are listed under course descriptions in Chapter 14."
### Option in Management Sciences

<table>
<thead>
<tr>
<th></th>
<th>2A Fall</th>
<th>2A Winter</th>
<th>2B Fall</th>
<th>2B Spring</th>
<th>3A Fall</th>
<th>3A Winter</th>
<th>3B Fall</th>
<th>3B Spring</th>
<th>4A Fall</th>
<th>4A Winter</th>
<th>4B Fall</th>
<th>4B Winter</th>
</tr>
</thead>
<tbody>
<tr>
<td>ChEA</td>
<td>ChE220*</td>
<td>MSci44</td>
<td>MSci46</td>
<td>MSci31</td>
<td>MSci47</td>
<td>ChE422#</td>
<td>MSci43</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ChEB</td>
<td>ChE220*</td>
<td>MSci44</td>
<td>MSci46</td>
<td>MSci31</td>
<td>MSci47</td>
<td>ChE422#</td>
<td>MSci43</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CivEA</td>
<td>CivE292#</td>
<td>MSci44</td>
<td>MSci46</td>
<td>MSci47</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CivEB</td>
<td>CivE292#</td>
<td>MSci44</td>
<td>MSci46</td>
<td>MSci47</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>EIEA</td>
<td>MSci23</td>
<td>MSci44</td>
<td>MSci46</td>
<td>EIE316*</td>
<td>MSci53</td>
<td>MSci47</td>
<td>MSci43</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>EIEB</td>
<td>MSci23</td>
<td>MSci44</td>
<td>MSci46</td>
<td>EIE316*</td>
<td>MSci53</td>
<td>MSci47</td>
<td>MSci43</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>MEA</td>
<td>MSci21</td>
<td>MSci23</td>
<td>MSci46</td>
<td>MSci44</td>
<td>MSci47</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>MEB</td>
<td>MSci21</td>
<td>MSci23</td>
<td>MSci46</td>
<td>MSci44</td>
<td>MSci47</td>
<td>MSci53</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SyDeB</td>
<td>SyDe213*</td>
<td>SyDe131#</td>
<td>MSci46</td>
<td>MSci43</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* Equivalent with MS21
# Equivalent with MS23
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 such as manufacturing, steel production, mining, transportation, communications, oil refining, chemical manufacture, paper, sugar, textiles, aerospace, and construction. In the last few years, because of the need to develop alternate energy sources, mechanical engineers have taken a major role in the development of new methods of energy conversion. The undergraduate programme in Mechanical Engineering is designed to provide the student with a firm grasp of the fundamentals of mathematics, physics and engineering, and also to provide some opportunity for specialization in the later years. The degree of B.A.Sc. in Mechanical Engineering is accredited and permits registration as a Professional Engineer in the Association of Professional Engineers in any Canadian Province upon satisfaction of the work experience requirement.

The Mechanical Engineering undergraduate programme contains a core of basic subjects that must be taken by all students. The first year is 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 included in each of the four years.

Each student is responsible for selecting his own programme 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, and turbomachinery.

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, weather prediction and modification, meteorology, oceanography, and related fields.

c) Machine Design and Solid Mechanics 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.

d) Engineering Materials 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.

e) Production 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 B.A.Sc. in Mechanical Engineering with an option in Management Sciences by taking eight specific Management Science courses as electives (see elective course listing under Department of Management Sciences).

A) Core Programme
a) Credit Courses
M E 201 Advanced Calculus
M E 203 Ordinary Differential Equations
M E 204 Numerical Analysis
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 230 Control of Properties of Materials
### M E 250 Thermodynamics
### M E 305 Partial Differential Equations
### M E 321 Kinematics and Dynamics of Machines
### M E 322 Mechanical Design 1
### 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 460 Instrumentation
### M E 482 Mechanical Engineering Projects
### M Sci 21 Probability and Statistics (Equivalent to M E 202)
### M Sci 23 Managerial and Engineering Economics 1
### E I E 14 Electrical Engineering 1
### E I E 32 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 programme will take three General Studies electives 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:

Eight technical elective courses are required in addition to the core courses listed above to fulfill the requirements of the Mechanical Engineering programme. Each student will, in addition, select and complete a two-term project (M E 482) under the direct supervision of a Professor. The project requires the student to demonstrate initiative and assume responsibility. Each student is responsible for selecting his own programme of electives, and project, in keeping with his ultimate career objective. 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 his 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 he refuses to sign the pre-registration form the student must reconsider his selection or else he must discuss his 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 Air Conditioning
### M E 456 Heat Transfer 2
### M E 459 Energy Conversion
### M E 463 Tribology 1
### M E 557 Combustion 1
### 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
### M E 469 Introduction to the Environmental Sciences
### 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 462 Introduction to Automation
### 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 Processes
### M E 568 Noise Analysis and Control
### M E 626 Fatigue and Brittle Fracture
(See Graduate Calendar)

#### d) Engineering Materials Option
### M E 432 Physical Metallurgy 2 - Plastic Deformation and Fracture
### M E 435 Industrial Metallurgy
### M E 443 Metal Casting Processes
### M E 527 Mechanics of Deformable Solids 3
### M E 531 Physical Metallurgy 1
### M E 534 Non-metallic Materials
### M E 541 Deformation Processes
### M E 544 Welding Processes
### Civ E 560 Mechanical Behaviour of Materials
e) Production Option
ME 435 Industrial Metallurgy
ME 443 Metal Casting Processes
ME 448 Production Engineering: Design of Manufacturing Systems
ME 482 Introduction to Automation
ME 463 Tribology 1
ME 541 Deformation Processes
ME 544 Welding Processes
ME 548 Numerical Control of Machine Tools 1
ME 561 Fluid Power Control Systems
ME 566 Noise Analysis and Control

f) Mechanical Engineering Core with Option in Management Sciences
(See Department of Management Sciences)

The Mechanical Engineering curriculum structure is summarized in the following table.

The Mechanical Engineering Undergraduate Program

<table>
<thead>
<tr>
<th>Term</th>
<th>Courses</th>
</tr>
</thead>
<tbody>
<tr>
<td>2A (F,W)</td>
<td>ME 201 ME 212 ME 215 ME 219 EE 14 M Sci 21 (ME 202)</td>
</tr>
<tr>
<td>2B (F,S)</td>
<td>ME 203 ME 204 ME 220 ME 230 ME 250 M Sci 23</td>
</tr>
<tr>
<td>3A (W,S)</td>
<td>ME 305 ME 321 ME 340 ME 351 ME 354 1 Non-Tech. Elect.</td>
</tr>
<tr>
<td>3B (F,W)</td>
<td>ME 322 ME 353 ME 360 ME 362 EE 32 1 Tech. Elect.</td>
</tr>
<tr>
<td>4A (F,S)</td>
<td>ME 482 ME 460 3 Tech. Elect. 1 Non-Tech. Elect.</td>
</tr>
</tbody>
</table>

F - Fall term, W - Winter term, S - Spring term
Systems Design

Introduction
Within the last decade it has become increasingly apparent that 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 evaluated, but the economic, social, human and political parameters must be given equally careful attention. When large scale problems are under study, few people can be knowledgeable in 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 undergraduate programme 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, production, planning and scheduling, environmental pollution, education, etc. 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 (B.A.Sc)\(^1\), the Systems Design Engineer may apply for registration as a Professional Engineer. If a Masters degree (M.A.Sc)\(^2\) 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 Accreditation Board (CAB) is a national organization that has representation from all of the Provincial Professional Engineering Associations. The CAB determines what types of courses must be contained in a university engineering programme in order for the programme to meet the standards of Canadian engineering. The Systems Design Engineering programme satisfies the strict standards of the CAB and is therefore acknowledged as a fully qualified Engineering Programme. In fact, the Department of Systems Design at the University of Waterloo, is the only department of its kind in all of Canada.

The Systems Design programme 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 programme for you.

The Systems Design programme is quite challenging. It is not easy to acquire the tools for solving the problems of complex systems. Moreover, these tools are becoming more and more sophisticated. Thus, the average student in Systems Design is expected to work at least 50 hours per week as he or she increases in awareness of the theories of human communication, makes progress in the areas of Systems Theory, Human Systems Engineering, and Socio-Economic Systems, and absorbs the implications of the tremendous growth of electronic computing systems.

Further information is available from:
Professor M. Chandrashekar
Associate Chairman for
Undergraduate Studies
Department of Systems Design
University of Waterloo
Waterloo, Ontario, N2L 3G1
(519) 885-1211 Ext. 2897

Professor K. Hipel
High School Liaison Officer
Department of Systems Design
University of Waterloo
Waterloo, Ontario, N2L 3G1
(519) 885-1211 Ext. 3113

Footnotes
\(^1\) B.A.Sc. Bachelor of Applied Science
\(^2\) M.A.Sc. Master of Applied Science

Employment Opportunities
Graduates of Systems Design Engineering will find employment opportunities in a number of diverse fields. To some extent, the technical and option area chosen by the student in the third and fourth year determine more specifically what he or she does upon graduation. The following is a list of general areas of activity for Systems Design Engineering graduates:

- Chemical Engineering Systems (process control and instrumentation; etc.)
- Civil Engineering Systems (transportation; water resources; waste disposal systems, etc.)
- Computer Science (advanced computer applications; system simulation; analysis and design; etc.)
- Electrical and Electronic Systems (control systems; system analysis; etc.)

Chemical Engineering Systems (process control and instrumentation; etc.)
Civil Engineering Systems (transportation; water resources; waste disposal systems, etc.)
Computer Science (advanced computer applications; system simulation; analysis and design; etc.)
Electrical and Electronic Systems (control systems; system analysis; etc.)
Human Engineering Systems (design applications; human factors in industrial management; biomedical engineering)  
Industrial Engineering Systems (production design; production and inventory systems; management systems; etc.)  
Mechanical Engineering Systems (production design; manufacturing processes; etc.)

**Undergraduate Curriculum in Systems Design**

The Undergraduate programme 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 programme 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 and Systems Behaviour 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 programme 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 M.A.Sc. degree, or for a rewarding career in industry or government with the Bachelor’s degree (B.A.Sc.).

**System Design 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 Systems Behaviour  
Sy De 181 Statics  
Sy De 183 Graphics and Design

1B (Spring Term)  
Sy De 102 Tutorial  
Sy De 112 Calculus 2  
Sy De 114 Theory and Application of Probability  
Sy De 142 Introduction to Ergonomics  
Sy De 162 Systems Design Methodology  
Sy De 182 Dynamics  
Sy De 184 Electricity and Magnetism

2A (Winter Term)  
Sy De 201 Tutorial  
Sy De 211 Applicable Mathematics for Systems Design 1  
Sy De 213 Theory and Applications of Statistics  
Sy De 221 Numerical Analysis and Computation  
Sy De 261 Systems Design Workshop 1  
Sy De 81 Mechanics of Deformable Solids  
1 General Studies Programme elective

2B (Fall Term)  
Sy De 202 Tutorial  
Sy De 212 Applicable Mathematics for Systems Design 2  
Sy De 252 Physical Systems 1  
Sy De 262 Systems Design Workshop 2  
Sy De 282 Thermodynamics  
Sy De 284 Fluid Mechanics  
Sy De 292 Systems Design Laboratory 1  
1 General Studies Programme elective

3A (Spring Term)  
Sy De 301 Tutorial  
Sy De 311 Systems Operations 1  
Sy De 361 Systems Design Workshop 3  
Sy De 381 Materials Engineering  
Sy De 383 Introduction to Biochemical and Polymer Systems  
Sy De 391 Systems Design Laboratory 2  
1 technical elective  
1 free elective (technical or General Studies Programme elective)
3B (Winter Term)
Sy De 302 Tutorial
Sy De 322 Computer Simulation of Systems
Sy De 354 Introduction to Linear Control Systems
Sy De 362 Systems Design Workshop 4
Sy De 392 Systems Design Laboratory 3
1 technical elective
1 free elective (technical or General Studies Programme elective)

4A (Fall Term)
Sy De 401 Tutorial
Sy De 421 Computer-Aided Design 1
Sy De 461 Systems Design Workshop 5
3 technical electives
1 General Studies Programme elective

4B (Winter Term)
Sy De 402 Tutorial
Sy De 458 Large Scale Engineering Systems
Sy De 462 Systems Design Workshop 6
3 technical electives
1 General Studies Programme elective

Technical Options in Systems Design
Each undergraduate student in Systems Design must choose a technical option by the 3A term. At present the department regularly offers option programmes in
Design & Human Systems
Socio-Economic Systems
and Physical & Computer Systems
Additionally there is an option programme called Management Sciences which is offered in conjunction with the Management Sciences Department of the Faculty. Students who elect this option will receive a final academic transcript from the University with a statement that the Option in Management Sciences has been successfully completed.

It is also possible for a student to organize an option 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, will constitute an individual technical option for that student.

Each technical option in Systems Design 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 below.

Summary of The Systems Design Technical Options

Design and Human Systems Option
The Design and Human Systems option embraces in whole or in part a wide spectrum of “professional” areas known as human factors engineering, human engineering, ergonomics, engineering ecology, 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 programme 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 expertise required to define and solve problems arising at the interface between man and machine (artifact), or man and environment.

Problem areas chosen might include:
design for extreme human environments
design where anthropometric aspects are dominant
design of instrumentation for human operators
design problems associated with safety in industry, transportation, etc.
medical design problems involving engineering technology
design of consumer products used in recreation and normal living
design involving human engineering
human aspects of engineering ecology
design of human “micro-environments”
problems of ergonomics and industrial hygiene
Socio-Economic Systems Option
Many large-scale design projects have important socio-economic consequences. Also social and political forces may affect the design process. Under this option a student can study the various interactions between a project and its social environment; in particular the aim of this option is to equip the student to attack problems associated with the design of large-scale non-corporate systems.

In this option core, techniques are taught for analyzing socio-economic situations by the use of statistics, operations research, game theory and the social sciences. Through additional electives, a student may pursue further topics in the social sciences and operations research.

Physical and Computer Systems Option
In this option the student is given the opportunity to study in some depth Physical Systems Theory as it has evolved as a discipline over the last decade and to gain additional background and expertise in the application of electronic computers to the analysis, simulation and design of systems.

Students who take the Physical and Computer Systems option will be able to solve problems involving electrical, mechanical, and hydraulic systems and their combinations. They may also apply the concepts of Systems Theory to wide varieties of other systems, involving both engineering and non-engineering disciplines.

For those students concerned with the applications of electronic computers this option provides access to information concerned with computer hardware (the physical structures of digital, analog, and hybrid computers), computer software (procedural, simulation, and problem-oriented languages), and application techniques (particularly in computer-aided design).

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, can obtain a background in Management Science in addition to his or her engineering degree. The Management Science programme for a Systems Design student consists of the following optional courses:

<table>
<thead>
<tr>
<th>Academic Term</th>
<th>Option in Management Sciences</th>
</tr>
</thead>
<tbody>
<tr>
<td>1A</td>
<td>F</td>
</tr>
<tr>
<td>1B</td>
<td>S</td>
</tr>
<tr>
<td>2A</td>
<td>W</td>
</tr>
<tr>
<td>2B</td>
<td>F</td>
</tr>
<tr>
<td>3A</td>
<td>S</td>
</tr>
<tr>
<td>3B</td>
<td>W</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>4A</td>
<td>F</td>
</tr>
<tr>
<td></td>
<td>M Sci 44 Organization Behaviour 1</td>
</tr>
<tr>
<td></td>
<td>1 other technical elective</td>
</tr>
<tr>
<td>4B</td>
<td>W</td>
</tr>
<tr>
<td></td>
<td>2 other technical electives</td>
</tr>
</tbody>
</table>

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%.

Special Individual Option
Some Systems Design students may wish to design their own option programme which consists of technical courses drawn from the wide variety of subjects taught at the University. Special Individual Options must be organized in conjunction with a faculty advisor in the Department of Systems Design 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.
Faculty of Environmental Studies

Geography students on a field trip
Faculty of Environmental Studies

Introduction
The Faculty of Environmental Studies is equivalent in organization to any regular faculty, such as Arts, Science, and Engineering but is unique in its outlook. It concentrates on using diverse sources of knowledge from different disciplines needed to understand one particular problem area: man and his environment. Since many of the issues are contemporary, the faculty has attempted to utilize the best of traditional teaching approaches combined with newer and innovative techniques derived from a broad range of disciplines.

The Faculty of Environmental Studies has within it two types of academic groups - the professional Schools, and the academic Departments.

Schools and Departments
School of Architecture
Department of Geography
Department of Man-Environment Studies
School of Urban and Regional Planning

The professional schools are specialized, vocation oriented but they are not narrow. Through the Faculty of Environmental Studies, they are integrated into the mainstream of the University's concern with man and his environment, through the two main thrusts of research and practical applications.

The academic Departments represent a grouping of studies which have the interaction of man with his environment as their core. Both the Man-Environment 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 programmes of the other units, and it is an objective of the Faculty to make all its members available to students in any of its four units. Interaction with other parts of the University is also fostered, and joint appointments of faculty members with other Faculties and Schools have been made. Students are not only free to, but are encouraged to choose courses from across the whole University.

Degrees

The Faculty of Environmental Studies offers two undergraduate degrees: a Bachelor of Environmental Studies (B.E.S.), and a Bachelor of Architecture (B.Arch.). At the graduate level a Master of Arts (M.A.) and a Ph.D. Degree may be obtained in both Geography, and Regional Planning and Resource Development. In addition, the Geography and

Man-Environment Studies Departments offer joint honours programmes with many other departments in the University (see programmes for other details).

Degrees may be obtained in the following programme areas:
B.E.S. - Pre-professional Architecture (3 years), on rotating work/study co-operative scheme.
B.Arch. - Professional Architecture (2 years, with co-operative work terms following completion of B.E.S. Pre-professional Architecture).
B.E.S. - Honours Geography (4 years)
B.E.S. - Honours Co-operative Geography (5 years with rotating work/study terms)
B.E.S. - Major in Geography (3 years).
B.E.S. - Honours Man-Environment Studies (4 years).
B.E.S. - Honours Urban and Regional Planning (4 years).
M.A. - Geography
M.A. - Regional Planning and Resource Development
Ph.D. - Geography
Ph.D. - Regional Planning and Resource Development.

The student should choose 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 programme. Ease of transferring between the units of the Faculty of Environmental Studies varies. Transfer to the School of Architecture is not normally permitted above Year 1, except where the applicant has done acceptable work at another approved School of Architecture. Transfer to the School of Urban and Regional Planning is not normally permitted above Year 2.

The Dean's Honours List will include no more than 5% of the students in any particular year based on scholastic achievement. The criteria for a student's inclusion shall be based on the major average and no one included on the list shall have an overall average of less than 75%.

The Faculty has several awards granted to students for meritorious performance, e.g. Dean's Honours List, Gold Medal, monetary prizes. Further information on this can be obtained from the office of the Associate Dean, Undergraduate Affairs.
Admission

The admission requirements and procedures for all programmes are outlined in detail in Chapter 2 of the Calendar. The following points emphasize some of the admission requirements which relate specifically to programmes in the Faculty of Environmental Studies.

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 Year 5 Mathematics course for admission to programmes in Environmental Studies. Year 5 Geography is similarly recommended for those applying to the Geography Department. For applicants to the School of Architecture, Functions and Relations, Calculus, Physics, and English or Français at the Year 5 level are required.

Interviews

Students being seriously considered for admission to the Schools of Architecture and Urban and Regional Planning are normally required to participate in an interview as part of the admissions process. For Architecture, a test will be conducted by the School during interviews to establish ability to comprehend the various thematic areas. A portfolio of creative work must be submitted at the time of the interview. Contact the School of Architecture for further details.

Transfer Credit

Generally transfer credit is given for courses in which a grade of 60% or better was obtained. Students transferring from other institutions 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 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 the cumulative average or transferring all relevant courses passed and failing in the cumulative average. The specific transfer credit policies vary with each Faculty and students are advised to refer to the Faculty sections in the Calendar for detailed regulations.

Examinations and Standings

The following regulations govern the practice 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 programmes. Further details concerning University Examination Regulations can be found in Chapter 1, page 17.

A maximum of eight first year credits will be counted towards a B.E.S. For other requirements, see the programme section for the Department/School.

Students should note that the Faculty of Environmental Studies operates under a "course system" in which student progress is measured by courses successfully completed rather than by years. Students who passed fewer than five courses will be considered Year 1 students; those who have passed at least five courses but fewer than ten will be considered Year 2 students; those with at least ten but fewer than sixteen, Year 3, and those with sixteen or more, Year 4.

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. 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.

d) Apologies 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 Affairs, for discussion at the Faculty Undergraduate Affairs Committee.
2) 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 on page 17 will be used.

b) Overall standing is determined by the cumulative average of grades assigned for all courses taken at the University except where a course is retaken, in which case the second grade will be included in the cumulative average regardless of whether it is higher or lower than the first. 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 programme including those with the Environmental Studies designation.

c) Students receiving an Incomplete standing in any courses will be allowed 4 months from the completion date of the course to clear the Incomplete. Any Incomplete standing 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.

d) To be considered in good standing in the Honours programmes, a student must maintain a cumulative overall average of at least B- (70.0) and an average in the chosen field of specialization as specified in the regulations of the relevant department/school. If an Honours programme candidate's average falls below the prescribed minimum, the individual can be given conditional standing 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 Programme and the regulations in (e) below will apply.

e) To be considered in good standing in the General Geography Programme, a student must maintain a cumulative overall average of at least C- (60.0) as well as an average of at least C (65) in Geography. If at any time a student's average falls below C- (60.0) or the average in Geography below C (65), the individual may be granted conditional status for one year, during which period he/she must make reasonable progress toward obtaining good standing or he/she will be asked to withdraw. A student whose cumulative overall average falls below D (55) may continue only with the permission of the Undergraduate Affairs Committee.

f) The only general programme in the Faculty is the General Geography Programme. The B.E.S. programme in the School of Architecture is a pre-professional programme. A regular (full-time) student in the General Geography Programme must in each academic year enrol in at least five courses, but in not more than six. A regular student in the Honours programmes must each year enrol in at least six courses (unless otherwise specified in a departmental Honours programme), but in not more than seven. Students may be enrolled for reduced programmes after obtaining the approval of the appropriate Undergraduate Affairs Officer.

g) Even while otherwise in good standing, a student who fails more than two course credits 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 “Failed, Required to Withdraw” decision, he/she must withdraw from that program for a year; that student is entitled to apply to any other program; if the reasons for withdrawal include disciplinary problems, a statement should be placed in the student's file.

3) Additional Regulations, School of Architecture Examinations and Promotions

In order to proceed unconditionally from one term to the next in the B.E.S. and B.Arch. programmes, the student:

a) Must maintain a minimum cumulative overall average of C- (60.0) calculated at the end of each term of study.

b) Must pass the studio course.

c) Must not fail* more than two half courses or equivalent in any single term.

* A term of study refers to a particular four month (13 week) period of registration including the 1A, 4A and 5A terms.

Failure to satisfy these requirements will normally result in the decision “Failed – Required to Withdraw; except as outlined in the following notes:
Note 1
Students who fail to maintain the minimum cumulative average requirement but who satisfy the other requirements will receive the academic decision “Failed - May Proceed on Condition”. Such students must repeat the studio course in question on the second attempt or the student will be credited to that particular term of study.
Failing this, the student will receive the academic decision “Failed - Required to Withdraw”.

Note 2
Students who fail a studio course (Arch192, 193, 292, 293, 392, 393, 492, 493, 592, 593) (but who satisfy the other requirements) will receive the academic decision “Failed - Must Repeat Studio”. Such students must repeat and pass the studio course. Failure to pass the studio course will result in the academic decision “Failed - Required to Withdraw”. Students may not register in any higher level studio courses or core courses until the failed studio course is passed. Courses passed in a term in which a studio course is failed, do not have to be repeated but will be credited to that particular term of study.

Note 3
Students who fail more than two half courses or equivalent in any single term (but who pass studio and maintain the minimum cumulative overall average) will receive the academic decision “Failed - May Proceed on Condition”. Such students must repeat and pass the failed courses or their equivalents during their next term of study (including the appropriate level of studio).
Should the student fail more than two half courses or equivalent in the next or any subsequent term, the student will receive the academic decision “Failed - Required to Withdraw”.

Note 4
The Examinations and Promotions Committee for the School of Architecture reserves the right to require a student to withdraw if it is felt by the Committee that the student will not benefit from further study and continuation in the programme. The School also reserves the right to make exceptional academic decisions for students who require exceptional consideration.

Note 5
Normally students of the School are permitted to take only one more or one fewer half-courses (academic weight 0.5) than that prescribed for the particular year and term in which they are registered. Any further addition or reduction to the student’s programme must be approved by the Undergraduate Officer of the School of Architecture.

The following procedures have been set out for those students who have not met the above conditions.

Supplemental Examinations
A student failing any Architecture course with an F+ standing has supplemental examination privileges and may take such an examination as arranged in accordance with University policy.

Appeals
See Faculty appeal procedures item D) page 135 under final examinations.

Academic Programmes
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 programme, the student should read the descriptions of individual courses in order to have a more comprehensive idea of what the content of any programme 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.

Course and Programme Changes
a) Students may freely add and drop half courses during the first two weeks of the Fall, Winter and Spring terms.
b) Students may add and drop full-year courses during the first two weeks of the Fall term.
c) After these periods, students will be allowed to add and drop courses only with the permission of the instructor and the appropriate undergraduate officer and upon completing the appropriate change form.
d) After these periods, students enrolled in more courses than their programmes require may, upon having the appropriate change form completed, with the signature of the appropriate undergraduate officer, drop the courses to reduce their programmes to the specified minimum up to but not later than November 1 (Fall term), March 1 (Winter term), July 1 (Spring term).
e) Students may reduce their programmes below the specified minimum only upon the recommendation of the undergraduate officer of the major department.
f) A course that has not been dropped officially (i.e. recorded in the Registrar’s Office) prior to November 1 (Fall term), March 1 (Winter term), July 1 (Spring term) will receive a grade and be counted in the student’s average.
The Calendar is designed to enable students to make a wise choice of the programmes 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.

Caution – Environmental Studies students wishing to take courses where full enrolment might be expected, such as Env St 200, should study their scheduling carefully to ensure that the courses can be fitted, at some time, into their undergraduate programme.

The Faculty of Environmental Studies offers two Faculty Options for students enrolled in Honours programmes: Environmental and Resources Management Option and Regional Development Option. These are comprised of groups of courses correlated with the theme area. If a student passes all these courses with the required standing (B), the Option will be noted on their transcript.

Environmental and Resources Management Option

1) Required Courses
- Env St 195A Introduction to Environmental Studies
- Env St 200 Field Ecology
- Env St 401 Environmental Law
- Geog 356 Resources Management
- Geog/Plan 357 Conservation and Resource Management
- M Env 320 Environmental Economics
- Env St 444 Land Evaluation and Resources Management

2) Some Electives
a) Techniques/Methods (Minimum of 2)
   - Env St 271 Introduction to Quantitative Research Methods
   - Plan 255 Planning Surveys and Analysis
   - Plan 307 Social Survey Techniques
   - Plan 319 Regional Planning Techniques
   - Geog 260 Introduction to Cartography and Analysis
   - Geog 275 Introductory Air Photo Analysis and Remote Sensing
   - M Env 250 Environmental Issues: Methods & Techniques

b) Content Courses
   - Env St 358 Environmental Pollution and its Control
   - Env St 417 Land Use History and Landscape Change 1
   - Env St 418 Land Use History and Landscape Change 2
   - Geog 102 Introduction to Physical Geography

- Geog 201 Some Basic Topics of Physical Geography
- Geog 300 Geomorphology and the Southern Ontario Environment
- Geog 315 Agricultural Geography
- Geog 406 Special Topics in Climatology and Natural Hazards
- Geog 410 Recreation Geography
- Geog 411 Resource Studies
- Geog 414 Resources Management Workshop
- Plan 156 Introduction to Urban and Regional Planning Concepts
- Plan 256 Principles of Environmental Design
- Plan 370 Land Development Planning
- M Env 375E Land and Leisure: Concepts and Methods in Recreational Land Use
- Arch 223 Human Ecology
- Arch 244 History of Gardens of Europe and Western Asia
- Arch 245 Survey of Contemporary Architecture

- Geog 101 Introduction to Human Geography
- Geog 202 Some Basic Topics of Economic and Urban Geography
- Geog 311 Regional Industrial Development
- Geog 350 Regional Urban Systems 1
- Plan 319 Regional Planning Techniques

- Geog 101 Introduction to Human Geography
- Geog 202 Some Basic Topics of Economic and Urban Geography
- Geog 311 Regional Industrial Development
- Geog 350 Regional Urban Systems 1
- Plan 319 Regional Planning Techniques

- Arch 223 Human Ecology
- Arch 244 History of Gardens of Europe and Western Asia
- Arch 245 Survey of Contemporary Architecture

- Plan 358* Regional Planning and Development
- Plan 222 Canadian Regional Issues
- or Geog 322 Geographical Study of Canada

- Geog 311 Regional Industrial Development
- Geog 350 Regional Urban Systems 1
- Plan 319 Regional Planning Techniques
- Arch 223 Human Ecology
- Arch 244 History of Gardens of Europe and Western Asia
- Arch 245 Survey of Contemporary Architecture

- Plan 358* Regional Planning and Development
- Plan 222 Canadian Regional Issues
- or Geog 322 Geographical Study of Canada
Elective Courses (3 half-course credits minimum)

Civ Eng 110 Urban Transport Problems and Prospects
P Sci 102M Contemporary Issues in Canadian Public Policy
Geog 203 Some Basic Topics of Cultural and Regional Geography
Geog 315 Agricultural Geography
Geog 349 The City as a System 1
Geog 352 The Rural-Urban Fringe of Canadian Cities
Geog 412 Geography of Manufacturing Firms and Industries
Geog 449 The City as a System 2
Geog 450 Regional Urban Systems 2
Geog 452 Problems of Rural Land Use
M Env 320 Environmental Economics
M Env 247 Urban Anthropology
M Env 445 Technology Assessment and Policy Analysis
Hist 204C Canadian Urban History
Plan 332 The Sociology of Regions
Plan 333 The Sociology of Regional Planning
Plan 360 Technology in Urban and Regional Planning
Plan 430 Social Policy Planning
Plan 456* Political and Administrative Processes in Urban and Regional Planning
Soc 231 Industrial Sociology
Econ 333 Inter-regional Economics
Econ 335 Economic Development
Econ 343 Urban Economics
*Available to Planning students only.

Courses in the Natural Resources - Ecology Theme

The following courses provide a possibility for students to orient their programmes to stress natural resources and ecology. Students are encouraged to see the Chairman of the Natural Resources - Ecology Committee (Dean's Office).

Ecology-Biology

Env St 200 Field Ecology
Env St 201 Introduction to Environmental and Planning Law
Geog/Plan 357 Conservation and Resource Management
Arch 385 Resources & Design
Biol 130 Biosphere (non lab)
Biol 131 Biosphere (lab)
Biol 236 Biosphere Natural
Env St 401 Environmental Law
Env St 417 Land Use History and Landscape Change 1
Env St 418 Land Use History and Landscape Change 2

Physical

Geog 102 Physical Geography
Geog 201 Physical Geography
Geog 300 Geomorphology of Southern Ontario
Geog 301 Climatology
Geog 302 Geomorphology
Geog 303 Water
M Env 356 Canadian Non-Renewable Resources
Geog 408 Hazards
Geog 461/462 Land Dereliction and Rehabilitation
Earth 130 Lithosphere - Products and Processes
Earth 438 Lithosphere - Geology and Engineering

Human

(Economic, Social, Policy)
M Env 357 Resource Use
M Env 331 International Environment
Geog 356 Resource Management
Geog 410 Recreation
Geog 411 Investment & Resources
M Env 445 Technology and Policy
Geog 413 Behavioural
Geog 414 Resource Management
M Env 410 Environmental Assessment
Env St 417 Land Use History and Landscape Change 1
Env St 418 Land Use History and Landscape Change 2

In addition are some basic techniques - Surveying and mapping, cartography, statistical analysis, air photo interpretation, computer science, field methods, cost benefit (resources-economics).

Applied Environmental Methods

The Environmental Studies Methods Committee coordinates and develops courses, programmes and facilities applicable to environmental research and teaching including: general research and study methodologies, computer applications, regional information systems, computer cartography, ecosystem simulations, and modelling.

A new methods area has been established where printed output and CRT terminals, a graphics terminal, map digitizer, plotter, and thermal copies are located in a research room, graphics lab, tutorial/lecture room and student work room. Computer access and associated consulting support is available to students.

Numerous formal and reading courses are available in the Faculty for students interested in pursuing a methods emphasis in their degree programme. An important developing area is computer aided (building) design. A cooperative project by Architecture and Planning with Public Works Canada is central to this advance.
Interested persons should contact any of the following committee members: R. Newkirk (Chairman), D. Dudycha, E. Farkas, L. Martin, D. Mcintyre, L. Russwurm, R. Schuster, and T. Semple for further information.

Courses in the Social Sciences
To deal adequately with environmental problems it is becoming increasingly essential that students have some understanding of the data and methods of the social sciences. There is at present no official "social science theme" within the Faculty, since the particular combinations of social science courses will vary from one school or department to another, and will change according to different vocational needs on the part of students. However, a wide range of appropriate courses in the concepts and skills of the social sciences exists both within the Faculty of Environmental Studies and elsewhere in the University. Guidance about particular courses for different student career paths is available from any member of the Social Science Framework Committee, which is charged with monitoring social scientific aspects of the curriculum. Faculty members of this committee are: C. Knapper (Chairman), T. Bunting, N. Carter, K. Izumi, B. Mitchell, G. Priddle, A. Schrecker, and S. Lerner.

As part of their undergraduate programme, students may become involved in gathering data from human subjects - for example by means of interviews or surveys. All projects that involve the gathering of such human data must receive the approval of the Committee on Research Involving Human Subjects, and students should ensure that their instructor or supervisor has requested and obtained such approval.

The following statements outline the objectives and nature of the four programmes in the Faculty of the Environmental Studies.

School of Architecture
Nature of the Programme
Architects decide how spaces within and about buildings shall be organized. It is they who determine the shape the total building will take and how it is to be built. They design at major scale with 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 shall be built and supervise the construction process.

Architecture is a vast spread of concerns about people and their surroundings, their history, cultures, resources, disciplines and contradictions. The School's primary concern is the development of design skills in architecture, and it stresses awareness of cultural background and existing environment.

The five-year programme 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 society it serves.

The five years of architectural studies are made up of: a pre-professional, three-year Bachelor of Environmental Studies programme leading to a two-year professional programme of study for the Bachelor of Architecture degree. Both programmes are on the co-operative system which consists of alternating periods of academic study and practical work experience.

Degrees
The pre-professional architecture programme comprises six academic terms of study and three, four-month co-operative work terms leading to the degree, Bachelor of Environmental Studies (B.E.S. Pre-Professional Architecture). This degree indicates appropriate preparation for four subsequent academic terms of study and two co-operative work terms, each of four months duration, leading to the degree, Bachelor of Architecture (B.Arch).

*See Chapter 5 on co-operative programmes.

Non-Architecture Students
Students not enrolled in the School of Architecture may take any architectural course listed in the recommended core programme 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) Programme

The purpose of the B.E.S. programme 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 programme aims to build up knowledge and expertise in various aspects of building and architectural design.

1) the design studio, theories and methods, and practice of architectural design
2) studies of systems and measures including computer, physical and material sciences
3) cultural history in the human environment
4) environmental studies, including natural and human ecology.

See Recommended Core Programme for course arrangement, page 142. See chapter 14 for course descriptions.

Bachelor of Architecture Programme

The Bachelor of Architecture programme 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 programme are normally devoted to a design thesis.

Note

Students are expected to defray costs of materials in connection with studio projects.

See Recommended Core Programme for course arrangement, page 143. See Chapter 14 for course descriptions.

Co-operative Programmes

The Bachelor of Environmental Studies programme includes six terms of study, three four-month co-operative work terms and one “off-term”. The subsequent Bachelor of Architecture programme consists of four terms of academic study and two co-operative work terms, of four months each. The work terms must be approved by the Department of Coordination and Placement.

Note

The “off-term” in the Bachelor of Environment Studies pre-professional programme follows the first two terms of study (from September to April) in Year 1. Students may use the “off-term” as a vacation period or they may seek temporary employment. Any employment arrangements made for the “off-term” are the student’s own responsibility.

The terms are arranged as indicated on the following charts.

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 judgement to assume responsibility for any medium sized building project.
<table>
<thead>
<tr>
<th>Year/Term</th>
<th>Systems and Measures</th>
<th>Ecology</th>
<th>Culture</th>
<th>Design</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Theme Area</td>
<td>Theme Area</td>
<td>Theme Area</td>
<td>Theme Area</td>
</tr>
<tr>
<td>1-A</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fall</td>
<td>Arch 102</td>
<td>Env St 195A</td>
<td>Arch 142</td>
<td>Arch 192</td>
</tr>
<tr>
<td>Sept-Dec</td>
<td>Math</td>
<td>Introduction to Environmental Studies</td>
<td>Iconography 1</td>
<td>Design Fundamentals</td>
</tr>
<tr>
<td></td>
<td>CS 116 (Arc)</td>
<td></td>
<td></td>
<td>(1-1/2 credits)</td>
</tr>
<tr>
<td></td>
<td>Introduction to Computers</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1B</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Winter</td>
<td>Arch 103</td>
<td>Arch 143</td>
<td>Arch 193</td>
<td></td>
</tr>
<tr>
<td>Jan-Apr</td>
<td>Statistics</td>
<td>Iconography 2</td>
<td>Design Fundamentals and Studio</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>(1-1/2 credits)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Arch 163</td>
<td></td>
<td>Arch 194 or FE</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Statistics</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Off-Term</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Spring</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>May-Aug</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 on co-operative programmes).</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2-A</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fall</td>
<td>Arch '212'</td>
<td>Env St 200**</td>
<td>Arch 246</td>
<td>Arch 292</td>
</tr>
<tr>
<td>Sept-Dec</td>
<td>Computer Science</td>
<td>Field Ecology</td>
<td>Foundations of Europe</td>
<td>Design Concepts</td>
</tr>
<tr>
<td></td>
<td>Simulation or FE</td>
<td></td>
<td></td>
<td>and Studio</td>
</tr>
<tr>
<td></td>
<td>Arch 262</td>
<td></td>
<td>Arch 293</td>
<td>(1-1/2 credits)</td>
</tr>
<tr>
<td></td>
<td>Strength of Materials</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Co-op Work Term 1</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, etc.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Winter</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Jan-Apr</td>
<td>Arch 213'</td>
<td>Arch 223**</td>
<td>Arch 247</td>
<td>Arch 293</td>
</tr>
<tr>
<td></td>
<td>Computer Generated Design or FE</td>
<td>Human Ecology or TE</td>
<td>Renaissance</td>
<td>Design Concepts</td>
</tr>
<tr>
<td></td>
<td>Arch 263</td>
<td>Arch 247</td>
<td>Arch 293</td>
<td>and Studio</td>
</tr>
<tr>
<td></td>
<td>Theory of Structures 1</td>
<td></td>
<td></td>
<td>(1-1/2 credits)</td>
</tr>
<tr>
<td>Co-op Work Term 2</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, etc.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fall</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sept-Dec</td>
<td>Arch 372</td>
<td>F.E.*</td>
<td>Arch 346*</td>
<td>Arch 392</td>
</tr>
<tr>
<td></td>
<td>Mechanical Systems 1</td>
<td></td>
<td>Romanticism and 20th Century or FE</td>
<td>Design Concepts</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>and Studio</td>
</tr>
<tr>
<td></td>
<td>Arch 392</td>
<td></td>
<td>Arch 393</td>
<td>(2 credits)</td>
</tr>
<tr>
<td>Co-op Work Term 3</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, etc.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Spring</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>May-Aug</td>
<td>Arch 303*</td>
<td>Arch 313*</td>
<td>Arch 393</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Economics or FE</td>
<td>Computer Generated Design or FE</td>
<td>Design Concepts</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Arch 363</td>
<td>Arch 393</td>
<td>(2 credits)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Theory of Structures 2</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Programme for the Degree of Bachelor of Architecture

<table>
<thead>
<tr>
<th>Year/Term</th>
<th>Systems and Measures</th>
<th>Ecology</th>
<th>Design</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Theme Area</td>
<td>Theme Area</td>
<td>Theme Area</td>
</tr>
<tr>
<td>Co-op Work Terms</td>
<td>This period of 8 months may serve many objectives. A student after the first degree programme has time in which he may travel and decide about his future goals before returning to the School for the second degree programme. During that time a student may continue the co-op terms wherein he obtains experience in design research; in assisting in the development of conceptual designs and schematics, preparation of site plans and details, floor plans, elevations, cross-sections and standard details; in assisting the site architect or construction superintendent; etc.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4-A Fall</td>
<td>Arch 452 Specifications</td>
<td>Arch 492 Design Studio (2 credits)</td>
<td></td>
</tr>
<tr>
<td>Sept-Dec</td>
<td>Arch 462 Structural Synthesis 1</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Arch 472 Mechanical Systems 2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4-B Winter</td>
<td>Arch 455* Management and Estimating or FE</td>
<td>Arch 423** Urban Planning or TE</td>
<td>Arch 493 Design Studio (2 credits)</td>
</tr>
<tr>
<td>Jan-Apr</td>
<td>Arch 463 Structural Synthesis 2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Co-op Work Terms</td>
<td>This is the last co-op term of 8 months before the final year of study. On the basis of previous experience in a variety of jobs, a student is capable of handling somewhat advanced work in professional offices such as: design research; preparation of design schematics and small project design; preparation of site plans and details; development of special details; co-ordination of consultants work and site architect on small projects, and assisting construction superintendent on large projects; etc.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5-A Winter</td>
<td>Arch 554* Development and Financing or FE</td>
<td>Arch 592 Design Studio (3 credits)</td>
<td></td>
</tr>
<tr>
<td>Jan-Apr</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5-B Spring</td>
<td>Arch 555 Architectural Practice</td>
<td>Arch 593 Design Studio (3 credits)</td>
<td></td>
</tr>
<tr>
<td>May-Aug</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
* The course may be replaced by a 'free elective'
** The course may be replaced by a 'theme elective'
FE (Free Elective) constitutes any course in any Faculty at the University of Waterloo.
TE (Theme Elective) constitutes a recommended course in the Faculty of Environmental Studies.
Note Department approval of electives is mandatory.
Department of Geography

Nature of the Programme

Geography is concerned with both the natural and man-made environment, studying how man has shaped it according to the 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) programme in Honours Geography provides students with almost unlimited freedom to choose supporting electives from across the whole University. Thus, in consultation with professors, students will be able to have a tailor-made programme to suit their particular needs, whether they are primarily interested in physical or human geography, regional or systematic topics, or a combination of these. Certain approved options may be designated on a student's transcript; these are specified on p. 149. The Department has Joint Honours programmes with a number of other departments on campus.

The Honours Geography programme provides a sound, well-rounded foundation in the discipline, and prepares the student for specialization at the graduate level in almost any aspect of Geography. The programme includes a group of mandatory core courses that provide a balance of content and technique. The content courses include a series of integrated courses in both physical and human geography, using a systems approach. The technique courses include field methods, remote sensing, cartography, statistical analysis, and computer use. The fourth year includes a research project known as the Senior Honours Essay.

In the programme there is emphasis on both the development of theory and methodology and on 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 programmes are enhanced by the availability in the Faculty of elective courses in Urban and Regional Planning and Man-Environment Studies given by faculty with academic and practical experience in urban and regional planning, resource management, conservation, and environmental design.

Many graduates of the Geography Programme proceed to further graduate work or jobs in education, in government, industry and planning agencies.

Although the programme is broad in scope, six major aspects of the discipline have been formalized into options. The Honours student may therefore take one of these options, as specified on p. 149 though this is not in any way required. Further concentration is possible by careful selection of courses from related fields in other parts of the University. However, a student may prefer to design his/her programme along other lines of specialization, or to pursue a non-specialized programme and the Department will be pleased to assist.

The programme is liberal in that the only requirement other than the core of Geography courses is that five of the elective courses be taken outside the Faculty of Environmental Studies. These may be taken in one discipline or in a variety of disciplines.

The Department of Geography also offers an Honours Co-operative Programme. Students will be admitted to the Co-operative Programme after spending their first year in one of the other Geography programmes on the basis of academic standing and interviews. The Co-op Programme provides for alternate terms of practical work experience and academic study. Co-op Geography students will enter their first work term in the Winter of the second year. Students anticipating entry to the Honours Co-operative Programme should be aware that a number of specific courses are required in the first year. The minimum number of successful work terms required for a Co-operative degree is normally four. Co-op Geography students are required to specialize in one of the theme areas outlined for the Co-op programme (p. 146).

Inquiries for additional information regarding Co-operative studies should be directed to the Department Chairman.

Upon successful completion, students taking the geography programme in the Faculty of Environmental Studies will receive a B.E.S. (Bachelor of Environmental Studies) degree and those in the Faculty of Arts will receive a B.A. (Bachelor of Arts) degree. The Co-op Geography Programme is not available in the Faculty of Arts.

The Department of Geography has both Master's (M.A.) and Ph.D. graduate programmes. At the graduate level the course work and research is concentrated on some specific subfield of Geography. The Department's 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, and Europe.
Bachelor of Environmental Studies

Undergraduate Geography Courses

Note 1
All courses are open to any student from any Faculty or School of this University whenever prerequisites are met and space permits. However, space limitations may from time to time mean that students admitted to the University or otherwise in good standing cannot be guaranteed course and programme selections of their choice.

Note 2
The Department of Geography offers General and Honours programmes both in the Faculty of Environmental Studies (B.E.S.) and the Faculty of Arts (B.A.). Joint honours programmes with most subjects in the University may be arranged subject to approval. For further discussion of these programmes see p. 150.

Note 3
The letter R designates courses given through Renison College.

Note 4
Geog 101 and Geog 102 are given in both fall and winter terms. It is immaterial which of these courses is taken first as neither is sequential to the other.

Note 5
For students in the Faculty of Environmental Studies, courses designated "Environmental Studies" (pp. 300) will be included with geography courses in the calculation of their major average and will be counted in the determination of minimum courses in the geography programme.

Note 6
Courses with a laboratory component of 2 hours or more are given a credit weight of 0.75. This does not apply in cases where there is a tutorial, seminar or discussion component.

Bachelor of Environmental Studies

General Geography Programme

<table>
<thead>
<tr>
<th>Year 1</th>
<th>Geog 102</th>
<th>Introduction to Physical Geography</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Geog 110</td>
<td>Tutorial in Geography</td>
</tr>
<tr>
<td></td>
<td></td>
<td>and one of, but not more than two of:</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Geog 101</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Env St 195</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Geog 125R</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Geog 126R</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Geog 127</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Additional electives to make a maximum of no more than 6 credits in all.</td>
</tr>
<tr>
<td>Year 2</td>
<td>Env St 200</td>
<td>Field Ecology</td>
</tr>
<tr>
<td></td>
<td>Geog 201</td>
<td>Some Basic Topics of Physical Geography</td>
</tr>
<tr>
<td></td>
<td>Geog 202</td>
<td>Some Basic Topics of Economic and Urban Geography</td>
</tr>
<tr>
<td></td>
<td></td>
<td>one of: Geog 203</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Geog 204</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Geog 205</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Geog 220</td>
</tr>
<tr>
<td></td>
<td></td>
<td>and additional credits so that a student should have completed by the end of the second year 11 full course credits.</td>
</tr>
<tr>
<td>Year 3</td>
<td>Geog 381</td>
<td>The Nature of Geography</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Additional credits so that a student will have completed at least 16 credits of which at least 6 are in Geography and 4 are outside the Faculty of Environmental Studies.</td>
</tr>
</tbody>
</table>

Note 1
Sixteen credits is the minimum requirement for the degree of Bachelor of Environmental Studies (General Geography). However, students may exceed this minimum.

Note 2
A minimum of six course credits in Geography and Environmental Studies, of which five must be designated as Geography courses constitutes a Geography major. Students may choose additional Geography electives, and are encouraged to do so.

Note 3
Students must take a minimum of four course credits in Faculties other than the Faculty of Environmental Studies.
Note 4

Students must maintain an overall average of C- (60.0) with a major average of C (65.0). The major average is made up of grades in Geography and Environmental Studies courses (this does not include courses in Architecture, Man-Environment Studies or Urban and Regional Planning).

Honours Geography

A) Regular Programme

Year 1
Geog 102 Introduction to Physical Geography
Geog 110 Tutorial in Geography

and one but no more than two of:
Geog 101 Introduction to Human Geography
Env St 195A Introduction to Environmental Studies
Env St 195B Introduction to Environmental Problems
Geog 125R Introduction to the Third World
Geog 126R Development in the Third World
Geog 127 Regional Problems of Europe

Electives: see note 1 below.

Year 2
Env St 200 Field Ecology
Geog 201 Some Basic Topics of Physical Geography
Geog 202 Some Basic Topics of Economic and Urban Geography

two of:
Geog 260 Introduction to Cartography and Map Analysis
Geog 275 Introductory Air Photo Analysis and Remote Sensing
Env St 271 Introduction to Quantitative Research

and one of:
Geog 203 Some Basic Topics of Cultural and Regional Geography
Geog 204 Soviet Geography
Geog 205 Africa
Geog 220 World Regional Geography

Electives: see note 1 below.

Year 3
Geog 381 The Nature of Geography
Geog 390 Senior Honours Essay Research Proposal
Geog 391 Field Research

one of:
Geog 260 Introduction to Cartography and Map Analysis
Geog 275 Introductory Air Photo Analysis and Remote Sensing
Env St 271 Introduction to Quantitative Research

and one of:
Geog 316 Multivariate Statistics
Geog 317 Nonparametric Statistics
Geog 318 Spatial Analysis
Electives: see note 1 below.

Year 4
Geog 490A and B Senior Honours Research Essay and additional course credits so that a student should have a minimum of 24 full credits of which at least 5 should be outside the Faculty of Environmental Studies and at least 11 in Geography and Environmental Studies.

B) Co-operative Programme

Year 1
Fall Term Core Courses
Geog 102 Introduction to Physical Geography
Geog 110 Tutorial in Geography
Geog 260 Introduction to Cartography & Map Analysis
Math 105 Math for Environmental Studies
(if no Year 5 Math)

and one of:
Geog 101 Introduction to Human Geography
Geog 125R Introduction of the Developing World
Geog 126R The Emerging "Third World"
Geog 127 Regional Problems of Europe
Env St 195A Introduction to Environmental Studies
Env St 195B Introduction to Environmental Problems

Theme Courses
one course in one of the following areas – Business, Economics, Languages, Earth Sciences, Biology
Environmental Studies
Geography

Electives - see note 1 below

Winter Term Core Courses

Either
Geog 201 Some Basic Topics of Physical Geography
Or
Geog 202 Basic Topics of Economic & Urban Geography

Plan 156 Introduction to Urban & Regional Planning Concepts

Either
Geog 275 Introductory Air Photo Analysis and Remote Sensing
Or
Env St 271 Introduction to Quantitative Research Methods

Theme Courses
one course in one of the following areas - Business, Economics, Languages, Earth Sciences, Biology

Electives - see note 1 below

Year 2
Fall Term Core Courses

Env St 200 Field Ecology
Engl 210 Report Writing

Either
Geog 275 Introductory Air Photo Analysis and Remote Sensing
Or
Env St 271 Introduction to Quantitative Research Methods

Either
Geog 201 Some Basic Topics of Physical Geography
Or
Geog 202 Basic Topics of Economic & Urban Geography

Theme Courses
none

Electives - see note 1 below

Winter Term
Work Term 1

Spring Term 2B Core Courses

One of:
Geog 203 Some Basic Topics in Cultural and Regional Geography
Geog 204 Soviet Geography
Geog 205 Africa
Geog 220 World Regional Geography

Theme Courses
at least three courses of which one course must be taken in the theme the student has selected as a continuing theme. The themes are: techniques, applied physical geography, urban geography, economic geography, resource management

Electives - see note 1 below

Fall Term
Work Term 2

Year 3

Winter Term 3A Core Courses

Geog 381 The Nature of Geography
Env St 272 Computer Programming in Environmental Studies

one of
Geog 316 Multivariate Statistics
Geog 317 Nonparametric Statistics
Geog 318 Spatial Analysis

Theme Courses
three courses of which two courses must be in the continuing theme

Electives - see note 1 below

Spring Term
Work Term 3

Fall Term 3B Core Course

Geog 390 Senior Honours Essay Research Proposal

Theme Courses
same as Winter Term 3A

Electives - see note 1 below

Year 4

Winter Term
Work Term 4

Spring Term 4A Core Course

Geog 490A Preparation of Senior Honours Research Essay

Theme Courses
at least two courses of which a maximum of one course is in the continuing theme

Electives - see note 1 below

Fall Term
Work Term 5

Winter Term 4B Core Course

Geog 490B Senior Honours Research Essay
Theme Courses
same as 4A

Electives - see note 1 below

Note 1
Such additional credits as are necessary to ensure that by the time of graduation a student has a minimum of 24 credits, of which at least 11 are in Geography and Environmental Studies and at least 5 are outside the Faculty of Environmental Studies.

Notes on Honours Programme (Regular and Co-op)

Note 1
Twenty-four full credits is the minimum requirement for the award of the degree Bachelor of Environmental Studies (Honours Geography - regular and Co-op). Honours Geography students must therefore ensure that, in addition to the courses required for the degree as outlined above, they take additional courses as electives to obtain an average of at least six full credits per academic year.

Note 2
Students are required to take at least eleven credits in Geography/Environmental Studies (this means courses designated Environmental Studies, Calendar pages 300-302). Of those, at least nine credits must be in courses designated as Geography.

Note 3
Students must take a minimum of five credits in Faculties other than the Faculty of Environmental Studies.

Note 4
To enter Year 2 of the Honours Geography programme, a student must achieve in Year 1 a minimum overall average of B- (70.0) and an average of B (75.0) in his Geography and Environmental Studies courses. (This means courses designated Environmental Studies, Calendar pp. 300-302). In subsequent years, a student must continue to achieve an overall average of B- (70.0) and an average of B (75.0) in Geography and Environmental Studies Courses.

Note 5
For students wishing to specialize, the Department offers a series of options as detailed below. Students meeting the requirements of an option (which are additional to the core requirements identified above), will have that option designated on their official university transcript. Students in the Co-op programme must in any event select an area of specialization from the theme areas identified above.

Note 6
Since many departments doing graduate work in Geography demand proficiency in a foreign language, students intent on graduate work should consider taking a foreign language in their first year.

Note 7
Students intending to teach in Secondary Schools are advised to take at least two credits of Regional Geography.

Note 8
This programme prepares students for graduate study in Geography or in Planning, for entry to Secondary School teaching, or for research positions in industry, commerce and government.

Note 9
All Geography students in the regular programme are encouraged to take summer employment which will provide experience useful to a geographer. Where possible, the Environmental Studies Placement Office will provide information and assistance in securing such summer employment. Co-op Geography students will gain appropriate employment experience as part of their degree requirements.

Note 10
For some courses, participating students may be expected to make a financial contribution to defray heavy equipment/travel costs, e.g. Geog 391 (Field Camp), which is mandatory for all third year honours students. Statements on fees, where required, will be found with the course description (pp. 310)

Note 11
No more than 1- 1/2 credits may be taken as reading courses in Geography.

Honours Geography Options
The following options represent recognised fields of specialization within the Honours Programmes. Students may elect one option, which will be designated on their transcript upon satisfactory completion of the requirements.
All students must fulfil their regular requirements for the honours degree and are responsible for meeting prerequisite courses.
Applied Physical Geography Option
Earth 121 Introductory Geology 1
Earth 122 Introductory Geology 2
Biol 231 Concepts of Ecology
Geog 301 Climatology
Geog 302 Geomorphic Processes
Geog 303 Physical Basis and the Geography of Water
Geog 375 Air Photo Interpretation and Remote Sensing 1
Geog/Plan 357 Conservation and Resource Management
Geog 407 Field and Lab Techniques in Geomorphology
Geog 451 Soils Geography

Urban Geography Option
Plan 156 Introduction to Urban and Regional Planning Concepts
Geog 311 Regional Industrial Development
Geog 349 The City as a System 1
Geog 350 Regional Urban Systems 1
Geog 449 The City as a System 2
Geog 450 Regional Urban Systems 2

3 of the following (to include the year 3 statistics requirement of the Honours Programme)
Geog/Plan 307 Social Survey Techniques
Geog/Plan 316 Multivariate Statistics
Geog/Plan 317 Non-Parametric Statistics
Geog/Plan 318 Spatial Analysis
Geog/Plan 319 Regional Planning Techniques

2 of
Plan 370 Land Development Planning
Env St 402 Planning Law
Civ Eng 543 Land Use Models

Regional Geography Option
Students are expected to take one course from the list below in their first year, and 2 courses in each subsequent year. A further 3 courses of selected electives must be selected in consultation with the option co-ordinator. These will normally represent either themes and techniques from within geography relevant to the individual’s particular interests, or related studies in disciplines other than geography.

The regional courses will be selected from the following list:
Geog 127 Regional Problems of Europe
Geog 125R Introduction to the Third World
Geog 126R Development in the Third World
Geog 225R Urbanization in the Third World
Geog 226R Food and Agriculture, and Integrated Rural Development in the Third World
Geog 204 Soviet Geography
Geog 205 Africa
Geog 220 World Regional Geography
Geog 321 Geographical Perspectives on Contemporary Problems of the American Society
Geog 322 Canada
Geog 323 Comparative Regional Problems
Geog 325R Special Topics in the Study of “Third World” Development
Geog 326R Special Topics in Development of the Third World
Geog 421 Europe and the Mediterranean
Geog 422 Canada
Geog 423 Central and Eastern Europe
Geog 424 Soviet Geography
Geog 425 Africa
Geog 426-432 Selected World Regions
Geog 430 Field Research in Regional Geography

Environmental and Resources Management Option
Env St 195A Introduction to Environmental Studies
Env St 401 Environmental Law
Env St 444 Land Evaluation and Resources Management
Env St 320 Environmental Economics
Geog 316 Multivariate Statistics
Geog 317 Nonparametric Statistics
Geog 356 Resources Management
Geog/Plan 357 Conservation and Resources Management
Geog 375 Air Photo Interpretation and Remote Sensing 1

three of
Geog 358 Water Planning and Management: Strategies and Experiences
Geog 410 Recreation Geography
Geog 411 Resources Studies
Geog 414 Resources Management Workshop
Joint Honours

Joint Honours programmes have been arranged between Geography and several other disciplines in the University. Detailed programmes have been worked out with Anthropology, Canadian Studies, Economics, English, French, German, History, Man-Environment Studies, Mathematics, Political Science, Recreation and Russian. The programmes “Geography with Biology” and “Geography with Earth Sciences” are not joint honours programmes. These programmes lead to the degrees of the faculty in which the student is registered, providing always that in addition to the requirements of the specific programme the general requirements of the faculty have been met. For the programmes already approved, depending on the student’s registration, the following degrees may be awarded:

BES or BA Joint Geography with: Anthropology Canadian Studies Economics, English, French German, History Man-Environment Studies Political Science Recreation Russian

BES or BA Mathematics or BMath

BES or BSc Earth Sciences

The Department of Geography is prepared to work out other programmes for keenly interested students who meet Honours standards.

Geography core requirements in joint programmes are identical with those of the Geography Honours Regular Programme above, with the exception that where both Departments participating in the programme require specific courses of similar content, a student shall meet that requirement in one Department only. This might be expected to apply in the cases of technique courses, field research and the Senior Honours Essay. Further information concerning Joint Honours Programmes may be obtained from the Undergraduate Officer of the Department.

Geography Minor for Honours Students in Other Faculties

The requirements are the same as those noted for the General Geography Programme, i.e. core requirements plus electives to make 6 credits.
Department of Man-Environment Studies

Nature of the Programme

Man-Environment Studies is a four year honours degree programme 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 enquiry into such complex interrelationships along with related study in the contributory academic disciplines, ample scope is provided for acquiring a broad-based education which recognizes to a degree the need for contemporary “relevance” in the approach and content of higher education.

More important is the educational process sought from a thematic programme such as man-environment studies, which is not artificially constrained by conventional boundaries of academic disciplines. This educational process derives from the recognition that many of the complex interrelated problems of the contemporary world and the future will require attention from people who not only have specialized technical abilities, but who also have the perspective, awareness and understanding necessary to exercise these abilities effectively in co-operation with others and take some measure of responsibility for the human, social and other implications of the results.

The Man-Environment Studies programme does not in itself concentrate on one technical or pre-professional field to meet specifications for particular jobs. However, by investigating a wide range of subjects and problems inherent in the theme of man-environment interrelationships, students obtain a clearer understanding of the range of options open to them for specialized study and can thereby decide more knowledgeably how best to proceed. The programme offers a good base and considerable flexibility from which more specialized qualifications can be sought in a number of related areas through concurrent and, especially, through graduate study.

Graduates holding the BES degree in Man-Environment 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 assistants, and with community agencies in various social programmes and as community organizers. Others who have graduated from Man-Environment Studies have gone on to post-graduate work in programmes 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 unique 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 programme qualifications in fields such as anthropology, agriculture, biology, chemistry, chemical engineering, communications science, earth sciences, economics, fine arts, geography, mathematics, physics, planning, political science, psychology, sociology and social work, as well as a variety of experience in such diverse areas as the planning of education systems, ecological research, geological investigations, economic studies, urban affairs, technology assessment, and work with various international organizations.

For the approach used in Man-Environment Studies, considerable academic innovation has been necessary. Besides lectures and labs, the programme uses modular instruction units; 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. Although there are no formal arrangements for a co-operative programme in Man-Environment Studies, students are encouraged to relate aspects of their academic programme to summer and other employment or to involvement in community organizations in order to incorporate this experiential learning into a university-based educational process.

For many students a “theme” oriented programme of this kind offers a more satisfying undergraduate education than traditional alternatives. Man-Environment Studies started at Waterloo in 1969 and as an undergraduate degree programme it is unique in Canada although similar ones have become established in the United States, Europe and Australia.

It is recommended that persons desiring more explicit information concerning the programme contact the Undergraduate Officer, Department of Man-Environment Studies directly.
**Bachelor of Environmental Studies**  
*(Honours Man-Environment Studies)*

The formal admission requirements of the programme are listed beginning on page 26 of this calendar. No specific Year 5 courses are required, but some science or mathematics would be helpful. Competence in English composition is expected. Applicants who have been out of school for a number of years are considered on their work and travel experiences as well as their past academic record.

About one half of the 22 courses required for the BES degree are designated as a core of required courses. The remainder are free electives chosen by each student to develop the mix of subjects and skills best suited for achieving individual educational or career preparation objectives.

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 man-environment studies such as a systems mode of understanding relationships and the "futures" implications of the problems considered. Additional course work on 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 one from among several honours seminars which provide the occasion for students to draw together much they have learned and direct it to one of the broad sub-areas within man-environment studies.

The stress given to project-oriented learning within the programme 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 government 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 programme. Faculty will advise on this, but essentially there are four broad options as follows:

**a)** Students may combine Man-Environment Studies with one academic discipline to the extent that some form of a joint honours degree can be awarded.

Arrangements to do this have been approved with seven other academic programmes in the University and more are being considered. Students interested in this type of option should make certain they consult with the Undergraduate Officer.

**b)** Students may concentrate study in an associated field to the extent it becomes a "minor" (5 full courses or equivalent) within honours Man-Environment Studies.

**c)** Students may develop a coherent sequence of courses from electives offered by the Department in combination with courses offered elsewhere to concentrate on one of several possible sub-areas emerging within man-environment studies, i.e. human and community studies, resource and environmental management, policy and decision-making at the interface of technology and society.

**d)** Students may choose instead to explore whatever range of subjects interest them in addition to Environmental Studies.

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 B.E.S. degree. They would also do well to seek information and advice on the kind of undergraduate courses favoured by different graduate programmes either as absolute prerequisites for them or expressed preferences.

The Honours programme requires a minimum of six full credits or the equivalent for the first two years and five full credits or their equivalent in the third and fourth years. Each student must have completed twenty-two full credits or the equivalent before graduation with a cumulative overall average of B- (70.0); a major average of B (75.0) must be maintained in the required courses. There are a number of evaluation techniques used to determine grades.
The programme is as follows:

### Year 7

<table>
<thead>
<tr>
<th>Code</th>
<th>Course Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>Env St 195A</td>
<td>Introduction to Environmental Studies</td>
</tr>
<tr>
<td>M Env 130(F)</td>
<td>Environmental Issues 1</td>
</tr>
<tr>
<td>M Env 131(W)</td>
<td>Environmental Issues 2</td>
</tr>
<tr>
<td>M Env 150(F)</td>
<td>Environmental Methods &amp; Techniques 1</td>
</tr>
<tr>
<td>M Env 151(W)</td>
<td>Environmental Methods &amp; Techniques 2</td>
</tr>
<tr>
<td>M Env 190(F)</td>
<td>Seminar-Workshop</td>
</tr>
<tr>
<td>M Env 191(W)</td>
<td>Seminar-Workshop</td>
</tr>
</tbody>
</table>

Electives: Two and a half full credits: five half-year courses or equivalent

### Year 2

<table>
<thead>
<tr>
<th>Code</th>
<th>Course Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>M Env 241</td>
<td>Social Change, or one other half-year course in social sciences</td>
</tr>
<tr>
<td>Env St 271</td>
<td>Introduction to Quantitative Research Methods, or one other introductory methods course approved by the Department (see Undergraduate Officer)</td>
</tr>
<tr>
<td>M Env 290(Y)</td>
<td>Seminar-Workshop</td>
</tr>
<tr>
<td>M Env 295</td>
<td>Development of Environmental Thought</td>
</tr>
</tbody>
</table>

Electives: Three full credits or equivalent (i.e. six half-year courses)

### Year 3

<table>
<thead>
<tr>
<th>Code</th>
<th>Course Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>M Env 390(Y)</td>
<td>Seminar-Workshop (credit value can be increased to 2 by consent of Faculty)</td>
</tr>
</tbody>
</table>

Electives: Three or four full credits or equivalent (i.e. six or eight half-year courses)

### Year 4

<table>
<thead>
<tr>
<th>Code</th>
<th>Course Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>M Env 490(Y)</td>
<td>Senior Honours Assignment (credit value can be increased to 2 or 3 by consent of Faculty)</td>
</tr>
</tbody>
</table>

One of the following Honours Seminars:

- M Env 410(Y) Environmental Management
- M Env 445(Y) Technology Assessment and Policy Analysis
- M Env 470(Y) Environmental Teaching and Learning
- M Env 480(Y) Special Topics Seminar

Electives: One to three full credits or equivalent

### Joint Honours

Joint programmes have been approved between the Department of Man-Environment Studies and the Departments of Economics, Geography, Germanic and Slavic Languages and Literature (for Russian), Philosophy, Political Science, Psychology, Recreation, Sociology and Anthropology. Joint programme arrangements have also been made with the Faculty of Mathematics and a special Honours Man-Environment Studies (with Biology Option) programme has been arranged with the Department of Biology.

These programmes lead to degrees from the Faculty in which the student is registered. Students from other departments choosing one of these joint programmes must complete the equivalent of seven full courses in Man-Environment Studies. The Department of Man-Environment Studies is prepared to work out other programmes for interested students who meet honours standing.

### School of Urban and Regional Planning

**Bachelor of Environmental Studies (Honours Urban and Regional Planning Programme)**

**Nature of the Programme**

The emphasis of the programme is on planning as a process, conceived in terms broad enough to include policy-making, research and decision making. The subject focus is regional; that is, the integrated planning of regions, large and small, with both their urban and rural components, including urban-centred or core regions, in which the policy emphasis is on environmental issues and other regional 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.

In order to implement this approach, the School of Urban and Regional Planning has gathered a team of faculty with diverse academic backgrounds and various kinds of planning experience.

The broad educational aim of the School is to prepare the student for active participation in the planning process. This leads to an approach which gives equal emphasis to the 'why' and 'how' of planning. To make this effective, and vital, has required 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 the integration within the programme of selected elements from the discipline of Geography and from other sciences, social sciences 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 programme 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 planning experience into the programme is considered an important part of the education process. Students are expected to gain planning experience during the summer period. The School endeavours to help students find suitable work, particularly between their second and third, and third and fourth years. It is hoped that through the work of the Professional Liaison Officer, the student 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.

Appropriate experience provides the maturing prospective planner with an opportunity for gaining a better understanding of the discipline and allows for the testing of personal interests, learning and aptitudes. In seeking assistance for finding meaningful planning experience, students will be asked to give permission for the release of their marks to employers.

Because of the importance placed upon effective communication, incoming students are expected to have a demonstrated proficiency in English writing skills. All incoming undergraduate planning students are required to take the English Language Proficiency Examination offered by the English Department at the start of the fall term and, if indicated by the examination, to take the appropriate remedial work in addition to normal course and credit requirements. With an increased emphasis in the profession on quantitative analytical techniques, it is highly recommended that students take at least one Year 5 level math course. Students with deficiencies in these areas can elect to take equivalent or remedial courses in their first year of the programme.

Students with advanced standing will be considered for admission to Year 2.
## Honours Urban and Regional Planning Recommended Programme

<table>
<thead>
<tr>
<th>Year</th>
<th>Required Planning Courses</th>
<th>Required Elective Courses</th>
<th>Elective Planning Courses</th>
<th>Other Electives</th>
</tr>
</thead>
<tbody>
<tr>
<td>Year 1</td>
<td><em>Plan 100 - Introduction to Urban Planning Concepts and Techniques</em></td>
<td>One-half credit from each of the eight categories in the list of Year 1 Required Elective Courses (see below)</td>
<td><em>Plan 159 - Graphics for Planning</em></td>
<td>Students may select other electives from any of the University Year 1 offerings – Required and Elective Courses together must total 6 full credits - all courses to be at the first year level.</td>
</tr>
</tbody>
</table>

Select those courses which appear to be best suited to your interests and background. *(N.B. There are no "best" courses).*

Before making a final selection in these courses, students should check that prerequisites have been covered for courses they might wish to take in Year 2, 3 and 4.

### Year 1 Required Elective Courses

**Theme Areas**

1. **Ecology**  
   *Bio 130 or 131 Introduction to Biology*  
   *Earth 121/122 Introductory Geology*  
   *Geog 102 Introduction to Physical Geography*  
   *Sci 100 Geological Foundations of the Environment*

2. **Administration**  
   *P Sci 101 Introduction to Politics 1*  
   *P Sci 102 Introduction to Politics 2*

3. **Design**  
   *Anth 105 Anthropology Through Science Fiction*  
   *Arch 142 Iconography 1*  
   *Arch 194 Visual Interdisciplinary Language*  
   *Fine 120 Fundamentals of Visual Art*  
   *Plan 159 Graphics for Planning*

4. **Habitat**  
   *Anth 101B Human Ecology and Adaptability*  
   *Env St 195A Introduction to Environmental Studies*  
   *Geog 101 Introduction to Human Geography*  
   *Rec 100 Introduction to the Study of Leisure and Recreation*

5. **Methodology**  
   *Anth 103 Nature of Language*  
   *Anth 104 Language Learning*  
   *Arch 112/113 Computer Science*  
   *CS 116 Introduction to Computers*  
   *CS 117 Applications and Implications of Computers*  
   *Engl 109 Basic Writing Skills*  
   *Fr 101 Reading French*  
   *Engl 150/151 English as an Instrument of Thought*  
   *Math 105 Math for Environmental Studies*  
   *Phi 140 Fundamentals of Logic*  
   *Sy De 161 Systems Behaviour*  
   *Sy De 162 Engineering Design Methodology*

6. **Sociology**  
   *Soc 101U Introduction to Sociology*  
   *(if taught, otherwise Soc 101)*

7. **Economics**  
   *Econ 100 Introduction to Modern Economics*  
   *Econ 101 Introduction to Micro-Economics*  
   *Econ 102 Introduction to Macro-Economics*

8. **Philosophy**  
   *Arts 122G Quest for Meaning in the 20th Century*  
   *Engl 108B Utopia and Anti-Utopia*  
   *Engl 108H Isolation and Alienation*  
   *Hist 101F Western Civilization*  
   *Hist 105 The Meaning of Civilization*  
   *Phil 125 Fundamentals of Social and Political Philosophy*  
   *Phi 140 Fundamentals of Logic*  
   *Phi 145 Critical Thinking*  
   *Phi 150 Knowledge and Reality*
<table>
<thead>
<tr>
<th>Year</th>
<th>Required Planning Courses</th>
<th>Required Elective Courses</th>
<th>Elective Planning Courses</th>
<th>Other Electives</th>
</tr>
</thead>
<tbody>
<tr>
<td>Year 2</td>
<td><strong>Env St 200 - Field Ecology</strong>&lt;br&gt;<strong>Plan 256 - Principles of Environmental Design</strong>&lt;br&gt;<strong>Env St 271 - Introduction to Quantitative Research Methods</strong>&lt;br&gt;<strong>Plan 307 - Social Survey Techniques</strong>&lt;br&gt;<strong>(Prerequisite: Env St 271)</strong></td>
<td>One full credit from list of Required Elective Courses (see following page)</td>
<td><strong>Plan 222 - Canadian Regional Issues</strong>&lt;br&gt;<strong>Plan 230 - The Small Group in the Planning Process</strong>&lt;br&gt;<strong>Plan 258 - Readings and Research in Planning</strong>&lt;br&gt;<strong>Env St 272 - Computer Programming in Environmental Studies</strong></td>
<td>Required and Elective Courses together to total 6 full credits&lt;br&gt;List of 'Non-Planning Suggested Electives' obtainable from Undergraduate Officer</td>
</tr>
</tbody>
</table>

and at least 2 of:<br>**Plan 255 - Planning Surveys and Analysis**<br>**Plan 358 - Regional Planning and Development**<br>**Plan 357 - Conservation and Resource Management**

| Year 3 | **Plan 300 - Seminar/Workshop Project in Urban and Regional Planning**<br>**Plan 307 - Social Survey Techniques**<br>**Plan 391 - Field Research Methods and Projects** | Two full credits from list of Required Elective Courses (see following page) | **Geog 352 - Rural Urban Fringe of Canadian Cities**<br>**Plan 301 - Planning Design**<br>**Plan 316 - Multivariate Statistics**<br>**Plan 317 - Nonparametric Statistics**<br>**Plan 318 - Spatial Analysis**<br>**Plan 319 - Regional Planning Techniques**<br>**Plan 330 - Urban Social Planning**<br>**Plan 332 - The Sociology of Regions**<br>**Plan 333 - The Sociology of Regional Planning**<br>**Plan 344 - Principles of Recreation Planning**<br>**Plan 360 - Technology in Urban and Regional Planning**<br>**Plan 370 - Land Development Planning** | Required and Elective Courses together to total 6 full credits<br>List of 'Non-Planning Suggested Electives' obtainable from Undergraduate Officer |

| Year 4 | **Plan 456 - Political and Administrative Processes in Urban and Regional Planning**<br>**Plan 480 - The Philosophy and Methodology of Urban and Regional Planning**<br>**Plan 490 - Senior Honours Essay**<br>(2 full course credits) | One full credit from list of Required Elective Courses (see following page) | **Env St 401 - Environmental Law**<br>**Env St 402 - Planning Law**<br>**Plan 414 - Housing Policies**<br>**Plan 430 - Social Policy Planning**<br>**Plan 431 - Citizen Involvement, Social Action Strategies, and Social Change**<br>**Plan 470 - Concepts and Ideas in Contemporary Urban Planning**<br>**Plan 475 - Projects, Problems and Readings in Planning**<br>**Plan 476 - Projects, Problems and Readings in Planning** | Required and Elective Courses together to total 6 full credits<br>List of 'Non-Planning Suggested Electives' obtainable from Undergraduate Officer |
### Environmental Studies
**Urban and Regional Planning**

<table>
<thead>
<tr>
<th>Year 2-4 Required Elective Courses</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Urban Theme</strong></td>
</tr>
<tr>
<td>These courses are subject to availability</td>
</tr>
</tbody>
</table>

**Year 2**
- **Plan 230** The Small Group in the Planning Process
- **Env St 272** Computer Programming in Environmental Studies
- **Anth 247** Urban Anthropology
- **Geog 201** Some Basic Topics of Physical Geography
- **Geog 202** Some Basic Topics of Economic and Urban Geography
- **Hist 204C** Canadian Urban History
- **Hist 265B** Canadian History 2
- **PSci 260** Canadian Government and Politics
- **Soc 240** Collective Behaviour
- **Soc 241** Social Movements

**Year 3**
- **Plan 301** Planning Design
- **Plan 330** Urban Social Planning
- **Plan 360** Technology in Urban and Regional Planning
- **Plan 370** Land Development Planning
- **Civ E 342** Urban Transport Planning 1
- **Civ E 393** Environmental Engineering
- **Econ 343** Urban Economics
- **Geog 350** Regional Urban Systems 1
- **PSci 344** Urban Politics 2
- **Soc 301** Urban Sociology

**Year 4**
- **Plan 414** Housing Policies
- **Plan 430** Social Policy Planning
- **Plan 470** Concepts and Ideas in Contemporary Urban Planning
- **Env St 406** Environmental Law
- **Geog 450** Regional Urban Systems
- **Arch 554** Development and Financing
- **Civ E 543** Land Use Models

<table>
<thead>
<tr>
<th>Year 3</th>
</tr>
</thead>
</table>
| **Year 3**
- **Plan 301** Planning Design
- **Plan 316** Multivariate Statistics
- **Plan 317** Nonparametric Statistics
- **Plan 318** Spatial Analysis
- **Plan 319** Regional Planning Techniques
- **Plan 332** The Sociology of Regions
- **Plan 333** The Sociology of Regional Planning
- **Plan 344** Principles of Recreation Planning
- **Plan 360** Technology in Urban and Regional Planning
- **Civ E 343** Transportation Engineering
- **Econ 335** Economic Development
- **Geog 350** Economic Development
- **Geog 355** Regional Urban Systems 1

<table>
<thead>
<tr>
<th>Year 4</th>
</tr>
</thead>
</table>
| **Year 4**
- **Plan 430** Social Policy Planning
- **Env St 401** Environmental Law
- **Env St 402** Planning Law
- **Geog 412** Industrial Geography
- **Geog 422** Canada
- **Geog 450** Regional Urban Systems 2
- **Geog 452** Problems of Rural Land Use
- **Civ E 543** Land Use Models

<table>
<thead>
<tr>
<th>Year 3</th>
</tr>
</thead>
</table>
| **Year 3**
- **Plan 332** The Sociology of Regions
- **Plan 333** The Sociology of Regional Planning
- **Plan 344** Principles of Recreation Planning
- **Econ 335** Economic Development
- **Geog 300** Geomorphology and the Southern Ontario Environment
- **Geog 301** Climatology
- **Geog 315** Agricultural Geography
- **Geog 352** Rural-Urban Fringe of Canadian Cities
- **Geog 356** Resources Management
- **Rec 302** Travel and Tourism
- **Rec 334** Park Management

<table>
<thead>
<tr>
<th>Year 4</th>
</tr>
</thead>
</table>
| **Year 4**
- **Env St 401** Environmental Law
- **Env St 402** Planning Law
- **Geog 408** Special Topics in Climatology and Natural Hazards
- **Geog 410** Recreation Geography
- **Geog 411** Resources Studies
- **Geog 414** Resources Management Workshop
- **M Env 410** Honours Seminar: Environmental Management
- **PSci 435** Politics of Canadian Resource Development
- **Rec 410** Planning of Recreation Facilities
- **Rec 434** Advanced Park Management
Additional Information

The four year Honours programme is recognized by the professional association of planners in Canada (the Canadian Institute of Planners) and an increasing number of employers as a satisfactory preparation for a wide range of careers.

Note 1
Students in the Planning School are required to participate fully in all four years of the programme. Students are normally expected to carry a minimum load of six credits in each of those years. However, students interested in taking extra courses are free to take a seven credit load in any given year without approval from the School; preregistration for more than seven credits may only be done with the undergraduate officer’s approval. If the student has accumulated more than the required minimum number of credits for proceeding into the next year of the programme (Year 2 - six credits, Year 3 - 12 credits, Year 4 - 18 credits) he may elect to reduce his load and will be permitted to take a minimum of five credits in any given academic year through Year 4.

All required courses should be taken in the year indicated.

Note 2
It is possible to gain admission to Year 2.

To enter Year 2 of the Honours Planning Programme, a student must obtain a minimum overall average of B – (70.0) and a B (73.0) in Planning and Environmental Studies courses and must obtain credit standing in 6 full courses. In subsequent years, a student must maintain a cumulative, overall average of B – (70.0) as well as an average of B (73.0) in Planning and Environmental Studies courses.

Note 3
Planning 156 and Planning 342 and 343 are intended for students in the other disciplines and may not be taken for credit by Planning students.

Note 4
No more than 8 first year level credits will be allowed toward the 24-1/2 required to graduate. The number of electives from the required list in each of the 4 years apply not merely to each year in question. For example, a student in Year 4 can also pick from the required list in Year 2 and 3 so long as the total required electives in all 4 years at graduation meets the minimum number (and is within the 8 credit guideline for Year 1 level courses).

Note 5
Students in Year 1 and 2 should be aware of prerequisites in other departments, where Year 1 courses are needed in order to be able to take more advanced courses later.

Note 6
A student wishing to register for a readings and research course (Planning 258, 475 and 476) must first make arrangements with a faculty member to provide the necessary supervision and guidance.

Note 7
Plan 307 may be taken in Year 2 or Year 3 provided that the Env St 271 prerequisite has been met.

Note 8
Students selecting the Quantitative Methods elective in the fourth year are required to select Planning 319, and, if they wish, any of Planning 316, 317, 318.

Note 9
Not all the courses listed herein are offered each year. Students should consult the School prior to registration.

Note 10
The number of hours of lectures shown after the course description is an attempt to indicate the “normal”; each instructor determines how often his particular class will meet.

Note 11
For some courses, participating students may be expected to make a small financial contribution to defray materials/travel costs, e.g. Plan 159 (Graphics for Planning), Plan 300 (Seminar/Workshop Project in Urban and Regional Planning), Plan 357 (Conservation and Resource Management), Plan 391 (Field Research Methods and Projects).

Note 12
Where a student selects 2 of: 255, 358 and 357 and then picks up the third option - that third course will be considered as one of the additional elective planning courses required to either Year 2 or 3.

Note 13
Leave of absence may be negotiated with the approval of the undergraduate officer.

Note 14
A variety of items are covered in the Undergraduate Affairs Policy Manual available from the undergraduate officer. Policy areas covered include: Admission, Courses, Examinations, Records and Transfers, Registration, Appeals and Discipline, Academic Standing.
Faculty of
Human Kinetics
and Leisure Studies

Kinesiology students studying bone structures
Facility of Human Kinetics and Leisure Studies

The Facility 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 (1966-1967) 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 the Dance Group offer academic programmes and conduct research, whereas the Department of Athletics administers intercollegiate and intramural athletics and a service programme in physical activity for all students, faculty and staff.

The programmes of the Faculty have developed rapidly in response to student needs and interests and to the changing needs and demands of society. Seven years ago a regular stream was added to the co-operative programme to enable students who wanted the programmes, 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 an area of Kinesiology, Dance, Health Studies or Recreation in which they had a special interest. The future promises even greater opportunities for specialized study by the individual students.

Dance Programme

The programmes in Dance offer students the unique opportunity of studying dance from the perspective of the humanities, the social sciences, and the biological sciences, as well as that of the performing arts. This orientation, which represents a marked departure from the strictly performance oriented approach which is taken in most programmes of dance at universities in Canada and the United States, allows the student a wider range of career choices than do the traditional programmes.

Health Studies Programme

Health Studies is a four-year university honours programme leading to the Bachelor of Science (B.Sc.) degree. Students in the programme study important health problems and their causes. Of primary interest are diseases in which behaviour is an important contributing cause, such as lung cancer and smoking or heart disease and diet. Also of interest are health problems which occur because people do not use preventive 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 and are opening up in community and government health agencies, community and school health education, and other areas where an understanding of health and health behavior is required. Graduates also pursue graduate studies in Health Studies, public health, nursing, medicine, physical and occupational therapy, and related fields.

Kinesiology Programme

The Kinesiology programme at Waterloo examines the hows and whys of human physical activity through a unique blend of theoretical, laboratory, and practical courses and experiences. How is one able to learn and perform the intricate and controlled movements demanded of sportspersons, musicians or users of prosthetics? What are the psychological and social implications of physical activity? In seeking and learning the answers to such questions, the student becomes well equipped to enter any of a variety of exciting and challenging careers such as exercise therapy, rehabilitative medicine, equipment design, gerokinesiatrics (exercise therapy for the elderly) coaching, lab technology, graduate studies and as well, the more traditional field of teaching.

Recreation Programme

The academic programme in Recreation has been designed to give each graduate the body of knowledge necessary to prepare for a professional position in the field of Recreation. Students completing the Honours Degree Programme can, in addition, complete course sequences resulting in a specialization in Recreation Administration, Therapeutic Recreation Services, Outdoor Recreation, or Leisure Studies. Joint Honours Programmes are available with Geography, Man-Environment Studies and Sociology. A Recreation-Business Option with Wilfrid Laurier University is also offered.

Graduates of the Recreation Degree Programme are found in diverse settings, including hospitals, private agencies, municipalities, schools, national and provincial parks, youth agencies, and university graduate programmes.

Degrees

Health Studies graduates receive an Honours Bachelor of Science degree. Graduates of all Kinesiology programmes will receive either an Honours or General Bachelor of Science degree in Kinesiology. Recreation programme graduates are awarded an Honours Bachelor of Arts degree in Recreation. Those students who graduate from the Dance programme will receive an Honours Bachelor of Science Degree in Dance, an Honours Bachelor of Arts Degree or a General Bachelor of Arts Degree.

Graduates who have pursued their studies in a co-operative programme and who have successfully completed 4 work terms, 4 work reports, and who indeed do finish the co-operative programme, will have
the words "Co-operative Programme" added to their University diploma.

Systems of Study

Co-operative System
The co-operative system is one whereby after the first eight month academic year the student spends alternate four month terms in academic study and related work experiences.

Arrangements for work assignments are made through the Department of Co-ordination 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 programme.

Regular System
In regular programmes students attend school for two consecutive four month terms each year for four years.

Admission

The admission requirements and procedures for all programmes are outlined in detail in Chapter 2 of this Calendar. The following points emphasize some of the admission requirements which relate specifically to programmes in the Faculty of Human Kinetics and Leisure Studies.

Application from Ontario Year 5
Applicants to any of the Kinesiology programmes are advised to select a Year 5 programme which includes four or more of the following courses: Biology, Chemistry, Physics, Functions and Relations, Algebra, Calculus.

Applicants to the Recreation programme are advised to include Year 5 Mathematics in their programme.

Advanced Standing
It is not unusual for students transferring to HKLS programmes to be granted credit for courses taken elsewhere in which they have received a grade of C- 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 11 full year courses) regardless of the number of courses that are presented for transfer.

One term of advanced work experience standing may be granted to students transferring into third year of co-operative programmes in HKLS. Details are available in the Department of Co-ordination.

Examinations and Standings

The Faculty of Human Kinetics and Leisure Studies currently operates under a "course system" in which student progress is measured by courses successfully completed rather than by years. Students who have passed fewer than 12 term courses will be considered Year 1; those who have passed at least 12 term courses but fewer than 22 will be considered Year 2; those with at least 22 but fewer than 32, Year 3; and those with 32 or more, Year 4.

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 defaulting 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 Chairman of the Undergraduate Affairs Committee 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 Chairman, Undergraduate Affairs Committee within one month of publication of the official mark reports.

Additional regulations concerning examinations may be found in Chapter 1, pg. 17.

2) Standing
a) The Faculty has endorsed the letter grade system outlined on page 17 of this calendar.
b) Overall standing will be determined at the end of each year for regular programmes and upon completion of the B term for co-operative programmes by the cumulative average of all courses taken at the University while enrolled in the Faculty (whether passed or failed).

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

<table>
<thead>
<tr>
<th>Programme</th>
<th>Overall</th>
<th>Major Field</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kinesiology Honours</td>
<td>C</td>
<td>C+</td>
</tr>
<tr>
<td>Health Studies Honours</td>
<td>C</td>
<td>C+</td>
</tr>
<tr>
<td>Kinesiology General</td>
<td>D</td>
<td>C-</td>
</tr>
<tr>
<td>Recreation Honours</td>
<td>C-</td>
<td>B-</td>
</tr>
<tr>
<td>Dance Honours</td>
<td>C-</td>
<td>C+</td>
</tr>
<tr>
<td>Dance General</td>
<td>C-</td>
<td>C</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 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 Programme". (The designation F takes into account all failing grades, i.e., F-, F, and F+). If a student clears his/her F, INC and DNW grades prior to his/her next registration, the decision on his/her grade report may be changed.

Students who are required to withdraw may be eligible to apply for readmission only after a one year absence. It is recommended that during this absence students do some academic work (extension, correspondence, or community college study) in order to demonstrate that they should be readmitted.

Programme selection
Full-time students: All first year students normally take 6 terms courses in both Fall and Winter terms. In subsequent terms, a student will normally take at least 5 terms courses.
Part-time studies or reduced programmes: Except in exceptional circumstances, an Honours programme may not be taken on a completely part-time or reduced programme basis; at least seven academic terms must be taken on a full-time (full programme) basis and no student may spend more than 5 years of full-time study (10 terms) for an Honours degree. The Faculty of Human Kinetics and Leisure Studies does not encourage part-time studies but will allow the General degree to be pursued on a part-time or reduced-programme basis subject to approval by the Associate Dean of Undergraduate Affairs and the Department concerned. Normally, no first year programme for a full-time student may be reduced below the 12 courses minimum except in very exceptional circumstances.

Course and Programme Changes
a) Up to the end of the first three weeks of lectures, the student may drop or add any course without approval, provided he or she does not predetermine a section.

b) After the first three 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 the date which is 8 weeks from the beginning of lectures.

Academic Programmes Dance
Dance is investigated as an entire field of academic and creative study and not solely as a performing art. It can be viewed as being either expressive (movement that communicates the thoughts and emotions of a culture), or instrumental (movement that serves a societal function such as socialization). Expressive dance and instrumental dance can be studied within the context of both Western and non-Western culture. Hence, four possible foci for the study of dance exist. The Dance Group recognizes each and has designed their curriculum in such a way that each of their three degree programmes provides exposure to the four foci. The two areas offered in greatest depth are within Western Expressive Dance. One of these areas focuses on the dancer, while the other focuses on the dance as a work of art. Each of these areas is further subdivided into two orientations: theoretical and applied.

The Degree Programmes
Based upon the necessary curricular experiences that have been identified, it would appear that the theoretical study of the dancer is best accomplished through a programme which is heavily science oriented, whereas the theoretical and practical study of dance as a work of art is best accomplished from the perspective of the arts and humanities. The applied aspects of the preparation of the dancer could draw upon both perspectives.

To accomplish these various pursuits, the Dance Group offers programmes which lead to three different degrees: The Honours Bachelor of Science Degree, The Honours Bachelor of Arts Degree, and The General Bachelor of Arts Degree. Students do not enroll in one of these particular degree programmes initially. Rather, they accumulate required course credits in their area(s) of interest throughout their 4 years at the end of which their credits are interpreted as satisfying the requirements for either the Honours B.Sc. or the Honours B.A. degrees. Students pursuing a three year plan of study are eligible for the General B.A. degree.
Course Requirements
To be eligible for the Honours B.Sc. degree or the Honours B.A. degree in Dance, students must successfully complete 44 term courses, and maintain an overall average of 60% and an average of 67% in their dance courses. To be eligible for the General B.A. degree, students must successfully complete 30 term courses and maintain an overall average of 60% and an average of 65% in their dance courses.

Honours Bachelor of Science Degree Programme
A) Required Dance Courses (14)
   Dance 110, 111, 346, 347, 364, 410, 411, 412, Two of Dance 220, 221, 225
   Two of Dance 230, 231, 233
   Two of Dance 241, 242, 341, 342
B) Required Outside Courses (9)
   Biol 151, 152; Comp Sci 118; Math 106; Phys 103; Music 150G; 151G; Psych 101, Anth 102 or Soc 101
C) Required Kinesiology Courses (10)
   Kin 102, 200, 222, 255, 300, 321, 330, Plus 3 additional courses in the bio-physical area of Kinesiology.
D) Dance Electives (4)
   Four term courses in Dance.
E) Outside Electives (7)
   At least three of the seven term course electives must be selected from the offerings of the Faculty of Science.

Suggested Course Sequences

<table>
<thead>
<tr>
<th>Year 1</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Dance 110</td>
<td>Dance 111</td>
</tr>
<tr>
<td>Music 150G</td>
<td>Music 151G</td>
</tr>
<tr>
<td>Math 106</td>
<td>Comp Sci 118</td>
</tr>
<tr>
<td>Kin 102</td>
<td>Soc 101 or Anth 102</td>
</tr>
<tr>
<td>Psych 101</td>
<td>Elective</td>
</tr>
<tr>
<td>Elective</td>
<td>Elective</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Year 2</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Biol 151</td>
<td>Biol 152</td>
</tr>
<tr>
<td>Kin 200</td>
<td>Phys 103</td>
</tr>
<tr>
<td>Kin 222</td>
<td>Kin 255</td>
</tr>
<tr>
<td>Dance 241 or 242</td>
<td>Dance 341 or 342</td>
</tr>
<tr>
<td>Elective</td>
<td>one of Dance 220, 221, 225</td>
</tr>
<tr>
<td>Elective</td>
<td>Elective</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Year 3</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Kin 300</td>
<td>Kin 321</td>
</tr>
<tr>
<td>Elective</td>
<td>Kin 330</td>
</tr>
<tr>
<td>Dance 364</td>
<td>one of Dance 220, 221, 225</td>
</tr>
<tr>
<td>Elective</td>
<td>Dance 346</td>
</tr>
<tr>
<td>Elective</td>
<td>Elective</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Year 4</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Dance 410</td>
<td>Dance 411</td>
</tr>
<tr>
<td>Dance 412</td>
<td>Dance 347</td>
</tr>
<tr>
<td>Elective</td>
<td>Elective</td>
</tr>
<tr>
<td>Elective</td>
<td>Elective</td>
</tr>
<tr>
<td>Elective</td>
<td>Elective</td>
</tr>
<tr>
<td>Elective</td>
<td>Elective</td>
</tr>
<tr>
<td>Elective</td>
<td>Elective</td>
</tr>
</tbody>
</table>

Honours Bachelor of Arts Degree Programme
A) Required Dance Courses (10)
   Dance 110, 111, 336, 410, 411, 412
   Two of Dance 220, 221, 225
   Two of Dance 230, 231, 233
B) Required Outside Courses (10)
   Hist 105; Music 150G, 151G; Psych 101; Anth 102 or Soc 101; Kin 200; two term courses from Drama and/or Fine Arts and the equivalent of one full language course or two of Dance 241, 242, 341, 342.
C) Dance Electives (8)
   Eight term courses in Dance
D) Outside Electives (16)
   At least eight of the 16 term course electives must be taken within the Faculty of Arts.

Suggested Course Sequences

<table>
<thead>
<tr>
<th>Year 1</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Dance 110</td>
<td>Dance 111</td>
</tr>
<tr>
<td>Music 150G</td>
<td>Music 151G</td>
</tr>
<tr>
<td>Psych 101</td>
<td>Hist 105</td>
</tr>
<tr>
<td>Drama 101 or Fine Arts</td>
<td>Soc 101 or Anth 102</td>
</tr>
<tr>
<td>Dance Elective</td>
<td>Dance elective</td>
</tr>
<tr>
<td>Elective</td>
<td>Elective</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Year 2</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Dance 230</td>
<td>Dance 231 or 233</td>
</tr>
<tr>
<td>Kin 200</td>
<td>one of Dance 220, 221, 225</td>
</tr>
<tr>
<td>Dance 241 or 242</td>
<td>Dance 341 or 342</td>
</tr>
<tr>
<td>Dance elective</td>
<td>Dance elective</td>
</tr>
<tr>
<td>Elective</td>
<td>Elective</td>
</tr>
<tr>
<td>Elective</td>
<td>Elective</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Year 3</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Elective</td>
<td>one of Dance 220, 221, 225</td>
</tr>
<tr>
<td>Elective</td>
<td>Drama or Fine Arts</td>
</tr>
<tr>
<td>Dance elective</td>
<td>Dance elective</td>
</tr>
<tr>
<td>Elective</td>
<td>Elective</td>
</tr>
<tr>
<td>Elective</td>
<td>Elective</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Year 4</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Dance 410</td>
<td>Dance 411</td>
</tr>
<tr>
<td>Dance 336</td>
<td>Dance 412</td>
</tr>
<tr>
<td>Dance elective</td>
<td>Dance elective</td>
</tr>
<tr>
<td>Elective</td>
<td>Elective</td>
</tr>
<tr>
<td>Elective</td>
<td>Elective</td>
</tr>
<tr>
<td>Elective</td>
<td>Elective</td>
</tr>
</tbody>
</table>
General Bachelor of Arts Degree Programme

A) Required Dance Courses (7)
   Dance 110, 111, 336
   Two of Dance 220, 221, 225
   Two of Dance 230, 231, 233

B) Required Outside Courses (9)
   Hist 105; Music 150G, 151G; Psych 101; Anth 102 or
   Soc 101; two term courses from Drama and/or Fine
   Arts and the equivalent of one full language course
   or two of Dance 241, 242, 341, 342.

C) Dance Electives (6)
   Six term courses in Dance

D) Outside Electives (8)
   Of the eight term course electives at least 4 must be
   taken within the Faculty of Arts.

Suggested Course Sequences

<table>
<thead>
<tr>
<th>Year 1</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Dance 110</td>
<td>Dance 111</td>
<td></td>
</tr>
<tr>
<td>Music 150G</td>
<td>Music 151G</td>
<td></td>
</tr>
<tr>
<td>Psych 101</td>
<td>Soc 101 or Anth 102</td>
<td></td>
</tr>
<tr>
<td>Dance elective</td>
<td>Hist 105</td>
<td></td>
</tr>
<tr>
<td>Elective</td>
<td>Dance elective</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Year 2</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Dance 230</td>
<td>Dance 231 or 233</td>
<td></td>
</tr>
<tr>
<td>Elective</td>
<td>one of Dance 220, 221, 225</td>
<td></td>
</tr>
<tr>
<td>Drama or Fine Arts</td>
<td>Drama or Fine Arts</td>
<td></td>
</tr>
<tr>
<td>Dance 241 or 242</td>
<td>Dance 341 or 342</td>
<td></td>
</tr>
<tr>
<td>Elective</td>
<td>Elective</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Year 3</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Dance 336</td>
<td>Dance elective</td>
<td></td>
</tr>
<tr>
<td>Dance elective</td>
<td>one of Dance 220, 221, 225</td>
<td></td>
</tr>
<tr>
<td>Elective</td>
<td>Dance elective</td>
<td></td>
</tr>
<tr>
<td>Elective</td>
<td>Elective</td>
<td></td>
</tr>
<tr>
<td>Elective</td>
<td>Elective</td>
<td></td>
</tr>
</tbody>
</table>

Technique Courses

Technique is a highly valuable tool for students in all
areas of dance. Ballet, Modern and Jazz Technique are
offered from beginning to advanced levels. Students
may pursue these classes to the technical level of their
interest and need. All technique courses are granted .25
credit. Students may apply 2.0 credit in technique
courses towards any degree in dance.

Note

Students should plan their programme with a faculty
advisor so that courses are elected in the appropriate
sequence.

Academic Programmes

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,
   anatomy, 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 Programme, co-op or regular.
In order to receive the honours B.Sc. degree the
student must successfully complete 44 term courses
including the following requirements:

Degree Requirements

a) Required Health Studies Courses: (11)
   Health Studies 140, 141, 241, 245, 344, 348, 349, 431,
   432, 442, 445.

b) Required Kinesiology courses: (5)
   Kinesiology 116, 200, 222, 317, 330

c) Required courses from other departments: (6)
   Biology 121, 122, 203, 204
   Psychology 101
   Sociology 101
d) Restricted electives: (8)
   One of: Math 106/107, CS 118 or CS 316
   (Recommended before Year 4)
   One of: Phil 226, 258
   (Recommended in Year 4)
   One of: Kin 442, Health 443, Mthel 402a, 402b
   (Recommended in Year 4)
   Two of: Biol 239, 245, 246, 340, 343, 434,
   Health 302, 303
   Three of: Health 340, 346, 410, Kin 300

e) Free electives: Fourteen (14) term courses selected
   in consultation with the student’s advisor.

Course Sequence

<table>
<thead>
<tr>
<th>Year 1 (Co-op and Regular)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Fall</strong></td>
</tr>
<tr>
<td>Health 140</td>
</tr>
<tr>
<td>Psych 101</td>
</tr>
<tr>
<td>Soc 101</td>
</tr>
<tr>
<td>Biol 121</td>
</tr>
<tr>
<td>2 electives</td>
</tr>
</tbody>
</table>

Regular Programme

<table>
<thead>
<tr>
<th>Year 2</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Fall</strong></td>
</tr>
<tr>
<td>Kin 200, 317</td>
</tr>
<tr>
<td>Biol 203</td>
</tr>
<tr>
<td>2 electives</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Year 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Health 349</td>
</tr>
<tr>
<td>Kin 222</td>
</tr>
<tr>
<td>3 electives</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Year 4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Health 442, 431</td>
</tr>
<tr>
<td>4 electives</td>
</tr>
</tbody>
</table>

Co-operative Programme

<table>
<thead>
<tr>
<th>Year 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>2A (Fall)</td>
</tr>
<tr>
<td>Kin 200, 317</td>
</tr>
<tr>
<td>Biol 203</td>
</tr>
<tr>
<td>2 electives</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Year 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>3A (Winter)</td>
</tr>
<tr>
<td>Biol 204</td>
</tr>
<tr>
<td>Health 241</td>
</tr>
<tr>
<td>3 electives</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Year 4</th>
</tr>
</thead>
<tbody>
<tr>
<td>4A (Spring)</td>
</tr>
<tr>
<td>Health 431</td>
</tr>
<tr>
<td>5 electives</td>
</tr>
</tbody>
</table>

Academic Programmes

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 programmes.

Degree Requirements Honours Programme

Successful completion of 44 term courses is necessary in order to obtain the Honours B.Sc. degree in Kinesiology. The co-op programme must be completed in 7 years. The regular programme must be completed in 6 years.


b) Required courses from other departments: (8) Physics 103 or Physics 104 (see note), Physics 105, Biology 151 and 152, Mathematics 106 or 107 (see note), Computer Science 118, Psychology 101, and Sociology 101.

c) Kinesiology Electives: (9) Nine courses from those offered in the Department in addition to the required courses.
   (Kinesiology 116 is required for all students not presenting Year 5 Chemistry for admission).
   Students must include 6 of the following courses in their programme: Kin 346, 356, 357, 401, 402, 410, 420, 425, 426, 453, 456. In lieu of these courses a student may specialize in one of the six streams designated by the Department.

<table>
<thead>
<tr>
<th>d) Electives: (12)</th>
</tr>
</thead>
<tbody>
<tr>
<td>The remaining twelve term courses required for the degree are to be elected as follows:</td>
</tr>
</tbody>
</table>

1) Eight (8) term courses must be elected in departments outside the Faculty of Human Kinetics and Leisure Studies.

2) The remaining four term courses may be taken in any department of the University including Dance, Health Studies, Kinesiology and Recreation.
Students should choose electives in consultation with their Faculty advisor.

General Programme
The general degree is offered on a regular basis only and may be taken by part time study.

In order to receive the general B.Sc. degree a student must successfully complete 40 term courses including the following requirements:

a) Required Kinesiology Courses (11) 102, 103, 200, 222, 252, 255, 300, 317, 321, 335, 354.

b) Required Courses from other departments (8)
Physics 103 or Physics 104, Biology 151, Biology 152, Math 106 or 107, Computer Science 118, Psychology 101, Sociology 101.

c) Kinesiology Electives (9)
Nine elective courses in Kinesiology.

d) Electives (12)
The remaining twelve terms courses required for the degree are to be selected as follows:
1) Eight (8) term courses must be elected in departments outside the Faculty of Human Kinetics & Leisure Studies.
2) The remaining four term courses may be taken in any department of the University including Dance, Health Studies, Kinesiology and Recreation.

Course Sequence – Honours and General Programmes

Year 1
(Common to regular and co-operative programmes)

<table>
<thead>
<tr>
<th>Year</th>
<th>Fall</th>
<th>Winter</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Kin 102</td>
<td>Kin 116</td>
</tr>
<tr>
<td></td>
<td>Kin 103</td>
<td>Kin 255</td>
</tr>
<tr>
<td></td>
<td>Biol 151</td>
<td>Biol 152</td>
</tr>
<tr>
<td></td>
<td>Math 106 or 107</td>
<td>Phys 103 or 104</td>
</tr>
<tr>
<td></td>
<td>Psych 101</td>
<td>CS 118</td>
</tr>
<tr>
<td></td>
<td>Elective</td>
<td>Elective</td>
</tr>
</tbody>
</table>

Regular Programme

Year 2

<table>
<thead>
<tr>
<th>Year</th>
<th>Fall</th>
<th>Winter</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Kin 200</td>
<td>Kin 252</td>
</tr>
<tr>
<td></td>
<td>Kin 222</td>
<td>Kin 321</td>
</tr>
<tr>
<td></td>
<td>Soc 101</td>
<td>Kin 335</td>
</tr>
<tr>
<td></td>
<td>Phys 105</td>
<td>Kin 354</td>
</tr>
<tr>
<td></td>
<td>Elective</td>
<td>Elective</td>
</tr>
</tbody>
</table>

Year 3

<table>
<thead>
<tr>
<th>Year</th>
<th>Fall</th>
<th>Winter</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Kin 300</td>
<td>Kin 330†</td>
</tr>
<tr>
<td></td>
<td>Kin 317</td>
<td>4 Electives</td>
</tr>
<tr>
<td></td>
<td>3 Electives</td>
<td></td>
</tr>
</tbody>
</table>

Co-Operative Programmes

2A Fall
| Kin 200          | Kin 252         |
|                 |                 |
| Kin 222         | Kin 321         |
| Soc 101         | Kin 335         |
| Phys 105        | Kin 330†        |
| Elective        | Kin 354         |

3A Winter
| Kin 300         | Kin 317         |
|                 |                 |
| 3 Electives     |                 |

4A Spring
| Kin 300         | Kin 330†        |
|                 |                 |
| 5 Electives     |                 |

4B Winter
| Kin 431†        | Kin 432†        |
|                 |                 |
| 4 Electives     |                 |

*Note
All students in Year 1 are honours students.
† for honours students only.

Academic Programmes

Department of Recreation

Fourty-four term courses are required for the Honours degree in Recreation. The student begins study in one of the four areas of concentration available in the second year of the programme. Double Honours programmes with Geography, Man Environment Studies and Sociology have been developed. A Business Option with Wilfrid Laurier is also offered.

Degree Requirements

A) Recreation courses (22):

1) Required:


b) Each student normally must include in his programme the five (5) courses listed in one of the following areas of concentration (see note):

Leisure Studies: Recreation 200, 201, 301, 302, 306,
Therapeutic Recreation: Recreation 200, 252, 253, 254, 361.
Recreation Administration: Recreation 312, 316, 320, 334, 410.
Outdoor Recreation: Recreation 332, 334, 432, 434, 435.
2) Electives:
Each student must complete additional recreation electives to meet the required total of 22.

B) Courses outside the Department of Recreation

1) Required: (8)
- Psychology 101 and Sociology 101
- Any two of English 109, 140, 141, 150, 151, 209, 210
- Any four of Business 121, a physical or natural science course. Economics 101, Geography 101/Environmental Studies 195, Planning 156 or a course in the Fine or Performing Arts.

2) Electives: (14)

Course Sequence (co-operative and regular)

Year 1
Recreation 100, 101, 230, 250
Psychology 101
Sociology 101
Elective
Two of:
English 109, 140, 141, 150, 151, 209, 210
Four of:
Business 121
A physical or natural science course
Economics 101
Geography 101/Environmental Studies 195
Planning 156
A course in the Fine or Performing Arts

Year 2
Recreation 201, 210, 270
3 Recreation electives
6 electives

Year 3
Recreation 371
5 Recreation electives
4 electives

Year 4
Recreation 400, 470, 471
3 Recreation electives
4 electives

Honours Recreation and Sociology
The Joint Honours programme in Recreation and Sociology has the following requirements:

Required Recreation Courses (11)
100 Introduction to the Study of Leisure & Recreation
101 Introduction to Leisure Services
201 Leisure and the Social Sciences
210 Organization and Administration of Recreation Services
230 Introduction to Outdoor Recreation & Education
250 Introduction to Therapeutic Recreation Service
270 Statistical Techniques Applied to Leisure Studies
371 Research Design Applied to Leisure Studies & Services
400 Seminar in Recreation & Leisure
470 Research Project
471 Research Project

Required Sociology Courses (5):
Sociology 101 Introduction to Sociology
320 Research Methods 1
321 Research Methods 2
425 Sociological Theory
426 Sociological Theory

Non-Departmental Required Courses (6):
Psychology 101 Introductory Psychology
Two of:
English 109, 140, 141, 150, 151, 209, 210
Three of:
Business 121
Kinesiology 200
Economics 101
Geography 101/Environmental Studies 195
Planning 156
A course in Fine Arts or Performing Arts

Recreation Electives (9):
Students must elect any nine advanced courses in Recreation.

Sociology Electives (9):
Students must elect any nine advanced courses in Sociology.

Non-Departmental Electives (4):
Students must elect any five courses outside of Recreation or Sociology which relate to their major area of study.

Honours Recreation and Business Option
In this special honours Recreation programme, students take business courses at Wilfrid Laurier University. The 44 term courses in this programme must include:
a) The 22 term courses required of all Recreation students.
b) The 8 outside courses required of all Recreation students.
   Two of: Bus 452, 454, 458, 459, 462, 464, 482.
d) Six (6) Electives.

Honours Recreation and Man-Environment Studies
Students in the joint honours programme in Recreation and Man-Environment Studies must successfully complete 44 term courses and must maintain a minimum average of 70% in their recreation courses, 75% in their Man-Environment courses, and 70% overall.

Students must include the following in their programme:

Required Recreation Courses (11-14)
100 Introduction to the Study of Leisure & Recreation
101 Introduction to Leisure Services
201 Leisure and the Social Sciences
210 Organization and Administration of Recreation Services
230 Introduction to Outdoor Recreation
250 Introduction to Recreation for Special Populations
T270 Statistical Techniques Applied to Leisure Studies
T371 Research Design Applied to Leisure Studies & Services
400 Seminar in Recreation & Leisure
T470 Research Project
T471 Research Project

Required Man/Environment Courses (14-17)
120(Y) Environmental Issues and the Natural Sciences
130(Y) Environmental Issues and the Social Sciences
150(Y) Environmental Issues: Methods and Techniques
190(Y) Seminar-Workshops
200(Y) Field Ecology
241 Social Change, or other half-year course in social sciences (Sociology 101)
T271 Introduction to Quantitative Research Methods or one other introductory methods course approved by the Department
290(Y) Seminar Workshop
390(Y) Seminar Workshop
T490(Y) Senior Honours Assignment

T Note
A student may elect to take either Recreation 470-471 or Man Environment 490, and Recreation 270 or Man Environment 271.

Recreation Electives (7)
Students must elect eleven advanced courses in recreation. Five of these courses should be from one of the following areas of concentration.
a) Therapeutic Recreation (200, 252, 253, 254, 361)
b) Leisure Studies (200, 201, 301, 302, 306, 361)
c) Recreation Administration (312, 316, 320, 334, 410)
d) Outdoor Recreation (331, 332, 334, 432, 434, 435)

Man Environment Electives (2)
Students must elect one of the following honours seminars:
410(Y) Environmental Management
445(Y) Technology Assessment and Policy Analysis
370(Y) Environmental Teaching and Learning
480(Y) Special Topics Seminar

Non-Departmental Required Courses (7)
- Sociology 101† and Psychology 101
- Any two of English 109, 140, 141, 150, 151, 209, 210
- Any four of Business 121, Kinesiology 200, Economics 101, Geography 101/Environment Studies 195, Planning 156, or a course in Fine or Performing Arts.

† can be substituted for 241, Social Change

Honours Recreation and Geography
Students in the joint honours programme in Recreation and Geography must carefully complete 44 term courses and must maintain a minimum average of 70% in their recreation courses, 75% in their Geography courses and 70% overall.

Students must include the following in their programme:

Required Recreation Courses (11)
100 Introduction to the Study of Leisure & Recreation
101 Introduction to Leisure Services
201 Leisure and the Social Sciences
210 Organization and Administration of Recreation Services
230 Introduction to Outdoor Recreation
250 Introduction to Recreation for Special Populations
T270 Statistical Techniques Applied to Leisure Studies
T371 Research Design Applied to Leisure Studies & Services
400 Seminar in Recreation & Leisure
T470 Research Project
T471 Research Project
**Required Geography Courses (14-15)**

One of Geog 101, 125R, 127, Env St 192 A or B.

- Geog 102 Introduction to Physical Geography
- Env St 200 Field Ecology
- Geog 201 Some Basic Topics of Physical Geography
- Geog 202 Some Basic Topics of Economics and Urban Geography
- Geog 260 Introduction to Cartography and Map Analysis
- Env St 271 Introduction to Quantitative Research Methods
- Geog 275 Introductory Air Photo Analysis and Remote Sensing
- Geog 316 Multivariate Statistics
- Geog 317 Nonparametric Statistics
- Geog 318 Spatial Analysis
- Geog 390 Senior Honours Essay Research Proposal
- Geog 391 Field Research, or other half-year courses in Geography
- T490(Y) Senior Honours Research Essay

Plus one of Geog 203, 204, 205, 220.

**T Note**

A student may elect to take either Recreation 470-471 or Geography 490, and Recreation 270 or Geography 271.

**Recreation Electives (11)**

Students must elect eleven advanced courses in recreation. Five of these courses should be from one of the following areas of concentration.

- **a)** Therapeutic Recreation (200, 252, 253, 254, 361)
- **b)** Leisure Studies (200, 301, 302, 306, 361)
- **c)** Recreation Administration (312, 316, 320, 334, 410)
- **d)** Outdoor Recreation (331, 332, 334, 432, 434, 435)

**Non-Departmental Required Courses (7)**

- Sociology 101 and Psychology 101
- Any two of English 109, 140, 141, 150, 151, 209, 210
- Any three of Business 121, Kinesiology 200, Economics 101, Planning 156, or a course in Fine or Performing Arts.
Informal discussions between Integrated Studies students
An Opportunity for the Individual to Develop an Independent Programme of Study

Integrated Studies, an undergraduate programme of less than 100 students, was established within the University of Waterloo in 1969 for students who desire to create their own programmes of study. While students may apply their studies toward a baccalaureate degree (it is an option, not a requirement), the Programme's emphasis is to provide individuals with the opportunity to explore their learning interests.

Integrated Studies is distinctive in that the students are encouraged to engage in independent study and to develop a perspective beyond that of a single discipline. At the same time, the daily life of the Programme reflects the broad diversity of the people within it. This community promotes a degree of interaction and sharing seldom found in a university setting, including much spontaneous learning, debates, discussions and plain fun. Finally, the students play the primary role in the operation of the overall programme.

Self Government

The students, in conjunction with the Resource Persons and staff, are responsible for the government of Integrated Studies through their participation in Operations Council. Council normally meets every second week to receive reports and recommendations from its committees, composed of members of the Programme, and to decide on all matters affecting the Programme's operation, with the exception of the BIS degree. Standing committees are concerned with such items as admission of students, budget development, hiring of personnel, student project assistance and year end reviews.

Through Council, Integrated Studies attempts to foster the students' development by making a wide variety of resources accessible to them. This includes providing financial assistance for individual travel, conference and research expenses, allocating computer time, sponsoring seminars and conferences, and hiring Resource Persons.

Resource Persons

The Programme's Resource Persons serve as tutors and advisors in the students' formulation and pursuit of their studies. As the Resource Persons are normally broadly experienced in transdisciplinary study, they are able to identify connections among areas of knowledge. From their experience in the University and the community they direct students to specialized areas of expertise or computer time, sponsoring seminars and conferences, and hiring Resource Persons.

Mat Jamieson, Larry Kendall, Hugh Miller

Approach to Resources

In designing their own studies, the students have access, not only to the Programme'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 Programme. They may audit several courses and take some for credit, or perhaps take no courses at all. 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 Programme's composition continually foster an enthusiastic exchange of information among the students and the Resource Persons. This activity has promoted a variety of seminars (for example, on evolution, creative writing, and communities) and, on a larger scale, has resulted in the recent sponsorship of two productive conferences - one a Writers' Workshop which brought together a number of successful writers, publishers and aspiring authors within the University, the other a Women's Studies Conference which attracted participants from throughout the province.

Year End Reviews

Students are encouraged to document the structure and pursuit of their studies as their programmes develop. They are required to report yearly on this development. It is suggested that they indicate the nature of their studies, resources used (personnel, facilities and materials), provide a critical evaluation of their educational year indicating particular achievements and difficulties, and perhaps include examples of their work and evaluation by others.

Degree Process

While students may take and receive grades for regular University courses, the degree awarded through this Programme is not based on the accumulation of course credits but on the evidence of competence achieved. The Bachelor of Independent Studies (BIS) degree is at least equivalent to a regular general baccalaureate degree. However, it is neither a three year nor a four year degree. Each degree programme is evaluated on its own merits.

Students who desire the degree and are ready for senior undergraduate work, present a written application to the Academic Board for Integrated 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 programmes. 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.

The responsibility students in this Programme must assume for their studies ensures that graduates will possess a high level of organizational skills, self-discipline and motivation, combined with their attested educational development. These capabilities have prepared them well for further endeavours and have proven advantageous in their search for employment. Moreover, graduates have been remarkably successful in gaining admission to teachers college, law, business, medicine, and other professional and graduate programmes.

Current members of the Academic Board are: M. L. Breidenbaugh (Psychology), T. E. Bunting (Geography), G. R. Francis (Man Environment), R. H. Holmes (Philosophy), S. M. (Biology), D. M. R. Taplin (Mechanical Engineering).

Admission Requirements

Students applying to the Programme are required to complete the appropriate formal application form (See Chapter 2 of this Calendar), and submit academic transcripts from previous educational institutions. In addition, they must provide an autobiographical letter indicating:

1) their previous learning experience,
2) their reasons for wishing to enter Integrated Studies, and
3) an indication of the type of exploration proposed.

Candidates are also encouraged to submit letters of reference assessing their ability to pursue their proposed programmes.

All applicants residing within a reasonable distance of the University are then interviewed by the Admissions Committee consisting of students and Programme staff. Decisions on the remaining applicants are made solely on the submitted material.

While general University standards are applicable to Integrated Studies, applicants who do not have a formal educational background but who do show aptitude for self direction and indicate an ability to flourish in an unstructured academic setting are given favourable consideration.

Those interested in this alternative approach to university education are urged to visit the Programme to meet with those currently involved in its operation. In addition, members of Integrated Studies would be happy to visit schools or groups of students to discuss the Programme.

For further information, including a copy of the current handbook, contact Bill Smythe, Co-ordinator, at extension 3437 in room 1054 in the Psychology (PAS) building.

Examples of Individual Study

Laurie entered the Programme directly from high school with the intention of pursuing studies in child psychology. As the year developed she shifted her emphasis to special education, focussed part of her studies on feminism and spent a great deal of time on nutrition, relating it to learning and behaviour. She took four courses each term, did volunteer work at a centre for the mentally retarded, served as a teacher’s aide in a local public school, worked with a Programme Resource Person toward developing her knowledge of French, and participated in IS seminars. One of the highlights of her year was attending, with financial support from IS, a conference in Montreal sponsored by the Quebec Association for Children with Learning Disabilities. This experience gave her an improved perception of special education and put her in contact with some of the most knowledgeable people in the field.

David’s study of the science of music led him into such areas as systems design, psychology, computer science and electrical engineering. He took courses, completed a wide range of projects, prepared musical compositions, and gave public recitals. He attended conferences (presenting a paper at one of them) and gave a course of his own to the University community.

The purpose of Shirley’s degree programme was, according to her description: ‘to extend and make formal the assessment by qualified people of my competence in literature studies, and to increase my competence in the kinds of literary analysis which contribute to the development of my creative writing and my teaching of English language and literature’. Working under the supervision of faculty from the English and History departments, she taught at the University’s Writing Clinic helping individuals with their writing problems, took literature courses, and prepared major papers. Other activities included working with IS Resource Persons, participating in the Programme’s writers’ group, continuing to write poetry and short stories, and organizing an informal conference which was attended by writers, both aspiring and successful, by several publishers and by a variety of people from the Kitchener-Waterloo area.

While Shelagh initially engaged in an independent study of alternative energy, she broadened her programme to include courses in physics, biology and mathematics, and work with a Resource Person on
political thought in the 19th and early 20th centuries and on social Darwinism. Finally, she participated in the Programme’s seminar on co-operatives.

Before entering Integrated Studies Marty had considerable work experience as a consultant to individuals and groups involved with social service agencies and the courts. He designed a programme which coupled intervention work in the criminal courts with related academic study in such areas as sociology and political science. Relevant courses were used primarily as skill’s training in community organizing. During his degree year he was involved in child advocacy work under the supervision of faculty in the departments of Planning and Psychology and a judge of the family court where he served his field placement.

Inspired by the ageless curiosity of children and by the relatively recent challenge taken by women, Beth’s programme is a continuation of her writing from a feminist perspective. A newly acquired interest in verbal communication, particularly spoken verse, has led her into a number of workshops both within the Integrated Studies Programme and the community. Working with Resource Persons, professors and public school teachers, Beth is currently writing poems and short stories for children.

Werner had a number of years experience as a carpenter before coming to Integrated Studies. From the outset he structured his programme to prepare himself to become a teacher of technical subjects. After an initial exploration of a number of areas, he focused his studies in mathematics and science, and engaged in a major examination of the design of roof trusses.

Working with the assistance of the Programme’s Resource Persons and other faculty of the University, Gary began with a general interest in education, sociology, German and philosophy, but gradually made philosophical scepticism his primary study concern. During his degree year he was awarded a scholarship to the University of Oslo which enabled him to continue his study of scepticism with one of Norway’s leading, philosophers.

Anthropology and philosophy provided the framework for Rachel’s study of women’s cognition of themselves and their attempts to organize their world. Her method consisted of credited courses and individual work with fellow students, Resource Persons from IS and other faculty from the University and the Ontario Institute for Studies in Education. Further, she was one of the principal organizers of the Programme’s Women’s Studies conference.

On entering IS after having completed a regular baccalaureate degree in Manitoba, Jamie pursued his study of man through philosophy and anthropology. He engaged in a weekly tutorial with an IS Resource Person who compiled a reading list introducing him to the sociology of knowledge and assisted his study of phenomenology and contemporary literature. While working occasionally with other Resource Persons he also made contact with faculty in the anthropology and philosophy departments. In order to gain some continuity while becoming accustomed to independent research, he registered in philosophy and history courses. In addition, he participated in a number of IS seminars.

While Elaine was concerned about social issues from the beginning of her programme, it was not until her second year that this interest gained a global perspective, particularly in terms of Third World countries. She then took courses in African history and environmental nutrition and undertook an independent study of foreign aid and development using the resources of the Global Community Centre.

Susan’s major paper on “The cognitive effects of learning an alternate mode of communication by non-verbal children” was the concluding work in her undergraduate programme, which included two years at the University of Toronto and two years in Integrated Studies. Her recent study in psycholinguistics consisted of courses at OISE and at the University of Waterloo, observational research carried out over a six month period in a special class for language handicapped retarded children, and an independent study of the pertinent literature under the guidance of her degree supervisors. Susan is currently in the Educational Psychology programme at OISE.

Joe joined the IS programme with the intention of studying alternative schools in the USA and Canada. While doing this study he developed an interest in the history of the American labor movement. This led him to visit old-time union organizers throughout the USA and Canada and to produce a number of taped interviews on the oral history of the Industrial Workers of the World (IWW). Subsequently, he undertook a study of the Industrial Revolution and the development of the work ethic while at the University of Waterloo. His blend of individual investigation and travel offered him many alternative approaches to historical study at an undergraduate level. Most of his university centered work was performed in conjunction with Resource Persons in association with other IS students. He then moved to Spokane, Washington where he studied the skid row area, and, upon his return, produced a thesis on the hobo’s attitude toward work.

Mark entered Integrated Studies after working with computers in high school and in England, and did independent work on many of the computer systems in use at this University. He also attended many of the computer science courses offered by the Math faculty and served as a tutor for a first year computing course. He found that the freedom of Integrated Studies provided a needed alternative to the traditional mathematically oriented approach to computer science. In addition, he did readings and took courses in a number of subjects such as philosophy, logic, international relations, economics and literature, mostly for their own sake but also with a view to exploring possible non-business/math applications of computers.
Faculty of Mathematics

Mathematics students working on terminal and line plotter
Faculty of Mathematics

Prior to 1967, Honours and General Mathematics programmes were offered through the Faculties of Arts and Science. The continued growth and development of these programmes led to the formation of the Faculty of Mathematics as a separate faculty in January, 1967. The Faculty is comprised of the departments of Applied Mathematics, Combinatorics and Optimization, Computer Science, Pure Mathematics and Statistics (including Actuarial Science). The degree Bachelor of Mathematics (B Math) is awarded upon successful completion of three-year Pass, four-year General and four-year Honours programmes.

Honours and General programmes are available on 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 programme is not available on the co-operative system. Students may also register in regular (not co-operative) programmes through St. Jerome’s College.

The Faculty also offers graduate programmes leading to the following degrees: Master of Mathematics (M Math), Master of Philosophy (M Phil) and Doctor of Philosophy (PhD). Detailed information is contained in the University of Waterloo Graduate Studies Calendar.

Brochures

The Faculty of Mathematics publishes a brochure which is specifically designed for Ontario high school students. Copies of this are available in school guidance offices or on request from either the Director of Undergraduate Affairs or the Assistant Registrar, Faculty of Mathematics.

Department of Applied Mathematics

Traditionally, Applied Mathematics has been almost synonymous with Mathematical Physics but times change and today Applied Mathematics, while retaining its interest in the physical sciences, is broadening its scope and is becoming concerned with the applications of mathematics to the social and biological sciences. To handle the types of problems that arise in these areas the Applied Mathematician requires two things: a firm background in mathematics with a mastery of techniques and an ability to understand a problem when that problem is stated in the language of biology, economics, engineering, chemistry, physics or business.

With these considerations in mind the Honours Applied Mathematics programme at Waterloo has been developed as follows: in the first two years the student follows essentially the same programme as every other student in the Faculty of Mathematics and acquires a basic mathematical background: in year three he is given some of the mathematical tools that will be indispensable – calculus of variations, tensor calculus and ordinary differential equations, and gets a firm grounding in mechanics and an introduction to partial differential equations. In his fourth year he is expected to choose some of the purely mathematical subjects such as partial differential equations, non-linear differential equations, Lebesgue integration and operator theory but equal emphasis is placed on the application of mathematics; for example, there is a one term course in continuum mechanics which is followed by either a course in elasticity or hydrodynamics or (we expect) aerodynamics. Other courses are: statistical mechanics, quantum mechanics, general relativity theory, electromagnetic theory, control theory and differential geometry.

It is our belief that a graduate from this programme will be able to turn his hand to many things such as meteorology, oceanography, seismic exploration, supersonic flow, the problems of navigation in space, control problems, ecological population studies and the study of epidemics.


For those students who wish a strong emphasis on Physics, the Department offers the programme “Honours Applied Mathematics with Physics Minor.”

Mathematics

Faculty Departments

Department of 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.

**Department of Computer Science**
The computational power made available by the electronic computer has revolutionized the approach taken in many areas toward problem solving and research. In recent years a knowledge of Computer Science has become a valuable asset for work in many fields.

In addition to providing the student with a strong core of Mathematics, the Computer Science programme gives him a solid foundation in programming languages, numerical methods, data structures, switching theory and machine architecture. Advanced students are offered courses in numerical analysis, scientific applications, operating systems, business systems analysis, simulation, formal languages, algorithm design and analysis, program verification, computer graphics, artificial intelligence, real-time computing, and data communications.

The student is also encouraged to take a series of courses in some other discipline to which he can apply his knowledge of Computer Science.

Upon completion of the Computer Science programme, the student is qualified to enter a rewarding career in the computing profession. In addition, he is well prepared to undertake graduate study in Computer Science.

**Department of Pure Mathematics**
Pure Mathematics is the study of mathematics both for its own sake and that of possible future applications. A mastery of fundamental areas of mathematics such as algebra, analysis and geometry is essential, not only to the further development of these subjects, but also to their application either to other basic sciences or to technology. Thus, in addition to those who are especially attracted to pure mathematics, the department’s programme is designed also for students who wish ultimately to apply their knowledge, but who would prefer to obtain a thorough understanding of mathematics before committing themselves to some particular area of application. Many of those Pure Mathematics graduates who do not become direct appliers of their mathematics enter the field of education, anywhere from the primary level to the most advanced research institute. Our objectives are based on the conviction that the ability to think clearly and precisely, and to continue educating oneself, are valuable in any field of endeavour.

The special interests of the Department include: Functional Equations and their applications (e.g. to information theory, probability, mathematical psychology, nomography, engineering, science, social science); Algebra (group theory, representation theory, ring theory, lattice theory, universal algebra, linear and multilinear algebra); Analysis (generalized integrals, real and complex analysis, functional analysis); Geometry (algebraic topology, homotopy theory, differential geometry); Number Theory; Logic and Foundations.

**Department of 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 numbers to collect, and how to collect them so that they will be without biases and 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 for collecting data is to assist in reaching a decision, and 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 programme; abstract algebra, combinatorics, difference and differential equations, analysis, and measure theory are required in more advanced work. Most statistical analyses involve the computer, and a good background in Computer Science is highly desirable.

The Department also offers courses and programmes in Actuarial Science, which is the application of mathematics and statistics to Financial Problems, with particular emphasis on Life Insurance and Employee Benefit Programmes. The courses offered provide theoretical preparation for the first five
examinations of the Society of Actuaries, and include studies of such subject areas as Mathematics of Finance, Life Contingencies, Theory of Risks, and Demography.

Students can also gain valuable background knowledge in economics, finance, administration, and law by carefully selecting their electives.

Admission

General admission requirements and procedures are outlined in detail in Chapter 2. The following policies relate specifically to the Faculty of Mathematics.

Admission as an Adult 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 an adult student. The applicant should, however, have covered the material of the Ontario Year 5 mathematics courses (Calculus, Functions and Relations, Algebra), either through a local high school or through the Correspondence Branch of the Ontario Ministry of Education and should provide evidence of being able to profit from a mathematics programme. Each application will be considered on its own merits by the Admissions Committee (See also Part-time Studies).

Advanced Standing

1) Transfer Credits

Students transferring into the Faculty of Mathematics either from outside or from within the University of Waterloo 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 designated for mathematics students. A transfer failure will normally be assigned if the mark is less than 50%.

A mark of 50-59% in a mathematics course equivalent to a course required for a B.Math degree could give the student exemption from that requirement but not a credit toward the degree.

A maximum of twelve transfer half-credits per academic year previously taken will normally be given.

Students admitted with a previous Bachelors degree will normally be given a maximum of twelve elective (non-math) half-credits, with a possibility of exemptions in certain math courses.

2) 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 B Math degree. Otherwise, the grades are only considered for transfer credit purposes and not included in averages.

Grades in courses taken at other institutions prior to a student's admission to the Faculty of Mathematics will not be included in cumulative averages.

3) Co-operative Programmes

It is normally not possible to transfer into a co-operative programme beyond the second-year level. Students applying for transfer at the second-year level must have credit in courses equivalent to the first-year Calculus, Algebra, and Computer Science courses required of University of Waterloo mathematics students. Past experience has indicated that very few places in co-operative programmes are available at the second-year level for students applying from other institutions. Applicants in this category who cannot be admitted to a co-operative programme will be considered automatically for the regular programme.

Part-Time Studies

Students wishing to work toward a degree in Mathematics on a part-time basis must meet the regular admission requirements.

Applicants who do not meet these requirements may be admitted as non-degree, part-time students at the discretion of the Admissions Committee. After completing at least four half-credit Mathematics courses, they may apply for degree candidacy. If regular admission is granted, any credits earned as a non-degree, part-time student will count towards BMath degree requirements.

The BMath Pass degree may be obtained entirely by part-time studies; the BMath General degree requires at least two terms on campus; the BMath Honours degree requires at least four terms on campus.

Mathematics courses are not normally offered in the evenings or on Saturdays, although a reasonable cross-section of elective courses is available in the evenings, particularly during the Fall/Winter sessions. Many part-time students take courses via the University of Waterloo Correspondence Programme. (See page 16 for more details of this programme; a separate brochure is available.)

Fees, Financial Assistance

See Chapters 3 and 4.
Standings and Promotions

a) Degree Requirements

The Faculty of Mathematics offers undergraduate programmes leading to the following Bachelor of Mathematics degrees: BMath Pass, BMath General and BMath Honours. The table below summarizes the degree requirements for these programmes in terms of full-course credits.

<table>
<thead>
<tr>
<th>Minimum total credits</th>
<th>Pass</th>
<th>General</th>
<th>Honours</th>
<th>Honours</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>15</td>
<td>21</td>
<td>24</td>
<td>24</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Minimum math credits</th>
<th>0</th>
<th>12</th>
<th>15</th>
<th>12</th>
</tr>
</thead>
<tbody>
<tr>
<td>Minimum elective credits</td>
<td>6</td>
<td>6</td>
<td>6</td>
<td>6</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Minimum math average</th>
<th>60%</th>
<th>60%</th>
<th>70%</th>
<th>70%</th>
</tr>
</thead>
<tbody>
<tr>
<td>on 6 credits</td>
<td>on 12 credits</td>
<td>on 15 credits</td>
<td>on 12 credits</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Maximum full course attempts (or equivalent)</th>
<th>22</th>
<th>27</th>
<th>30</th>
<th>30</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Maximum full course failures (or equivalent)</th>
<th>5</th>
<th>6</th>
<th>4</th>
<th>4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Complete terms required</td>
<td>0</td>
<td>2</td>
<td>4</td>
<td>4</td>
</tr>
</tbody>
</table>

Footnotes

1 A full-course refers to a two-term (or eight month) course. One credit is awarded for successful completion of a full-course. A half-course refers to a one-term (or four month) course. A half-course is awarded for successful completion of a half-course. Two half-courses, not necessarily in the same subject, constitute the equivalent of a full-course.

2 Included in the category of math credits are courses with abbreviations AM (Applied Math), C & O (Combinatorics and Optimization), CS (Computer Science), Math (faculty non-departmental courses), PMath (Pure Math) and Stat (Statistics, including Actuarial Science). Note that students transferring from other post-secondary institutions or other U of W faculties require at least 6 full U of W Math courses that may be taken for credit by a student in the Faculty of Mathematics.

3 Elective courses are normally non-mathematics courses. MTHEL courses, offered by the Math Faculty, are acceptable electives for math students.

4 All Faculty and Departmental courses required for a particular degree will be included in the Math Average.

For Honours programmes requiring more than 15 math credits (e.g. Double Honours), all such credits will be included in the Math Average. For Honours programmes which require fewer than 15 math credits (e.g. the Chartered Accountancy, Management Accounting and Business Administration options require only 14 math credits) only those required credits will be included in the average.

There are two deadline dates each term, one for adding courses (this includes changing sections) and a second for dropping courses. The last day to add a course is 2 weeks after the official beginning of lectures. The last day to drop a course is 6 weeks after the official beginning of lectures in the term the course terminates. (These deadline dates apply only to Math Faculty students.)

A full-course attempt refers to a full-course registration not formally cancelled with the Registrar’s Office before the drop deadline in the second term of the course.

A half-course attempt refers to a half-course registration not formally cancelled with the Registrar’s Office before the drop deadline in the term in which the course is taken. Further, if a full-course registration is cancelled after the drop deadline in the first term of the course but before the drop deadline in the second term of the course, the course will be recorded as a half-course attempt.

A full-course attempt (half-course attempt) not successfully completed constitutes a full-course failure (half-course failure). In particular, a full-course registration cancelled between drop deadlines (see 6 above) constitutes an unsuccessfully completed half-course attempt, hence a half-course failure.

A complete term is normally one in which a student successfully completes at least five half-courses, at least two of which must be Mathematics courses. For purposes of satisfying the requirements for a complete term, each term of a full-course will be regarded as a successfully completed half-course, provided the student successfully completes the full-course.

The Joint Honours column refers to Joint Honours Programmes with other Faculties (e.g. Statistics and Psychology, Computer Science and Economics, etc). In addition to meeting Math Average requirements, students in these programmes must also satisfy Honours average requirements specified by the other department.

Under the Math Faculty’s credit system, the onus is on the student to be aware of all regulations pertaining to his/her programme of study. When all requirements for a particular BMath degree have been met, it is the student’s responsibility to submit an ‘Intention to Graduate Form’ to the Registrar’s Office.
b) Special Co-op Requirements
Additional requirements for co-op students are summarized in booklets entitled 'Regulations and Procedures For Co-operative Programmes' and 'Co-op Math - Handbook for Students in the Co-operative Mathematics Programme - University of Waterloo'. Both publications are available from the Department of Co-ordination and Placement in Needles Hall. In particular, the following should be noted.

(i) A student is expected to follow the normal work-term sequence from the point of entry into a co-operative programme through to graduation. (See (ii) below.) Thus, a student who enters a Co-op Math programme in 1A is normally expected to complete 6 work terms.

(ii) Requests to alter the normal work-term sequence must be directed to (and preferably discussed with) the Liaison Co-ordinator who in turn forwards those he supports to the Mathematics Standings & Promotions Committee for approval. The special Stream Switch Form which exists for this purpose must normally be accompanied by a letter of support from the employer involved together with the reasons for the request. Requests for more than two consecutive work terms or school terms are not normally approved.

(iii) A co-op student’s primary responsibility while on a work term is to his/her employer. Accordingly, unless supported in writing by his/her employer, the Standings & Promotions Committee is not prepared to consider a co-op student’s request to take more than one half-course while on a work term.

(iv) While registered for an academic term on campus, Co-op Math students are normally expected to maintain a full-time course load. In the case of the ‘graduating’ term, enrolment need only be maintained in those courses needed to satisfy degree requirements.

(v) In addition to meeting all academic and co-operative requirements, to be eligible for the Co-operative BMath degree, a student must maintain his/her registration in ‘Co-op’ through to graduation and must complete the programme with an academic term. (i.e. The last term may not be a work term.)

c) Examining Body
The Faculty constitutes the examining body for all examinations. All examination results are considered by the Faculty Committee on Standings and Promotions on behalf of Faculty Council, and then issued to individual students by the Registrar.

d) Required Withdrawal from Co-op
A student will normally be allowed to remain in a co-operative math programme if he/she has satisfied all of the following requirements.

(i) an overall cumulative average of 60.
(ii) no more than 2 half-course failures in any one term.
(iii) no more than 3 half-course failures in any two consecutive full-time academic terms.
(iv) no more than 8 half-course failures in total.

Continuation in a Co-operative programme is also contingent upon satisfactory performance on work terms.

e) Required Withdrawal from Honours
When an Honours student has exceeded 4 full-course failures, he/she will be required to withdraw from the Honours programme. In those cases where the student has not fallen into one of the categories warranting required withdrawal from the Faculty (see below), he/she will still be eligible to pursue a Pass or General degree. In such instances, however, the student will not normally be permitted to take an Honours level course when there is a General level equivalent course available.

f) Required Withdrawal from Mathematics
A student will normally be required to withdraw from the Math Faculty if he/she is in one or more of the following categories:

(i) exceeded 5 full-course failures (or equivalent)
(ii) by the end of the first term in which the student has accumulated 22 or more full course attempts (or equivalent), failed to satisfy all BMath Pass degree requirements.
(iii) is unlikely to profit from further study in the Math Faculty (in the opinion of the Standings & Promotions Committee).

A student who has been required to withdraw from the Math Faculty will not normally be readmitted to a degree programme in Mathematics at any point in the future.

g) 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. In other instances, however, it is quite possible that the student would be required to withdraw from the Faculty with no degree.
h) 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 zero in overall cumulative average calculations.

Illness may constitute an acceptable reason for not writing an examination. Students who miss examinations because of illness should 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 and to the Registrar’s Office. The Faculty Standings & 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 record.

i) Voluntary Withdrawal
A student may withdraw from the Faculty of Mathematics within the first six weeks of classes in a term without incurring any academic penalty. (A special ‘Withdrawal Form’, available in the Mathematics Undergraduate Office or the Registrar’s Office, must be completed.) A student who withdraws after this date 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.

j) Grade Appeals
Any student wishing to appeal a grade may do so by contacting the Secretary of the Standings & Promotions Committee (the Assistant Registrar, Faculty of Mathematics, in Needles Hall). Such an appeal must (i) be made in writing within one month of the official release of that term’s grades, (ii) specify the course(s), instructor(s) and grade(s) involved together with reasons why the appeal is being made, (iii) include $5.00 per grade appealed (which is refunded if the grade is raised). Please note, however, that a grade may be lowered if a re-examination leads to the discovery of an earlier error in the student’s favour.

k) Exceptional Cases
All regulations described in this section apply except under “exceptional” circumstances. Exceptions to normal faculty policies under the jurisdiction of the Standings & Promotions Committee may only be authorized by that Committee. Requests or appeals of this nature must be made in writing to the Secretary of the Committee (the Assistant Registrar, Faculty of Mathematics, in Needles Hall). Unless the Committee feels that the circumstances outlined in writing justify their giving an individual student special treatment that others would not receive, such requests are usually refused.

It is often advantageous to discuss this type of situation with a faculty advisor before formally approaching the Standings & Promotions Committee. Committee meetings are normally scheduled every other week.

l) 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. (INC, NMR, DNW count as zeroes in overall cumulative average calculations.)

The averages displayed on end-of-term ‘Student Examination Reports’ are intended only to give an indication of student progress. They do not correspond exactly to the average requirements for a BMath degree as outlined earlier in this section. (For example, the only average referred to in the discussion on degree requirements is the “graduating math average”, which obviously cannot be calculated until all required Math courses have been successfully completed.) The overall average includes all marks displayed on the mark report (counting zero from DNW, NMR, INC). Two math averages are displayed. One includes the marks of all math courses taken, whether passed or failed. The other includes only the marks of successfully completed math courses.

m) Advanced/Honours/General Equivalents
Certain core subjects are offered at three different levels. The advanced level courses are intended for
exceptionally gifted students in an Honours programme. A student pursuing an Honours degree may substitute the Advanced level equivalent course(s) for any required Honours level course(s).

A student pursuing a Pass or General degree may substitute the Honours level equivalent course(s) for any required General level course(s), unless the student has been required by the Standings & Promotions Committee to switch from an Honours programme to General or Pass. In this case, the student must enrol in General courses.

n) The Dean’s Honours List
Beginning in 1978, the Faculty introduced a Dean’s Honours List for students in each undergraduate year of the Honours programme. To be on this list a student in years 1 and 2 must complete at least two full-credits in Advanced Level Math courses (e.g. Maths 140a/b, 144a/b in Year 1 and 240a/b, 241a/b in Year 2) and achieve at least 85% Math and Overall Averages. In years 3 and 4, a student must achieve Math and Overall Averages of at least 85%.

Each year that a student is on the Dean’s Honours List, a notation to this effect will appear on his/her mark report and official transcript. In addition, graduating students who are on the Dean’s Honours List in year 4 and in at least one earlier year will be identified as having ‘graduated on the Dean’s Honours List’ (with an appropriate notation on their graduating transcript) and will have their names added to the list of such students in the Faculty Colloquium Room.

o) Course Upgrading
A student who takes the General version of a course instead of the Honours version (e.g. Maths 220a/b instead of 230a/b in 2nd year), but later decides that he/she wishes to pursue an Honours degree, may petition the Standings & Promotions Committee for special consideration. In the past, in a few rare instances where the academic record of the student in question was of very high calibre, the Committee has permitted the student to count the General course toward an Honours degree. In other cases, the Committee may permit the student to write a special final examination in the Honours course without submitting all the written work normally required during the term. In such cases the grade obtained will be treated in the same manner as if the student had registered in the course and obtained that final mark. Otherwise, the student must formally take the Honours course. (Special provisions apply to Math 120a/b; 124a/b: A grade of at least 80% in one of these courses will count as satisfying the corresponding Honours level course.)

p) 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 Math Average required for the degree in question.

Note that supplemental examinations are not available for students in the Math Faculty.

q) 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 Math Average pertaining to the degree requirements.

r) Maximum Course Load
No student may pre-register for more than 6 courses per term. Students in Years 3 and 4 may add additional courses, to a maximum of 8, during the two-week course-change period at the beginning of term if their academic record justifies a heavier course load. For new students in Year 1, addition of extra courses in the first term will normally be restricted to students with admission averages both at least 80%. For current students in Years 1 and 2, addition of extra courses will normally be restricted to students with both overall and math averages at least 75% during the student’s most recent complete term. In cases where the student was registered in more than 6 courses in the previous term and had both averages at least 70% in those courses, he/she will be permitted to register in the same number of courses in the subsequent term. In all cases a student’s “year” will be determined by the number of credits (N) achieved to date according to the scheme below.

<table>
<thead>
<tr>
<th>Year</th>
<th>0 ≤ N ≤ 5</th>
</tr>
</thead>
<tbody>
<tr>
<td>first</td>
<td>0 ≤ N ≤ 5</td>
</tr>
<tr>
<td>second</td>
<td>5 ≤ N ≤ 10</td>
</tr>
<tr>
<td>third</td>
<td>10 ≤ N ≤ 16</td>
</tr>
<tr>
<td>fourth</td>
<td>16 ≤ N</td>
</tr>
</tbody>
</table>

s) Part-time/Full-time
A student registering for one or two courses per term is considered to be part-time and fees are assessed exclusively on a per-course basis. A student registering for more than two courses is considered to be full-time and fees include extra provisions for an incidental fee (student federation membership, athletics, etc.) and a co-op fee (for students in co-operative programmes).

Students in the regular programme normally take courses during the fall and winter terms. However, they may also take courses on a part-time or full-time
basis during the Spring (May-August) or Summer (July-August) terms.

If students plan to be part-time in the fall term and full-time in the winter term, or vice versa, they should discuss their situations with a faculty advisor. Considerable complications can arise in situations of this nature if the paperwork involved is not handled properly.

1) No Credit/Overlap Courses
Some courses offered by other faculties have considerable mathematical content. These courses typically fall into two categories, those for which no Math student may obtain credit under any circumstances and those for which a student might obtain credit provided he/she does not enroll in the overlapping course(s) offered by the Math Faculty. There are also overlapping Math courses. Lists of all such courses are available at pre-registration times. All undergraduate advisors also have copies for perusal. It is the student’s responsibility to determine whether any of his/her courses fall into these categories.

u) Letters of Permission
Students in good academic standing (i.e. at least 60% cumulative overall average) are normally permitted to take elective courses at other universities on a part-time basis during terms off campus to count as credits toward a Bachelor of Mathematics degree at Waterloo. However, only under very special circumstances will full-time math students be permitted to take mathematics courses at other institutions to count toward their Waterloo degree requirements. Students wishing to take courses at other universities may apply to the Standings & Promotions Committee for permission by contacting the Assistant Registrar, Faculty of Mathematics. Please note that permission must be obtained in advance of taking the course. The Committee will normally approve a course taken elsewhere for Waterloo degree credit if prior approval was not obtained. All courses taken on “letters of permission” at other institutions will be treated as if they had been taken at Waterloo (for Standings and Promotions purposes).

Care should be exercised in the selection of courses to be taken on a letter of permission to ensure that the student does not duplicate any work he/she has already taken or is planning to take in future years at the University of Waterloo. Once the Faculty has approved a request to take a course on a letter of permission, the student will be held responsible for it. It will be his/her responsibility to ensure that an official transcript is sent to the Registrar’s Office within two months of the completion of the course. Otherwise, a grade of DNW (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 by the Standings & Promotions Committee. The Faculty strongly recommends that students attempt at most one full-course in any intensive study programme (e.g. six weeks).

v) Correspondence Courses
The Correspondence Programme at the University of Waterloo offers a large variety of courses each term for part-time students. However, concurrent registration by full-time BMath degree candidates in on-campus and correspondence courses will not normally be permitted. The Mathematics Faculty feels that the Correspondence Programme should normally be restricted to part-time students who are not able to attend classes on campus.

Correspondence courses offered in the fall term do not generally begin until late October and have their final exams at the beginning of the following February. In this regard the Mathematics Faculty has adopted a policy whereby a student with less than a 70% overall average in his/her most recent complete academic term may not normally take a correspondence course on a part-time basis during the fall term if he/she will be registered full-time during the winter term. This policy is intended to limit this type of situation to students who should be able to cope with the overlap involved with studying for and writing final examinations in fall-term correspondence courses while simultaneously carrying a full-time load of on-campus winter courses.

Correspondence courses may not normally be used to satisfy explicitly stated course requirements for an Honours programme. It is the intent of this policy to require that all such degree requirements be satisfied entirely on-campus courses. Any additional courses, whether mathematics or non-mathematics, may be taken on a part-time basis by correspondence for Honours degree credit. It should also be noted that this policy applies only to Honours programmes. No such restriction applies for General or Pass programmes.

Subject to the limitations described in earlier paragraphs, correspondence courses may be taken on a part-time basis by regular and co-op students during terms off campus. However, a separate application form must be completed in addition to the usual transactions involving course-change and/or pre-registration forms. These application forms and other information can be obtained directly from the Correspondence Programme Office (room 375 in the Physics Building).
Academic Programmes

General Remarks
In each of the first three years, honours and general courses are offered in Calculus and Algebra. The pace and subject matter are more demanding in the honours versions than in their corresponding general counterparts. (Advanced level courses are also available in Calculus and Algebra for exceptionally gifted students in an Honours programme.)

In addition to the differences in degree requirements among Pass, General and Honours programmes highlighted on page 179, students in an Honours programme are required to take honours (or advanced) level courses and are normally expected to take six half-credit courses each term, whereas students in General or Pass programmes normally take general level courses and five half-credit courses each term beyond first year.

Students are not associated with a specific department in the Faculty of Mathematics for the first two academic years of study. Departmental honours programmes commence in Year 3. Although there are no formal departmental programmes in Pass or General, students in these programmes may also associate themselves with a department at the beginning of Year 3. This procedure allows Pass or General students to turn to departmental undergraduate officers for advice but does not subject them to departmental degree requirements.

It is possible to transfer from one programme to another within the Faculty, provided that the prerequisites of the new programme have been met. As well, it is possible to transfer to other Faculties provided that electives have been judiciously chosen.

The following tables and accompanying descriptions outline in detail the degree requirements and typical course load for each year (i.e. two four-month academic terms) of all undergraduate programmes in the Faculty of Mathematics. Except where noted, Honours and General programmes may be taken on either the regular or co-operative system of study. The Pass programme is available only in the regular system. The academic requirements of corresponding co-operative and regular programmes are identical.

The term 'math half-credit' includes courses with abbreviations AM (Applied Mathematics), C&O (Combinatorics and Optimization), CS (Computer Science), Math (faculty non-departmental courses), PMath (Pure Mathematics), and Stat (Statistics, including Actuarial Science). The term 'elective half-credit' refers to courses offered by other UW faculties as well as those with the abbreviation MTHEL.

Departmental Honours Programmes
Requirements and Recommendations

Applied Mathematics (Regular only)
Faculty core requirements as outlined in Table 1 and:
Math 331a/b or P Math 341 a/b;
One of Math 332a, CS 370, 371, P Math 351a;
Math 332b or P Math 352a;
A minimum of eight Applied Math half-credits at the 300 or 400 level, at least two of which must be at the 400 level.
AM 260, 270 are recommended.

Recommended elective courses for Honours Applied Mathematics with Physics Option are: Physics 121/122 or 162/163, 253/254, 255, 354, 362/363, 358/359, 441 and Chemistry 121/122.

Applied Mathematics (with electives in Engineering)
(Co-operative only)
Faculty core requirements as outlined in Table 1 (with CS 140, 250 required in Year 1) and:
AM 260, 270;
Math 332b, AM 371, 381, 391;
Four of AM 340, 365, CS 370, 371, Math 331a, 332a;
A minimum of eight Applied Math half-credits at the 300 or 400 level, at least four of which must be chosen from AM 395, 461, 466, 468, 476, 478, 481, 482, 485.

Electives required include Physics 121/122 or 162/163 in Year 1 and two half-credits each year (one each term) beyond Year 1 from options A, B, C, D, E, or F.

Option A
ME 219, 220, CE 303, 304, ME 527 and/or ME 525; One or more of CE 518, 522, 526, ME 626.

Option B
Sy De 282, 555, Sy De 281 and/or 543; Three or more of Sy De 352, 372, 343, 442, 468, 535, 544, 565, 567.

Option C
ME 219, 250, 351; Three or more of ME 353, 354, 452, 456, 459, 469, 557, 563.

Option D
El E 271, 233 and/or 241; Four or more of El E 342, 351, 352, 372, 418, 419, 434, 435, 436, 453, 454.
### Table 1 Typical Programmes

<table>
<thead>
<tr>
<th>Year</th>
<th>Honours Programme</th>
<th>General Programme</th>
<th>Pass Programme</th>
</tr>
</thead>
<tbody>
<tr>
<td>Year 1</td>
<td>Math 130a/b; Math 134a/b; two of CS 140, 180, 240, 250; six elective half-credits.</td>
<td>Math 120a/b; Math 124a/b; two of CS 140, 180, 240, 250; six elective half-credits.</td>
<td>Math 120a/b; Math 124a/b; two of CS 140, 180, 240, 250; six elective half-credits.</td>
</tr>
<tr>
<td>Year 2</td>
<td>Math 230a/b; Math 231a/b; Stat 230, 231; two math half-credits; two elective half-credits; two elective or math half-credits.</td>
<td>Math 220a/b; Math 221a/b; two math half-credits; two elective half-credits; two elective or math half-credits.</td>
<td>four math half-credits; two elective half-credits; four elective or math half-credits.</td>
</tr>
<tr>
<td>Year 3</td>
<td>eight math half-credits; two elective half-credits; two elective or math half-credits.</td>
<td>Math 321a/b; one of CS 370, CS 371, Math 322a; Math 322b; two math half-credits; two elective half-credits; two elective or math half-credits.</td>
<td>four math half-credits; two elective half-credits; four elective or math half-credits.</td>
</tr>
<tr>
<td>Year 4</td>
<td>eight math half-credits; two elective half-credits; two elective or math half-credits.</td>
<td>six math half-credits; two elective half-credits; two elective or math half-credits.</td>
<td>not applicable</td>
</tr>
</tbody>
</table>

**Note**
The specific courses listed in Table 1 constitute the Faculty core requirements for each programme. Subject to item (m) on page 181, substitutions among advanced, honours and general level equivalent courses are possible as follows:

<table>
<thead>
<tr>
<th>Advanced</th>
<th>Honours</th>
<th>General</th>
</tr>
</thead>
<tbody>
<tr>
<td>Math 140a/b</td>
<td>Math 130a/b</td>
<td>Math 120a/b</td>
</tr>
<tr>
<td>Math 144a/b</td>
<td>Math 134a/b</td>
<td>Math 124a/b</td>
</tr>
<tr>
<td>Math 240a/b</td>
<td>Math 230a/b</td>
<td>Math 220a/b</td>
</tr>
<tr>
<td>Math 241a/b</td>
<td>Math 231a/b</td>
<td>Math 221a/b</td>
</tr>
<tr>
<td>P Math 341a/b</td>
<td>Math 331a/b</td>
<td>Math 321a/b</td>
</tr>
<tr>
<td>P Math 351a</td>
<td>Math 332a</td>
<td>Math 322a</td>
</tr>
<tr>
<td>P Math 352a</td>
<td>Math 332b</td>
<td>Math 322b</td>
</tr>
<tr>
<td>Stat 230/231</td>
<td>Stat 220/221</td>
<td></td>
</tr>
</tbody>
</table>
### Combinatorics and Optimization
Faculty core requirements as outlined in Table 1 and:
- Math 331a/b or P Math 341a/b;
- One of Math 332a; CS 370, 371, P Math 351a;
- A minimum of twelve additional 300 or 400 level math half-credits. These must include at least two math half-credits from one or more of the other four departments and at least five half-credits from the C & O department. The five C & O half-credits must include at least two of C & O 331a, 331b, 332, 360, 370a, 370b, and at least two of C & O 431a through C & O 472b.

### Operations Research (Co-operative only)
Faculty core requirements as outlined in Table 1 (with CS 140, 180 required in Year 1) and:
- CS 240, AM 260;
- Math 331a/b or P Math 341a/b;
- One of Math 332a, CS 370, 371, P Math 351a;
- Math 332b or P Math 352a;
- C & O 331a, 331b, 340;
- Two of C & O 431a through C & O 449;
- Two of CS 330, 331, 370, 371, 437, 472, 474, 482;
- Two of Stat 331, 332, 333, 340, 341, 430, 431, 442;
- A total of at least sixteen 300 or 400 level math half-credits.

A minimum of twelve elective half-credits is required, including at least eight of Economics 101, 102, 191, 192, 241, 291, 292, 294, 311, 391, 392, 393, 394, 411, 421, 422, Business 111W, 121W, 231W, 352W, 362W, 388W, 398W, 481W, 491W; Management Sciences 43, 44, 47, 53, 411. (These Wilfrid Laurier University Business courses are described by title on page 189. The WLU academic calendar should be consulted for full course descriptions and pre-requisites.)

This programme is administered by the Department of Combinatorics and Optimization.

### Computer Science
Faculty core requirements as outlined in Table 1 (with CS 140 required in Year 1) and:
- CS 240, 250, 340, 350, 360, 369, 370, 371;
- Math 331a or P Math 341a;

### Mathematics

#### Academic Programmes

#### Honours Programmes

Four additional CS half-credits from those labelled CS

At least four half-credits chosen from the following list:
- Math 331b (or P Math 341b), Math 332a (or P Math 351a/b), Math 332b (or P Math 352a/b), Stat 333, 340, 341, AM 381, 391, C & O 360, 370a/b, P Math 430a/b (or P Math 432a/b), or any fourth year (non Computer Science) course for which one of these or CS 340, 350, 360, 369, 370, 371 is an explicit pre-requisite.

#### Pure Mathematics (Regular only)
Faculty core requirements as outlined in Table 1 and:
- P Math 341a/b, 351a/b, 352a/b, 367;
- Eight 400 level math half-credits, at least four of which must be in Pure Mathematics.

#### Pure Mathematics with Computer Science Minor
Faculty core requirements as outlined in Table 1 (with CS 140 required in Year 1) and:
- P Math 341a/b, 351a/b, 352a/b, 367;
- Four half-credits (at least two P Math) from 400 level P Math courses or CS courses labelled 440 or higher.

#### Pure Mathematics with Statistics Minor
Faculty core requirements as outlined in Table 1 and:
- P Math 341a/b, 351a/b, 352a/b, 367;
- Three half-credits from P Math 352b, 367, C & O 370a/b, Math 380a/b;
- Four half-credits (at least two P Math) from 400 level P Math half-credits.

Students will normally delay taking some 300 level required courses until fourth year.

#### Statistics
Faculty core requirements as outlined in Table 1 and:
- Math 331a/b or P Math 341a/b;
- Math 332b or P Math 352a;
- One of Math 332a, CS 370, 371, P Math 351a;
- Stat 340, 341, 350, 351, 452, 454, 451, 452, 454;
- At least two additional 400 level and two more 300 or 400 level math half-credits.

### Actuarial Science
Faculty core requirements as outlined in Table 1 and:
- Math 331a/b or P Math 341a/b;
- Math 332b or P Math 352a;
One of Math 332a, CS 370, 371, P Math 351a;
Stat 273, 264, 374, 384, 475, 477, 487;
Two of Stat 373, 383, 470, 471, 474, 476, 480, 481, 486;
A total of at least sixteen 300 or 400 level math
half-credits, at least eight of which are at the 400 level.
MTHEL 305a/b is recommended for co-op students in
Year 1 and for regular students in Year 1 or 2.

Double Honours Programmes within the Faculty of
Mathematics
A student who has satisfied the requirements for any
two of the above honours programmes may elect to
have both areas named on his degree.

Joint Honours Programmes within the Faculty of
Mathematics
In the following programmes, students must satisfy all
requirements of the honours programme in the
first-named subject.

Actuarial Science with Computer Science
Computer Science requirements are CS 140, 240, 250,
370, 371, 330, 331. In exceptional circumstances, these
courses may be replaced by other upper-level
half-credits in Computer Science.

Actuarial Science with Statistics
Statistics requirements are Stat 350 or 330, 351 or 331,
333, 454 or 332, plus one additional 300 or 400 level
Stat half-credit.

Computer Science with Actuarial Science
Actuarial Science requirements are MTHEL 305a,
Stat273, 284, 374, 384, 475.

Computer Science with Statistics
Statistics requirements are at least four half-credits in
Probability and Statistics at the 300 or 400 level,
including Stat 331 or 351; Stat 332 or 454; Stat 430 or
452.

Statistics with Actuarial Science
Actuarial Science requirements are MTHEL 305a, Stat
273, 284, 374, 384, 477, 487.

Statistics with Computer Science
Computer Science requirements are CS 140, 240, 250,
370, 371, 446, one additional 300 or 400 level
Computer Science half-credit.

Non-Departmental Honours and General
Programme Requirements and
Recommendations

Teaching Option (Co-operative only)
The co-operative Mathematics Teaching Option is a
uniquely integrated programme involving the Faculty of
Mathematics and the Faculty of Education of the
University of Western Ontario. This programme
combines academic work, experience in secondary
schools, and professional training, with the graduate
fully qualified as a secondary school mathematics
teacher.

Students interested in the programme enrol in the
regular programme in Year 1, and are admitted to the
co-operative programme in Year 2 on the basis of good
academic work and success in an interview process.

There are various recommended courses which are
of special interest to persons interested in a career in
teaching. A selection of these may be made in
consultation with the academic advisor as the student
progresses.

Work term arrangements in this option differ from
other co-operative programmes because of the nature
of the programme. Details concerning this and the
Faculty of Education components are outlined in a
separate brochure available upon request.

Honours Teaching Option
Faculty core requirements as outlined in Table 1 and:
Math 331a/b or P Math 341a/b;
Math 332b or P Math 352a;
One of Math 332a, CS 370, 371, P Math 351a;
At least five of Stat 270, C & O 282, 283, 384, 385, 487,
488;
A total of at least four Computer Science half-credits;
A total of at least fourteen 300 or 400 level math
half-credits, at least six of which must be at the 400
level.
Electives required include MTHEL 206a, Psych 212 and
Psych 312 in Year 2, and Soc 207G, Phil 311 and Phil
312 in Year 3.

General Teaching Option
Faculty core requirements as outlined in Table 1 and:
Stat 220, 221;
At least five of Stat 270, C & O 282, 283, 384, 385, 487,
488;
A total of at least four Computer Science half-credits.
Electives required include MTHEL 206a, Psych 212 and
Psych 312 in Year 2, and Soc 207G, Phil 311 and Phil
312 in Year 3.

Note
The Faculty of Education at the University of Western
Ontario requires that Psych 212, 312 and Phil 311, 312
be part of the B Ed degree. As a result, four additional
half-credits are required for the B Math degree; that is,
Honours students must complete a minimum of 26 full
credits and General students must complete a minimum of 23. To achieve this, Honours students normally take seven half-credits each term in Years 2 and 3; General students normally take six.

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 School of Business and Economics at Wilfrid Laurier University and the Department of Economics at Waterloo, offers three unique programmes 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 in both the regular and co-operative systems of study.

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 programme, including the courses mentioned in notes 3 and 5 below, qualifies a student for twelve RIA exemptions and also to write three of the Society’s six Uniform National Examinations.

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 able to complete all Institute or Society requirements in as little as one year after graduation. Graduates of the regular programme are able to complete all such requirements in as little as two years after graduation.

The mathematics and elective courses required for the Business Administration, Chartered Accountancy and Management Accounting options are given in the tables below. (Courses labelled BUS are offered by Wilfrid Laurier’s Business School while those labelled ECON are offered by U of W’s Department of Economics.)

<table>
<thead>
<tr>
<th>Mathematics Courses</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Honours Programme</strong></td>
</tr>
<tr>
<td><strong>Year 1</strong></td>
</tr>
<tr>
<td>Math 130/a,b,</td>
</tr>
<tr>
<td>Math 134/a,b,</td>
</tr>
<tr>
<td>CS 140, 180.</td>
</tr>
<tr>
<td><strong>Year 2</strong></td>
</tr>
<tr>
<td>Math 230/a,b,</td>
</tr>
<tr>
<td>Math 231/a,b,</td>
</tr>
<tr>
<td>Stat 230, 231,</td>
</tr>
<tr>
<td>two of CS 250,</td>
</tr>
<tr>
<td>C &amp; O 283, Stat 270.</td>
</tr>
<tr>
<td><strong>Year 3</strong></td>
</tr>
<tr>
<td>CS 330, 331,</td>
</tr>
<tr>
<td>Stat 331,</td>
</tr>
<tr>
<td>one of Stat 330,</td>
</tr>
<tr>
<td>332, 333,</td>
</tr>
<tr>
<td>two of C &amp; O 283, 331a,</td>
</tr>
<tr>
<td>331b, 340, 341,</td>
</tr>
<tr>
<td>443a, 443b, 447a,</td>
</tr>
<tr>
<td>447b, 448, 4492</td>
</tr>
<tr>
<td>two math half-credits4</td>
</tr>
<tr>
<td><strong>Year 4</strong></td>
</tr>
<tr>
<td>six math half-credits4</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Elective Courses</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Accounting Options</strong></td>
</tr>
<tr>
<td><strong>Year 1</strong></td>
</tr>
<tr>
<td>Econ 101, 102, 191, 192,</td>
</tr>
<tr>
<td>Bus 111W, 121W.</td>
</tr>
<tr>
<td><strong>Year 2</strong></td>
</tr>
<tr>
<td>Econ 291, 292;</td>
</tr>
<tr>
<td>Bus 477W, 231W.</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td><strong>Year 3</strong></td>
</tr>
<tr>
<td>Econ 391, 392;</td>
</tr>
<tr>
<td>two elective or</td>
</tr>
<tr>
<td>math half-credits5</td>
</tr>
<tr>
<td><strong>Year 4</strong></td>
</tr>
<tr>
<td>Econ 393, 394, 491;</td>
</tr>
<tr>
<td>Bus 357W;</td>
</tr>
<tr>
<td>two elective or</td>
</tr>
<tr>
<td>math half-credits (Honours</td>
</tr>
<tr>
<td>Programme)5</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
</tbody>
</table>
Notes

1) Subject to item (m) on page 181, substitutions among advanced, honours and general level equivalent courses are possible as follows:

<table>
<thead>
<tr>
<th>Advanced</th>
<th>Honours</th>
<th>General</th>
</tr>
</thead>
<tbody>
<tr>
<td>Math 140a/b</td>
<td>Math 130a/b</td>
<td>Math 120a/b</td>
</tr>
<tr>
<td>Math 144a/b</td>
<td>Math 134a/b</td>
<td>Math 124a/b</td>
</tr>
<tr>
<td>Math 240a/b</td>
<td>Math 230a/b</td>
<td>Math 220a/b</td>
</tr>
<tr>
<td>Math 241a/b</td>
<td>Math 231a/b</td>
<td>Math 221a/b</td>
</tr>
<tr>
<td>P Math 341a/b</td>
<td>Math 331a/b</td>
<td>Math 321a/b</td>
</tr>
<tr>
<td>P Math 351a</td>
<td>Math 332a</td>
<td>Math 322a</td>
</tr>
<tr>
<td>P Math 352a</td>
<td>Math 332b</td>
<td>Math 322b</td>
</tr>
<tr>
<td>Stat 230/231</td>
<td>Stat 220/221</td>
<td></td>
</tr>
</tbody>
</table>

Some flexibility exists to permit the scheduling of courses in a different manner than that shown in Tables 2a and 2b, provided that course pre-requisites have been met. Since relatively few free choices exist in any of these programmes, deviations from the sequence recommended above should be planned carefully.

2) Certain substitutions for the math courses specifically listed in Year 3 may be made with special permission.

3) Stat 331 is required by the Society of Management Accountants, but not for the B Math degree.

4) A minimum of twelve 300 or 400 level math half-credits must be completed, at least four of which are at the 400 level. Recommended courses are:
  - Comb & Opt: C & O 332, 432, 433a, 433b, 442a, 442b, 444.

5) Students in the Management Accounting option must include Bus 388W and are strongly recommended to include Bus 398W and Econ 492 as courses for Society standing.

6) Wilfrid Laurier Business courses by title are:
  - Bus 111W – Introduction to Business Organization
  - Bus 121W – Functional Areas of the Organization
  - Bus 231W – Business Law
  - Bus 52W – Introduction to Marketing
  - Bus 357W – Taxation
  - Bus 362W – Marketing Functions
  - Bus 388W – Organizational Behaviour
  - Bus 399W – Administrative Practices

Mathematics
Academic Programmes
Non-Departmental Honours and General Programme

Bus 477W – Auditing
Bus 481W – Business Policy
Bus 491W – Management Policy

The WLU academic calendar should be consulted for complete course descriptions and pre-requisites.

Joint Honours Programmes with other Faculties leading to a degree in Mathematics

Joint honours programmes exist between any one of the departments in the Faculty of Mathematics and any one of the following: Economics, French, Geography, German, Philosophy, Psychology, Russian, and Sociology.

Students may take these programmes in either faculty in Years 1 and 2. In Year 3 they must register in a department of the Faculty of Mathematics.

The number of full math credits required is reduced from 15 to 12, provided the faculty and departmental requirements for an Honours programme outlined earlier in this section are satisfied. These programmes must be approved by both departments involved.

Requirements in the second-named subject are as follows:

<table>
<thead>
<tr>
<th>Subject</th>
<th>Courses</th>
</tr>
</thead>
<tbody>
<tr>
<td>Economics</td>
<td>101, 102, 201, 202, 231, 301, 302, 311, 321, 401, 402, 421, 422, one additional Economics half-credit.</td>
</tr>
<tr>
<td>French</td>
<td>191 or 192; fourteen additional half-credits in French with six at the second-year level, four at the third-year level, and four at the fourth-year level.</td>
</tr>
<tr>
<td>Geography</td>
<td>102, 201, 202, 260, 271, 275, 381, 390, 391, 490; Environmental Studies 200; one of Geography 203, 204, 205, 220, one of Geography 101, 110, 125R, 126R, 127, or Environmental Studies 195a or b; One of Geography 316, 317, 318.</td>
</tr>
<tr>
<td>German</td>
<td>one of the following pairs 101/102, 105/106, 111/112, 121/122, 151/152, and four German half-credits in each of Years 2, 3, 4.</td>
</tr>
<tr>
<td>Philosophy</td>
<td>221, 222, 280, 281, 282, 283, 340, 358, 359; four additional half-credits in Philosophy.</td>
</tr>
<tr>
<td>Psychology</td>
<td>101, 102, 499; ten additional half-credits in Psychology chosen in consultation with the Psychology Department to fulfill their research requirements.</td>
</tr>
<tr>
<td>Russian</td>
<td>101, 102; four half-credits in Russian in each of Years 2, 3, and 4.</td>
</tr>
</tbody>
</table>
Sociology 101, 320, 321, 322, 425, 426, 481, 499; seven additional half-credits in Sociology.

Joint Honours leading to a degree with another Faculty

Joint honours programmes exist between the Faculty of Mathematics and any one of the following: Economics, French, Geography, German, Man Environment Studies, Philosophy, Psychology, Russian, Sociology.

Students may take these programmes in either faculty during Years 1 and 2. At the beginning of Year 3 they must register in the appropriate department in Arts or Environmental Studies, and have their programmes approved by that department.

The Mathematics requirements are:
Maths 120a/b, 124a/b, 220a/b, 221a/b.
At least six additional Math half-credits which would be acceptable toward a B Math degree;
A minimum average of at least 70% on these fourteen Math half-credits is required.

*Some substitutions are permitted. See the note following Table 1 on page 185.

Students wishing to specialize in one area of mathematics should consult the undergraduate officer of the appropriate department in the Faculty of Mathematics for advice in selecting their mathematics courses.
Faculty of Science

Optometry student and patient in Optometry Clinic
Faculty of Science

Introduction
The first students were enrolled in the Faculty of Science in the autumn of 1959. There are now approximately 2,000 full-time students including 200 graduate students, taking programmes within the Faculty.

The Faculty of Science has five teaching departments: Biology, Chemistry, Earth Sciences, Physics, and the School of Optometry. Programmes studied through the Biology, Chemistry, Earth Sciences, and Physics departments lead to a Bachelor of Science (BSc) degree in either 3 or 4 years depending upon the programme taken. The School of Optometry offers a five year programme leading to a Doctor of Optometry (OD) degree.

Biology, Chemistry, Earth Sciences and Physics are also available on a Co-operative System of Study where the student alternates four month study terms on campus with four month work terms in industry, business or government in an area related to his or her studies.

For those students whose leanings are more towards administration than research or teaching there is a General Science and Business programme.

A programme leading to an Honours BSc in Psychology is also available.

The Associate Dean and Department Chairmen will be pleased to receive inquiries about the programmes in this Faculty.

Degrees
The degree of Bachelor of Science (BSc) is awarded by the University on the successful completion of any of the undergraduate programmes involving Biology, Chemistry, Earth Sciences, Physics and Psychology which are discussed under Academic Programmes. The ordinary or pass-level BSc will be awarded on completion of the General Science Programme in either the three or four-year option. The honours degree, BSc (Honours), will be awarded on completion of any of the honours programmes. MSc and PhD degrees are discussed in the Graduate Calendar.

Upgrading of BSc Degree
A student who has graduated with a 3-year General degree from this University only, may successfully complete the requirements of the 4-year degree with an official major field designation and exchange the old diploma for a new one. 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.

Admission

The admission requirements and procedures for all programmes are outlined in Chapter 2 of this Calendar. The following points emphasize some of the admission requirements which relate specifically to programmes in the Faculty of Science.

Applicants from Ontario Year 5
Satisfactory completion of six Year 5 credits with a 60% overall average as well as 60% overall average in Math (Calculus and one of Relations and Functions or Algebra) and two Sciences (one of which must be Physics or Chemistry). Co-op Physics requires 70% average in Math and Physics. Co-op Chemistry requires 70% in Chemistry and in Math.)

Co-operative students
Students applying to co-operative programmes in the Faculty of Science will not normally be admitted above the Year 2 Term B level.

Transfer students
Students will be accepted for transfer from other Year 1 programmes in the University or from other universities. Their programmes will be evaluated in terms of the number of credits allowed and the number remaining for a degree. Credits will normally be transferred without a cumulative average and only courses with a 60% or better mark.

Students will be accepted for transfer at other than the Year 1 level but will normally be required to complete at least the equivalent of two years' work while registered in the Faculty of Science (i.e. at least 10 credits) regardless of the number of transfer credits they present.

Admission as an Adult Student
It is recommended that applicants obtain standing in at least one Ontario Year 5 (Grade 13) Mathematics and one Science course or their equivalent in order to have the proper background for first year University courses in these areas. To discuss admissibility and appropriate qualifying works, applicants are advised to contact the Assistant Registrar, Faculty of Science.

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 programmes. Further details concerning University Examination Regulations can be found in Chapter 1 page 18.

Students should note that the Faculty of Science
operates under a "course system" in which student progress is measured by courses successfully completed rather than by years. Students who have passed fewer than five courses will be considered Year 1 students; those with at least five but fewer than ten, Year 2; those with at least ten but fewer than fifteen, Year 3; and those with fifteen or more, Year 4; Year 5 students will exist only in the Optometry programme for those students in their graduating year.

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 term or year marks. Appeals launched later than two terms after the term in which the mark was obtained will not be considered.

b) Final examinations in one-term courses are held in December, April, or August. Final examinations for all full year courses are held in April, and cover the whole work of each course. 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 in a course, a student must obtain a minimum of 50% 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 his 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.

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 overall average. If a passing grade is achieved more than once in the same course, it will still only count as one course passed towards the total necessary for graduation. Students in good standing will not normally repeat courses they have passed. No course may be repeated more than once.

f) In cases where more than one course or course-sequence contains the same or similar course content, credit will only be given in one.

g) All examinations which receive a failing grade are automatically re-read.

2) Make-up Examinations
Make-up examination privileges may be granted to students in good standing:

a) In a case where failure to pass is attributable to extraordinary circumstances, especially medical or health-related problems.

b) Only when such failed courses could not be repeated and when a student's progress could be unduly held up by lack of one prerequisite.

In all cases regarding make-up examinations the student must have satisfied all term work requirements in the course and must have the permission of the Examinations and Standings Committee (who must be satisfied the student has a fair chance to pass the examination - the student's overall University record may be used in making this assessment.) Regardless of standing, no student will be allowed make-up privileges if he or she has failed more than two full courses or their equivalent in a given year (except on medical grounds as in a).

Make-up examinations will be held in July for regular programmes. Applications for these examinations must be filed by the end of June on forms provided by the Office of the Registrar. In co-operative programmes, make-up examinations will be written in the term immediately following that in which the respective final examinations are written. Fees for make-up must accompany the application. If the student decides not to write the examination the fee is not refunded. Except in extraordinary circumstances (e.g. a) above), when a make-up examination is passed, the course will count as a course passed toward the degree, but the mark obtained will not be counted in determining cumulative average (i.e. the original mark will normally be the mark which counts).
3) Co-operative Programme Evaluation
Students in co-operative programmes will be evaluated by the rules shown modified where necessary to suit their special needs. In particular:

1 Evaluation in Year 1 will be made at the end of term 1B on the entire year's work. In order to proceed to term 2A students must have obtained a 60% overall average, 60% or better in their major field and passed all core courses. Those not meeting these requirements may be transferred to the General programme (non-co-op) in good standing, if possible.

2 Upper year assessment will be made on a term by term basis. Beyond Year 1, the various programmes are mostly composed of one-term courses in which all marks are final. Depending on electives chosen there may be some mixture of term and full-year courses. Assessment made in terms of 2A and 3A will be on the basis of marks in all courses taken; for assessments in terms 2B and 3B, marks given for the second half of a full-year course will be the final mark for the course and will replace the A term mark for average purposes. 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. Students from any co-operative programme may be transferred to the General programme (non-co-op) if they are deemed to be making unsatisfactory progress towards their Honours degree. Normally a student may take no more than two upper year terms on a part-time or reduced programme basis and must have special permission from the Department to do so.

3 A student is expected to follow the work-term sequence from the point of entry, subject to the minimum requirements for graduation within the individual programmes.
   The minimum number of related work terms required is normally four.
   The minimum number of satisfactory work reports is normally four.

4) 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, the lowest mark to be recorded and averaged will be 32, equivalent to the weighting factor for the F— on the common grading system.

Required to Withdraw
Students required to withdraw from the Faculty of Science may be eligible to apply for re-admission only after one year's absence.

Terminology
INC (either term work, lab work, examination, etc., are incomplete). AEG (aegrotat - signifying the student's work or examination was incomplete for some acceptable reason (such as illness) and his instructor felt 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 applicable).

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 overall average. 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. Then, if the required courses and accumulated average are met, the student will be allowed to graduate.

Unless there are medical or other extenuating circumstances, a DNW will be weighted for averaging purposes as the lowest possible failing mark (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 each 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.

Laboratory courses are designated by the letter L following the course number.
Credit
Credits are assigned for lecture and laboratory courses as designated in the course descriptions (also see page 4).

Deans Honours List
Each year students of merit will be selected and their names placed on the Deans Honours List.

Academic Programmes

General Programmes - 3 year General and 4 year General (Major)
The 4 year General Programme begins at the Year 2 level, admission to which requires a 50% overall average as well as 60% or better in the field of specialization.
To continue in the general programmes a full-time student carrying the normal 5 lecture course load must maintain a cumulative average of 50% with a minimum of 3.0 lecture credits obtained per academic year and no more than 2.0 failed. Failure to meet these requirements could result in a Conditional Standing or a requirement to withdraw. A Conditional Standing may be allowed the first time depending upon the circumstances.
Of the total 15 credits required in the 3 year General programme at least 14 must be lecture credits. No more than 21 attempts will be allowed.
Of the total credits required in the 4 year General programme (20 or greater) at least 18 must be lecture credits the number dependent on the programme. No more than 6 attempts over and above the number of credits required will be allowed.
Not more than 4 credits offered under the “Science” label may be applied to any general degree.

Honours Programmes

Honours Science Programmes
(4 programmes, with specialization in Biology, Chemistry, Earth Sciences, or Physics; and a non-specialized programme).
A 60% cumulative overall average must be maintained in all programmes in the field of specialization.
A 60% cumulative average must be maintained in all Faculty of Science courses in the non-specialized programme.
A student who fails one of the credits in the field of specialization may be placed on probation in order to clear that requirement. Failure of more than one such course could result in requirement to withdraw from that programme.
In no programme will more than 2.0 failed credits be allowed per academic year and normally a minimum of 3.0 lecture credits must be obtained.
Not more than 4 credits offered under the “Science” label may be applied to any Honours Programme.

Honours Major Programmes
Honours Biology - regular and co-operative
Honours Biology and Chemistry - regular
Honours Chemistry - regular and co-operative applied
Honours Earth Sciences - regular (Geology or Geography) and co-operative applied (Geology or Geotechnical)
Optometry - regular
Honours Physics - regular and co-operative applied
Honours Psychology - regular

In all programmes an overall cumulative average of 60% must be maintained with a cumulative average of at least 60% in the major field.
In the Optometry programme an overall 60% average as well as a 60% average in the courses of the major subject must be obtained each academic year. In the Optometry programme a student who fails to demonstrate clinical competence as evidenced by a failing grade in a clinical course may not continue in the programme.
In the Honours Earth Sciences (Geography) programme a cumulative average of 75% must be maintained in the Geography courses, and a cumulative average of 60% in the other courses.
In the Honours Psychology programme a cumulative average of 75% must be maintained in the Psychology courses and a cumulative average of 60% in the Faculty of Science courses.
A student who fails one of the credits in the field of specialization may be placed on probation in order to clear that requirement. Failure of more than one such course could result in requirement to withdraw from that programme.
In the Honours Biology programme any student who fails a Biology course during second or third year will not be permitted to continue in the programme unless reinstated by the department.
Academic Programme Selection

Students entering first year in the Faculty of Science are essentially enrolled in a common year. Students in Year 1 Co-operative Biology, Chemistry and Physics are labelled as such but all other students are officially in Year 1 regular Science. (Students planning to enter co-operative Applied Earth Sciences in Year 2 should enrol in Year 1 regular Science.) Essentially the same courses are available to all first year students and any student may enter most Year 2 programmes in Science provided he or she has taken the necessary courses in Year 1 and has achieved the necessary passing average; the notable exception to this is in the Optometry programme where enrolment is limited to 60 in Year 2.

1) First Year Programmes (Regular and Co-operative)
The normal minimum course load for a full-time student in Year 1 Science is 5.0 lecture courses per term, exclusive of laboratory credits. At least two of these courses must be Faculty of Science courses and students are encouraged to select an Arts elective (preferably English or Psychology). Only students whose secondary school Year 5 average was 70% or better may select 6 lecture-courses if they wish (recommended for students intending to take an Honours Physics programme).

Courses should be chosen either with a specific Year 2 goal in mind or to cover many Year 2 programmes. The required and recommended Year 1 selections for various Year 2 Honours or General Science-Major programmes can be found in the table which follows.

2) Course and Programme Changes
a) Students may “add and drop” half courses during the first three weeks of the Fall, Winter and Spring terms upon having the appropriate change form completed.
b) Students may “add and drop” full-year courses during the first three weeks of the Fall term upon having the appropriate change form completed.
c) Courses may be dropped after the normal three weeks change period with adequate cause but not after November 1 or July 1 for Fall and Spring one-term courses or March 1 for Winter one-term or full-year 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.
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) Correspondence Courses
Only in exceptional cases should correspondence courses be taken by a student in a semester in which he or she is a full-time student.

4) Enrolment in a Graduate Course
A student may obtain credit toward a graduate degree in the Faculty of Science for normally not more than one term graduate course taken during the fourth year of an undergraduate programme 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.

5) Reduced programme
Only in exceptional circumstances may an Honours programme be taken on a completely part-time or reduced programme basis; at least two of the upper three years must be taken on a full-time (full programme) basis and no student may spend more than 5 years of full-time study (or its equivalent) for an Honours degree. A student in good standing who “stops out” of an Honours Programme for more than a year must have Department approval before returning to that Programme.

Only in exceptional circumstances may a first year programme for a full-time student be reduced below the 5 lecture-course minimum.

Type A Teaching Certification
Admission to the Type A Certification programme at the Ontario Colleges of Education requires the completion of a programme of at least twenty full-year University courses, including one or two specialist fields in which the student has obtained at least second class (honours) or equivalent standing. A programme of twenty courses and one specialist field must include at least nine full courses in the field. A programme of twenty courses and two specialist fields must include fourteen full-year courses in the two combined fields, with at least six in each field. Information regarding approved specialized fields can be obtained from the Ontario Ministry of Education.

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.
### Year 1 Science Programme Selections Leading to Year 2 Honours or Major Programmes

<table>
<thead>
<tr>
<th>Regular Programmes</th>
<th>Required Courses in Year 1</th>
<th>Recommended Electives in Year 1</th>
</tr>
</thead>
<tbody>
<tr>
<td>Biology</td>
<td>Biology 121-122, 121L-122L Chemistry 121-122 and 121L-122L</td>
<td>Physics 111-112, AM 101-111 or Math 113, Earth Sciences 121-122</td>
</tr>
<tr>
<td>Biology and Chemistry</td>
<td>Biology 121-122, 121L-122L Mathematics 113 Chemistry 121-122 and 121L-122L</td>
<td>A first-year Physics course</td>
</tr>
<tr>
<td>Chemistry (see Note 2)</td>
<td>Chemistry 121-122 and 121L-122L Mathematics 113 Physics 121-122 and 121L-122L</td>
<td>Biology 111-112, 111L-112L or 121-122, 121L-122L, Earth Sciences 121-122, Environmental Studies 195 or a Computer Science course</td>
</tr>
<tr>
<td>Chemistry (Environmental Studies Option) (see Note 2)</td>
<td>Chemistry 121-122 and 121L-122L Mathematics 113 Physics 121-122 and 121L-122L</td>
<td>A Computer Science Course</td>
</tr>
<tr>
<td>Chemistry (Mathematics Option) (see Note 2)</td>
<td>Chemistry 121-122 and 121L-122L Mathematics 113 Physics 121-122 and 121L-122L</td>
<td>A full-year Algebra course, A Computer Science course</td>
</tr>
<tr>
<td>Chemistry (Physics Option) (see Note 2)</td>
<td>Chemistry 121-122 and 121L-122L, Mathematics, 113, Physics 121-122 and 121L-122L, or 162-163 and 162L-163L</td>
<td></td>
</tr>
<tr>
<td>Earth Sciences (see Note 4)</td>
<td>Earth Sciences 121-122, Chemistry 121-122 and 121L-122L, a first year Physics course with labs, Mathematics 113</td>
<td>Biology 111-112, Computer Science 118, or Arts elective</td>
</tr>
<tr>
<td>Earth Sciences (Geography Option)</td>
<td>Earth Sciences 121-122, Chemistry 121-122 and 121L-122L, Geography 102 and one of: Geography 101, 125R, 126R, 127, or Environmental Studies 195</td>
<td>Computer Science 118</td>
</tr>
<tr>
<td>Optometry (see Note 3 and p. 214)</td>
<td>Mathematics 113, Biology 121-122, 121L-122L Physics 121-122 and 121L-122L Psychology 101</td>
<td>Chemistry 121-122 and 121L-122L Psychology 102 or Sociology 101</td>
</tr>
<tr>
<td>Physics (see Note 1)</td>
<td>Mathematics 113, Physics 121-122 and 121L-122L or 162-163 and 162L-163L</td>
<td>Mathematics 111A-111B A computer course Chemistry 121-122 and 121L-122L</td>
</tr>
<tr>
<td>Psychology</td>
<td>Biology 121-122, 121L-122L Chemistry 121-122 and 121L-122L, Physics 111-112 or 121-122 and 121L-122L Mathematics 113 Psychology 101-102</td>
<td></td>
</tr>
<tr>
<td>General Science &amp; Business</td>
<td>2.0 Science lecture-course credits from the Year 1 departmental courses, Math 113, Econ 101, 102 CS118 and CS 115 (see p. 221)</td>
<td></td>
</tr>
</tbody>
</table>

**Notes:**
1. Physics 121-122 and 121L-122L
2. Mathematics 113
3. Psychology 101
4. Computer Science 118

**Related Courses:**
- Mathematics 113
- Biology 121-122
- Chemistry 121-122
- Physics 121-122
- Geography 102
- Environmental Studies 195
- Psychology 101
- Computer Science 118
### Co-operative Programmes

<table>
<thead>
<tr>
<th>Major Field of Study</th>
<th>Required Courses in Year 1</th>
<th>Recommended Electives in Year 1</th>
</tr>
</thead>
<tbody>
<tr>
<td>Applied Chemistry</td>
<td>Chemistry 121-122 and 121L-122L, Mathematics 113, Physics 121-122 and 121L-122L</td>
<td></td>
</tr>
<tr>
<td>Applied Physics</td>
<td>Mathematics 113, Physics 121-122 and 121L-122L or 162L-163L</td>
<td>Mathematics 113, 111a-111b, Chemistry 121-122 and 121L-122L</td>
</tr>
<tr>
<td>Applied Earth Sciences (Geology Option)</td>
<td>Earth Sciences 121-122, Chemistry 121-122 and 121L-122L, a first year physics course with labs, Mathematics 113</td>
<td>Biology 111-112, Computer Science 118 or Arts elective</td>
</tr>
<tr>
<td>Applied Earth Sciences (Geotechnical Option)</td>
<td>Earth Sciences 121-122, Mathematics 113, Phys 011 or Phys 121, 121L and Phys 122, 122L, Chemistry 121-122 and 121L-122L, Computer Science 118, One term arts elective</td>
<td></td>
</tr>
<tr>
<td>Co-operative Biology</td>
<td>Biology 121-122, 121L-122L, Chemistry 121-122 and 121L-122L</td>
<td>Physics 111-112, AM 101-111, Earth Sciences 121-122</td>
</tr>
</tbody>
</table>

**Note 1**
Co-op Physics students and those planning to enroll in Honours Physics in Year 2 are advised to select Math 130a-130b instead of Math 113 if they have a ≥ 80% average in Grade 13 Mathematics and Physics.
Students desiring the Biophysics option of the Honours Physics programme are advised to include Biology 111-112, 111L-112L in their programme.
Students desiring the Theoretical Physics option are advised to select Math 111a-111b, and a computing course.
Students desiring the geophysics option of the Honours Physics programme are advised to include Earth 121-122 and Chem 121-122 in Year 1.
Students wishing any of the Business Administration options are advised to select Econ 101-102.
Students wishing the elective programme with Ei E are advised to select SY De 183 or Gen E 115 (Fall term) and CS 118 (Winter term).

**Note 2**
The year 2 honours chemistry programmes (including Co-op Applied Chemistry) are normally limited to the 100 best qualified students. Those who have failed core courses should not expect to proceed in an honours chemistry programme.

**Note 3**
Students planning to apply for admission to Year 2 Optometry should have a sound background in Chemistry. Chem 121-122 and 121L-122L is strongly recommended. Phys 162-163 and 162L-163L may be taken instead of Phys 121-122 and 121L-122L.

**Note 4**
Earth Sciences majors planning to enter the co-operative programme and desiring elective courses in Biology should take Biol 111-112, 111L-112L during their first year.
By the end of Year 2, students must have completed Phys 111-112 and Phys 111L-112L, General Physics, or Physics 121-122 and 121L-122L, Math 113, Calculus, and an introductory course in computer programming (for example CS 118 or Gen E 121).

**Note 5**
Students in the co-operative Applied Chemistry programme have two methods of taking Year 1: (i) two terms in a row (September-April) or (ii) fall term on campus (September-December), winter term at work (January-April) and spring term on campus (April-August). Since no first-year Biology or Earth Sciences courses are offered in the Spring term (April-August), only students who plan to take two terms in a row may elect these courses. Sci 100, a one-term introductory geology course, is available in the Fall and Winter terms.

**High School Teaching**
The Ontario Ministry of Education has strongly recommended that all students who are preparing to
teach science in High school should take at least one full-year course in Biology.

A brief discussion of the above courses and some other courses available for selection is given below. See Course Descriptions, Chapter 14 of this Calendar for more details.

Faculty of Science Courses
Introductory courses are offered in Biology, Chemistry, Earth Sciences and Physics. Courses from at least two of these areas must be elected. Although there are several first year courses available in Physics there is sufficient overlapping of material that only one of the full-year sequences may be chosen, i.e. only one of Phys 111-112, 121-122, 162-163 and only one of Biol 111-112, 121-122.

Biology
Biol 111
Introductory Biology 1
An introduction to basic concepts in biology, including aspects of genetics, evolution and plant biology. (For all students other than those intending to major in Biology or to enter the School of Optometry)

Biol 111L
Introductory Biology 1 Laboratory
A laboratory course only for students taking Biology 111. Take-home problems and/or assignments will alternate with in-house labs. (For all students other than those intending to major in Biology or to enter the School of Optometry)

Biol 112
Introductory Biology 2
An introduction to the basic principles of zoology and ecology with reference to man as a biological organism. (For all students other than those intending to major in Biology or to enter the School of Optometry)

Biol 112L
Introductory Biology 2 Laboratory
A laboratory course only for students taking Biology 112. Labs on alternate weeks. (For all students other than those intending to major in Biology or to enter the School of Optometry)

Biol 121
Introduction to Biology 1
The principles of biology are explored at the organismic level. Topics include: evolution, natural selection and phylogeny; structure and function of the major groups of animals, plants and microorganisms; ecology of populations and communities. (For Science students intending to major in Biol or to enter the School of Optometry)

Biol 121L
Introduction to Biology 1 Laboratory
For students taking Biol 121.

Biol 122
Introduction to Biology 2
The principles of biology are explored at the cellular and sub-cellular level. Topics include: cell structure and function; photosynthesis; cell metabolism; cell division; genetics; molecular biology and developmental biology. (For Science students intending to major in Biol or to enter the School of Optometry)

Biol 122L
Introduction to Biology 2 Laboratory
For students taking Biol 122.

Biol 151
Introductory Cell Physiology.
An introduction to the principles of cell physiology with emphasis on human systems and their basic physiological processes. (Primarily for students in Kin. Available to all students other than those intending to major in Biol or enter the School of Optometry).

Biol 152
Introductory Human Physiology.
A study of the physiological processes of principal organ systems in the human body with emphasis on the nervous system. (Primarily for students in Kin. Available to all students other than those intending to major in Biol or enter the School of Optometry).

Earth Sciences
Earth 121-122
Introductory Geology.
These courses are ideal electives for first year students who are not familiar with this area. It is not necessary to have a Geography course or other specific high school background for this course. Students with potential interest in Geology, Geochemistry, or Geophysics should select these courses.

Chemistry
Chem 121-122
Chemical Structure 121 and Chemical Reaction 122
(with the associated laboratories, 121L-122L) are the introductory Chemistry courses for those wishing to major in Chemistry, or those electing a first year Chemistry course.
Physics
Physics 111-112, Physics for the Life Sciences, is a course sequence offered for students intending to major in Biol. The associated laboratories, Phys 111L-112L, are recommended for students who want some practical experience to complement their theoretical studies or to fulfill the entrance requirements of certain medical or dental schools. (Students obtaining better than minimum marks in Phys 111-112 and 111L-112L may be admitted to a Physics major programme, at the discretion of the Physics Department). Physics 121-122, Introductory Physics, is the normal course sequence for students wishing to major in Physics, Chemistry, Applied Earth Sciences (Geotechnical Option) or to enter the School of Optometry. Science students taking Phys 121-122 must also take Phys 121L-122L. Physics 162-163, Enriched Introductory Physics, is a course sequence offered for students who prefer, and have sufficient preparation for, an enriched and more challenging course. Science students taking Phys 162-163 must take Phys 162L-163L.

Prereq: Phys 111-112 and 121-122; only the Ontario Year 5 courses required for admission to Science. Physics 162-163: at least 75% average in Ontario Year 5 Physics, Functions and Relations and Calculus.

Faculty of Mathematics Courses
The first year Mathematics courses, 113 (Calculus), 111a-111b (Algebra and Solid Geometry) may be chosen. Calculus is either required or recommended in all programmes in Science and should be strongly considered. For students wishing some computer science, Sci 160 or the sequence CS 118-250 are suggested. Sci 160 (Computational Methods in Science) is a Science Faculty course, while CS 118 (Introduction to Computing) and CS 250 (Introduction to Computer Science) are offered by the Faculty of Mathematics. Only students who are above average in Mathematics (i.e. approximately 70% or better in at least two Year 5 Mathematics courses) should normally choose three Mathematics courses. AM 101-111 (Applications of Mathematics in the Sciences) is recommended for potential Biology majors.

Faculty of Arts Courses
Usually selections are made from the introductory courses offered in various Departments. English 102 (Regular students only), 105, 108, and 190 are strongly recommended for consideration as are Psychology 101 and 102. Some other popular areas for consideration might be Anthropology, Economics, French, Geography, German, History, Philosophy, Political Science, Russian, Sociology or Religious Studies. Other areas may be suitable if available.

The following Honours Programmes are available

Honours Biology

Year 1
(for a complete discussion of Year 1, see page 197).
(Course weight is shown in parentheses)

Year 2
Biol 231 Concepts of Ecology (0.5)
Biol 232 Non-Vascular Plants (0.5)
Biol 234 Vascular Plants (0.5)
Biol 235 Fundamentals of Microbiology (1.0)
Biol 237 Introductory Invertebrate Zoology (0.5)
Biol 238 Introductory Vertebrate Zoology (0.5)
Biol 239 Cytogenetics (0.5)
Chem 266 Organic Chemistry 1 (0.5)
Chem 267 Organic Chemistry 2 (0.5)
Chem 267L Organic Chemistry Laboratory (0.25)
Stat 202 Elementary Statistics for Biologists (0.5)

One non-Biol elective (half-credit) (0.5)

Year 3†, ‡ At least two full credits from
Biol 331 Vertebrate Zoology (0.5)
Biol 332 Arthropod Zoology (0.5)
Biol 333 Invertebrate Zoology (0.5)
Biol 334 The Flowering Plants (0.5)
Biol 335 Identification and Variety of Microorganisms (0.5)
Biol 337 Microorganisms in Foods (0.5)
Biol 338 Plant Anatomy & Morphogenesis (0.5)
Biol 340 Molecular Biology (0.5)
Biol 341 Cell Physiology (0.5)
Biol 343 Histology & Cytology (0.5)
Biol 345 Plant Physiology (0.5)
Biol 346 Population Ecology 1 (0.5)
Biol 347 Mycology 1 (0.5)
Biol 348 Vertebrate Physiology 1 (0.5)
Biol 349 Vertebrate Physiology 2 (0.5)

Plus
Chem 332 Biochemistry 1 (0.5)
Chem 332L Biochemistry 1 Laboratory (0.25)
Chem 333 Biochemistry 2 (0.5)
Chem 333L Biochemistry 2 Laboratory (0.25)
One Elective (1 full-credit or equivalent: 1.0)
Phys 301 (0.5) - 302 (0.5) are recommended.)

† Students may select only two of the three Zoology courses offered (i.e. Biol 331, 332, 333). Those wishing to take the third course may do so as part of their fourth year programme or as an elective.
††Year 4
5 full courses of which at least 3 must be Biol 400-level courses. This year is designed to be the specialist year. The course selection should reflect this and must form an integrated group around a particular area of interest. (Chem 432-433 is recommended.)

††All Honours Biol students who have completed their third year are required to participate in an off-campus field course (Biol 450 or 498) before entering Year 4; the cost will range between $50 and $200 per student. All students must fulfill this field course requirement to obtain their B.Sc. Honours degree in this programme.

Note regarding Electives
A listing of Science and other electives is found on page 219. Although this list was prepared for the General Science programme many of the courses would be suitable here. Other Honours level courses in Chemistry, Physics or Psychology should also be considered.

Co-operative Biology
The University of Waterloo now offers a co-operative Biology programme 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 programme has academic and work terms scheduled as shown on page 57 in Chapter 5.

In-course academic requirements are the same as for Honours Biology. During the work terms, students are assessed on their performance and are also required to write work reports. The programme is aimed at making the student competitive in the job market without precluding entry into graduate school.

Honours Biology and Chemistry

Year 1
Normal Year 1 Science (see page 197) in which Chem 121-121L, 122-122L, Biol 121-122, 121 L-122L, a first year Physics course and Math 113 are required; (Course weight is shown in parentheses)
\textbf{Note}

Students may select only two of the three Zoology courses offered (i.e. Biol 331, 332, 333). Those wishing to take the third course may do so as part of their fourth year programme or as an elective.

\begin{table}[h]
\begin{tabular}{|l|l|}
\hline
Year 4 & \\
\hline
\textbf{Biol} & Any three credits from 400-level courses offered in Biology or Any two credits from 400-level courses offered in Biol and Chem 492 \\
\textbf{Chem 312} & Transition Element Chemistry (0.5) \\
\textbf{Chem 316} & An Introduction to Transition Metal Chemistry (0.5) \\
\textbf{Chem 419} & Biological Aspects of Inorganic Chemistry (0.5) \\
\textbf{Chem 432-433} & Biochemistry 3 (0.5) and 4 (0.5) \\
\textbf{Chem 432L-433L} & Biochemistry 3 (0.25) and 4 (0.25) \\
\hline
\end{tabular}
\end{table}

\textsuperscript{+}The Biochemistry 432L and 433L laboratory courses are compulsory except for students who elect to do a biochemistry 492 project. These students may choose not to do 432L/433L but, if so, they must take an extra 0.5 credit course chosen from upper level biology or chemistry courses and approved by an undergraduate officer in the appropriate department.

\textbf{Honours Chemistry Programmes}

All students intending to graduate as honours chemists – either Co-op or regular – should seriously consider taking several of the courses listed below as electives in order to get a broader background. Such electives are recommended by industrial advisors. Stat 204 – 205 or Chem Eng 220 – Statistics and Experimental Design
Sci 209 – Information 
M Env 320 and M Env 357 – Environmental Conservation and Resource Management. 
Env St 401/402 or ME 100 – (MTHEL 100) – Econ 294 – Law
Business courses from Wilfrid Laurier such as Bus 211, 352, 382, 383. Economics courses from Waterloo such as Econ 101/102; 191/192; 193/194; 201/202.

\textbf{Honours Chemistry}

This programme fulfills the academic requirements for professional membership in the Chemical Institute of Canada.

\begin{table}[h]
\begin{tabular}{|l|l|}
\hline
\textbf{Year 2} & \\
\textbf{Fall Term} & \\
Chem 10 & Chemistry Seminar \\
Chem 212 & Structure and Bonding (0.5) \\
Chem 220 & Introductory Analytical Chemistry (0.5) \\
Chem 220L & Analytical Chemistry Laboratory 1 (0.25) \\
Chem 254 & Physical Chemistry 1 (0.5) \\
Math 215 & Differential Equations (0.5) \\
One elective & (0.5) \\
\hline
\textbf{Winter Term} & \\
Chem 10 & Chemistry Seminar \\
Chem 221 & Analytical Chemistry of Multi-Component Systems (0.5) \\
Chem 221L & Analytical Chemistry Laboratory 2 (0.50) \\
Chem 255 & Physical Chemistry 2 (0.5) \\
Chem 264 & Organic Chemistry 1 (0.5) \\
Chem 264L & Organic Chemistry Laboratory 1 (0.25) \\
Phys 243 & Electricity and Magnetism (0.5) \\
Phys 243L & Electricity and Magnetism Laboratory (0.25) \\
One elective & (0.5) \\
\hline
\textbf{Year 3} & \\
\textbf{Fall Term} & \\
Chem 10 & Chemistry Seminar \\
Chem 312 & Transition Metal Chemistry (0.5) \\
Chem 314L & Inorganic Chemistry Laboratory 1 (0.25) \\
Chem 355 & Physical Chemistry 3 (0.5) \\
Chem 355L & Physical Chemistry Laboratory 1 (0.25) \\
Chem 364 & Organic Chemistry 2 (0.5) \\
Chem 364L & Organic Chemistry Laboratory 2 (0.5) \\
Two electives\textsuperscript{+} (1.0) & \\
\hline
\textbf{Winter Term} & \\
Chem 10 & Chemistry Seminar \\
Chem 313 & Main Group Chemistry (0.5) \\
Chem 315L & Inorganic Chemistry Laboratory 2 (0.5) \\
Chem 358 & Physical Chemistry 4 (0.5) \\
Chem 358L & Physical Chemistry Laboratory 2 (0.5) \\
Chem 365 & Organic Chemistry 3 (0.5) \\
Two electives\textsuperscript{+} (1.0) & \\
\hline
\textbf{Year 4} & \\
Chem 10 & Chemistry Seminar \\
Chem 492 & Advanced Laboratory (1.5) \\
Eight & one-term electives\textsuperscript{+} (4.0) \\
\hline
\end{tabular}
\end{table}

\textsuperscript{+}In Years 3 and 4, in addition to the required core courses, a total of 6 one-term Chem courses must be selected from the Chem elective courses listed below. At least four of these must be at the 400-level.
Chemistry Electives

Note
Elective courses will be given subject to sufficient demand and determined at preregistration.
1) Available at least once every academic year.
Fall Term

Winter Term

Spring Term
Chem 353

2) Available only once every two years
Fall Term
(even years: next offered Fall 1980) Chem 442
Winter Term
(Odd years: next offered Winter 1981) Chem 409, 416, 458

Winter Term
(Even years; next offered Winter 1980) Chem 351, 359, 362, 417

Co-operative Applied Chemistry (Honours)
Information about the Co-op work terms and the Co-ordination Department can be found in Chapter 5. Both streams run until the end of academic term 3B whereupon the stream taking 3B in the Fall term will have a double work term. This procedure will allow both streams to take Year 4 together over the regular academic year (Fall-Winter) when a wider range of courses are offered, and to graduate at the same time in May. The required courses in the two co-op streams are exactly the same as the "regular" Honours Chemistry programme. However, the order in which some of these courses are taken is slightly different for the Second Group which starts its 2A term in the winter. The difference allows this group to take most of their year 3 electives in their 3B Winter term, when a wider selection of courses is available.

This programme fulfills the academic requirements for professional membership in the Chemical Institute of Canada.

Honours Chemistry (Environmental Studies Option)
This programme is designed to combine the core of the Honours Chemistry Programme with selected courses which provide knowledge of environmental problems, approaches to their solution, environmental law and resource management. Conceivably a graduate from the programme could serve as a chemist working on problems of pollution and the environment. Such a graduate should have familiarity with legal, economic, and social aspects of the problems encountered.
This programme fulfills the academic requirements for professional membership in the Chemical Institute of Canada.

Year 1
Normal Year 1 Science (see page 197) including Chem 121-121L, 122-122L, Math 113, and Phys 121-122, 121L-122L, Biol 111-112 or 121-122 with labs. Earth 121-122, Env St 195, or a Computer Science course are considered desirable electives.

Year 2
Fall Term
Chem 10 Chemistry Seminar
Chem 212 Structure and Bonding (0.5)
Chem 220 Introductory Analytical Chemistry (0.5)
Chem 220L Analytical Chemistry Laboratory 1 (0.25)
Chem 254 Physical Chemistry 1 (0.5)
Math 215 Differential Equations (0.5)

Winter Term
Chem 10 Chemistry Seminar
Chem 221 Analytical Chemistry of Multi-Component Systems (0.5)
Chem 221L Analytical Chemistry Laboratory 2 (0.50)
Chem 255 Physical Chemistry 2 (0.5)
Chem 264 Organic Chemistry 1 (0.5)
Chem 264L Organic Chemistry Laboratory 1 (0.25)
Phys 243 Electricity and Magnetism (0.5)
Phys 243L Electricity and Magnetism Laboratory (0.25)

Year 3
Fall Term
Chem 10 Chemistry Seminar
Chem 312 Transition Metal Chemistry (0.5)
Chem 314 Inorganic Chemistry Laboratory 1 (0.25)
Chem 355 Physical Chemistry 3 (0.5)
Chem 355L Physical Chemistry Laboratory 1 (0.25)
Chem 364 Organic Chemistry 2 (0.5)
Chem 364L Organic Chemistry Laboratory 2 (0.5)
Stat 204 Statistics for the Sciences (0.5)

continued on pg. 204
First Group: Commencing with the Fall 1975 intake into year one
For course details see Hons. Chem. (page 202)

<table>
<thead>
<tr>
<th>Fall</th>
<th>Winter</th>
<th>Spring</th>
</tr>
</thead>
<tbody>
<tr>
<td>Year 2A</td>
<td>Work Term</td>
<td>Year 2B</td>
</tr>
<tr>
<td>Chem 10, 212, 220, 220L, 254</td>
<td></td>
<td>Chem 10, 221, 221L, 255, 264, 264L</td>
</tr>
<tr>
<td>Math 215</td>
<td></td>
<td>Phys 243, 243L</td>
</tr>
<tr>
<td>One Elective</td>
<td></td>
<td>One Elective</td>
</tr>
<tr>
<td>Work Term</td>
<td>Year 3A</td>
<td>Work Term</td>
</tr>
<tr>
<td>Chem 10, 313, 314L, 355 355L, 364, 364L</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Two Electives</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Year 3B</td>
<td>Work Term</td>
<td>Work Term</td>
</tr>
<tr>
<td>Chem 10, 312, 315L, 358, 358L, 365</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Two Electives</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Year 4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Chem 10, 492</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Eight Electives</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Second Group: Commencing with the Fall 1975 intake into year one

<table>
<thead>
<tr>
<th>Fall</th>
<th>Winter</th>
<th>Spring</th>
</tr>
</thead>
<tbody>
<tr>
<td>Work Term</td>
<td>Year 2A</td>
<td>Work Term</td>
</tr>
<tr>
<td>Chem 10, 220, 220L, 254</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Math 215</td>
<td></td>
<td></td>
</tr>
<tr>
<td>One Elective</td>
<td>Year 2B</td>
<td></td>
</tr>
<tr>
<td>Chem 10, 212, 255, 364, 364L</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Phys 243, 243L</td>
<td></td>
<td>One Elective</td>
</tr>
<tr>
<td>One Elective</td>
<td>Year 3A</td>
<td>Work Term</td>
</tr>
<tr>
<td>Chem 10, 221, 221L, 312, 314L, 355, 355L, 365</td>
<td></td>
<td></td>
</tr>
<tr>
<td>One Elective</td>
<td>Year 3B</td>
<td>Work Term</td>
</tr>
<tr>
<td>Chem 10, 313, 315L, 358, 358L</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Three Electives</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Year 4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Chem 10, 492</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Eight Electives</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

†In Years 3 and 4, in addition to the required courses, a total of six one-term Chemistry courses must be taken; at least four of these must be at the 400-level. For students in the co-operative Applied Chemistry programme, it is strongly recommended that at least five of these be selected from: Chem 311, 320-320L, 353, 363, 416, 420, 421, 422, 454, 455, 456, 457. Other electives may be chosen from the Chemistry Electives list on page 203.
Winter Term
Chem 10 Chemistry Seminar
Chem 313 Main Group Chemistry (0.5)
Chem 315L Inorganic Chemistry Laboratory 2 (0.5)
Chem 358 Physical Chemistry 4 (0.5)
Chem 358L Physical Chemistry Laboratory 2 (0.5)
Chem 365 Organic Chemistry 3 (0.5)
Stat 205 Statistics for the Sciences (0.5)

Year 4
Chem 10 Chemistry Seminar
Chem 492 Advanced Laboratory (1.5)
Env St 401 Environmental Law (0.5)
Four one-term courses (Recommended courses include:
Chem 311, 320-320L, 332-332L, 419, 420, 455)

Honours Chemistry (Mathematics Option)
This programme fulfills the academic requirements for professional membership in the Chemical Institute of Canada

Year 1
As for Honours Chemistry (see page 197). A first year course in Algebra is also required and at least one term of Computer Science is recommended.

Year 2
Fall Term
Chem 10 Chemistry Seminar
Chem 212 Structure and Bonding (0.5)
Chem 220 Analytical Chemistry Laboratory 1 (0.25)
Chem 254 Physical Chemistry 1 (0.5)
Math 215 Differential Equations (0.5)
or CS 370 Introduction to Scientific Computation (0.5)
One of:
Math 220a, 221a, 231a, 213 (0.5)

Winter Term
Chem 10 Chemistry Seminar
Chem 221 Analytical Chemistry of Multi-Component Systems (0.5)
Chem 221L Analytical Chemistry Laboratory 2 (0.50)
Chem 255 Physical Chemistry 2 (0.5)
Chem 264 Organic Chemistry 1 (0.5)
Chem 264L Organic Chemistry Laboratory 1 (0.25)
Phys 243 Electricity and Magnetism (0.5)
Phys 243L Electricity and Magnetism Laboratory (0.25)
One of:
Math 220b, 221b, 231b, 213 (0.5)

Year 3
Fall Term
Chem 10 Chemistry Seminar
Chem 312 Transition Metal Chemistry (0.5)
Chem 314L Inorganic Chemistry Laboratory 1 (0.25)
Chem 355 Physical Chemistry 3 (0.5)
Chem 355L Physical Chemistry Laboratory 1 (0.25)
Chem 364 Organic Chemistry 2 (0.5)
Chem 364L Organic Chemistry Laboratory 2 (0.25)
One of:
Math 322a, 331, AM 365. (0.5)
plus
One elective (0.5)
Winter Term
Chem 10 Chemistry Seminar
Chem 313 Main Group Chemistry (0.5)
Chem 315L Inorganic Chemistry Laboratory 2 (0.25)
Chem 358 Physical Chemistry 4 (0.5)
Chem 358L Physical Chemistry Laboratory 2 (0.5)
Chem 365 Organic Chemistry 3 (0.5)

One of:
Math 322b, 331, AM 371. (0.5)
plus:
One elective (0.5)

Year 4
Chem 10 Chemistry Seminar
Chem 492 Advanced Laboratory (1.5)
Four one-term Chem courses of which at least two must be at the 400-level. (2.0)
Four one-term (or equivalent) Math courses at 300-or 400-level. (2.0)

Honours Chemistry (Physics Option)
This programme fulfills the academic requirements for professional membership in the Chemical Institute of Canada.

Year 1
As for Honours Chemistry (see page 197) but the first year Phys course selected should be 121-121L, 122-122L or 162-162L, 163-163L. One credit in Algebra and at least one half-credit of Computer Science is recommended.

Year 2
Fall Term
Chem 10 Chemistry Seminar
Chem 212 Structure and Bonding (0.5)
Chem 220 Introductory Analytical Chemistry (0.25)
Chem 220L Analytical Chemistry Laboratory 1 (0.5)
Chem 254 Physical Chemistry 1 (0.5)
Math 210 Calculus 2 (0.5)
Phys 222 or Electricity and Magnetism 1 (0.5)
252
Phys 222L or Electricity and Magnetism Laboratory 1 (0.25)

Winter Term
Chem 10 Chemistry Seminar
Chem 221 Analytical Chemistry of Multi-Components Systems (0.5)
Chem 221L Analytical Chemistry Laboratory 2 (0.50)
Chem 255 Physical Chemistry 2 (0.25)
Chem 264 Organic Chemistry 1 (0.5)
Chem 264L Organic Chemistry Laboratory 1 (0.25)
Math 215 Differential Equations (0.5)
Phys 223 or Electricity and Magnetism 2 (0.5)
253
Phys 223L Electricity and Magnetism Laboratory 2 (0.25)

Year 3
Fall Term
Chem 10 Chemistry Seminar
Chem 312 Transition Metal Chemistry (0.5)
Chem 314L Inorganic Chemistry Laboratory 1 (0.25)
Chem 355 Physical Chemistry 3 (0.25)
Chem 355L Physical Chemistry Laboratory 1 (0.25)
Chem 364 Organic Chemistry 2 (0.5)
Chem 364L Organic Chemistry Laboratory 2 (0.25)
Phys 324 Atomic and Nuclear Physics 1 (0.5)
One Elective† (0.5)

Winter Term
Chem 10 Chemistry Seminar
Chem 321 Main Group Chemistry (0.5)
Chem 315L Inorganic Chemistry Laboratory 2 (0.25)
Chem 358 Physical Chemistry 4 (0.5)
Chem 358L Physical Chemistry Laboratory 2 (0.5)
Chem 365 Organic Chemistry 3 (0.5)
Phys 325 Atomic and Nuclear Physics 2 (0.5)
One Elective† (0.5)

Year 4
Chem 10 Chemistry Seminar
Chem 492 Advanced Laboratory (1.5)
Two one-term Chemistry courses which must be at the 400-level. (1.0)
Four one-term Physics courses at the 300- or 400 level. (2.0)
Two one-term electives. (1.0)

†Year 3 electives may be chosen from Phys 352-353 plus 352L-353L, 362-363, 364-365, Math 221a-221b, 222b, CS370.

Honours Earth Sciences
Completion of this programme requires a total of 24.0 credits (including Year one). Of these at least two elective credits must be from the Faculty of Arts and at least two elective lecture credits must be non-Earth Sciences courses from the faculties of Science and Mathematics. (There are two exceptions: Earth 355 is considered a non-Earth Science/Mathematics elective and Physics 368-369 are not). In addition, attendance on two field trips is required (Earth 390-490).
(See Undergraduate Course Descriptions, Ch. 14)
A list of recommended Science and Mathematics electives is given on page 207.
207

Science
Academic Programmes

Year 1
(For a complete discussion of Year 1, see page 197)

Earth 221 Geochemistry 1 (0.5)
Earth 231 Mineralogy (0.5)
Earth 232 Petrography (0.5)
Earth 235 Stratigraphy (0.5)
Earth 236 Principles of Paleontology (0.5)
Earth 260 Introductory Structural Geology (0.5)
Electives Three credits, normally two from courses in Science and/or Mathematics, and one from Arts.

Note
By the end of Year 2, students must have completed Phys 111-112 and Phys 111L-112L, General Physics (or an equivalent physics course), Math 113, Calculus, and an introductory course in computer programming (for example CS 118 or Gen E 121).

Year 2
Earth 331 Igneous Petrology (0.5)
Earth 332 Metamorphic Petrology (0.5)
Earth 333 Sedimentology (0.5)
Earth 336 Paleontology (0.5)
Earth 342 Geomorphology (0.5)
Earth 345 Historical Geology (0.5)
Earth 360 Applied Geophysics 1 (0.5)
Earth 370 Economic Geology (0.5)
Earth 390 Field Camp
Electives Two credits, normally one from courses in Science and/or Mathematics, and one from Arts.

Year 3
Earth 490 Field trip
Earth 436 Thesis (1.0)
Earth 427 Crustal Evolution (0.5)
Earth 421 Geochemistry 2 (0.5)
Earth 432 Precambrian Geology (0.5)
Earth 433 Applied Sedimentology (0.5)
Earth 434 Biostratigraphy (0.5)
Earth 435 Advanced Structural Geology (0.5)
Earth 438 Engineering Geology (0.5)
Earth 439 Groundwater Geology (0.5)
Earth 440 Quaternary Geology (0.5)
Earth 456 Mathematical Geology 2 (0.5)
Earth 461 Applied Geophysics 2 (0.5)
Earth 470 Metallic Mineral Deposits (0.5)
Electives One credit, not from Earth Sciences.

†Upon programme approval by the Undergraduate Officer, a student may take six half-credits from the above list to allow freedom to take courses in the faculties of Engineering, Mathematics or Science. Students who plan to do graduate work in hydrogeology and who have not taken the Geotechnical Option are advised to take Math 210 or Civ E 221 during their fourth year.


Note
The Department of Earth Sciences is prepared to work out honours programmes with students who wish to use their electives to specialize in a particular discipline; e.g. Mathematics, Biology, Chemistry, Physics.

Honours Earth Sciences (Geography Option)
This programme combines the basic courses of Honours Earth Sciences with Geography. Successful completion requires 23.5 credits of which at least 13.5 are from the Faculty of Science and 5.5 are from the Faculty of Environmental Studies. Students must maintain a 75% average in all Geography courses.

Year 1
Earth 121 Introductory Geology 1 (0.5)
Earth 122 Introductory Geology 2 (0.5)
Geog 102 Introduction to Physical Geography (0.5)
Chem 121 Chemical Structure (0.5)
Chem 121L Chemical Structure Laboratory (0.25)
Chem 122 Chemical Reaction (0.5)
Chem 122L Chemical Reaction Laboratory (0.25)
One of:
Geog 101 Introduction to Human Geography (0.5)
Geog 125R Introduction to the Developing World (0.5)
Geog 126R The Emerging Third World (0.5)
Geog 127 Regional Problems of Europe (0.5)
Env St 195 Introduction to Environmental Problems (0.5)
Electives Two credits
### Science

#### Academic Programmes

| Year 2 | Earth 221 | Geochemistry 1 (0.5) |
| Year 2 | Earth 231 | Mineralogy (0.5) |
| Year 2 | Earth 232 | Petrography (0.5) |
| Year 2 | Earth 233 | Stratigraphy (0.5) |
| Year 2 | Earth 236 | Principles of Paleontology (0.5) |
| Year 2 | Earth 260 | Introductory Structural Geology (0.5) |
| Year 2 | EnSt 200 | Field Ecology (0.5) |
| Year 2 | Geog 201 | Some Basic Topics of Physical Geography (0.5) |
| Year 2 | Geog 202 | Some Basic Topics of Economic and Urban Geography (0.5) |
| Year 2 | Electives | Three half credits including one of: |
|          | Geog 203 | Some Basic Topics of Cultural and Regional Geography (0.5) |
| Year 2 | Geog 220 | World Regional Geography (1.0) |

**Note**

By the end of Year 2, students must have completed an introductory course in computer programming (e.g. CS 118 or Gen E 121).

| Year 3 | Earth 331 | Igneous Petrology (0.5) |
| Year 3 | Earth 332 | Metamorphic Petrology (0.5) |
| Year 3 | Earth 333 | Sedimentology (0.5) |
| Year 3 | Earth 336 | Paleontology (0.5) |
| Year 3 | Earth 342 | Geomorphology (0.5) |
| Year 3 | Earth 345 | Historical Geology (.5) |
| Year 3 | Earth 370 | Geology of non-renewable Primary Resources (0.5) |
|          | Geog 381 | Special Topics |
|          | Earth 390 | Field Camp |
| Year 3 | Geog electives | One credit (1.0) |
| Year 3 | Elective | One credit (1.0) |

| Year 4 | Earth 436 | Honours Thesis (1.0) |
| Year 4 | Earth 490 | Field Camp |
| Year 4 | Earth | Electives | Three credits |
| Year 4 | Geog | Electives | One credit (1.0) |
| Year 4 | Elective | One credit (1.0) |

**Co-operative Applied Earth Sciences**

The co-operative programmes in Earth Sciences are Honours programmes designed to satisfy the requirements of many potential employers that graduating geologists have practical experience as well as good academic training. In the first year, students take the Year 1 Science programme as described on page 197. The co-operative Earth Sciences programmes will begin in the fall term of the second year and will be operated as a single co-operative stream. The first work term begins in the Winter term following the Fall term 2A and thereafter academic and work terms alternate until the end of term 3B when a double work term commences. Students then take terms 4A and 4B as a full academic year, graduating the following Spring.

General features and conditions of the co-operative plan at the University of Waterloo are given in Chapter 5.

The normal progress of a student entering co-operative Earth Sciences in the second academic year in the Fall of 1978 is shown in the table page 57 Chapter 5. There are two programmes available: The Geology and the Geotechnical options. Students contemplating careers in engineering geology or hydrogeology are advised to take the Geotechnical Option.

**Geology option**

Completion of this course requires a total of 24.0 credits (including year one) Of these at least 2 lecture-credits (excluding required courses) must be non-Earth Sciences courses from the faculties of Science and Mathematics and 2 credits must be from the Faculty of Arts. (There are two exceptions: Earth 355 is considered a non-Earth Science/ Mathematics elective and Physics 368-369 are not). In addition, attendance is required on two field trips (Earth 390, Earth 490) (see Undergraduate Course Descriptions, Ch. 14). A list of recommended Science and Mathematics electives is given on page 207.

| Year 2A | Earth 231 | Mineralogy (0.5) |
| Year 2A | Earth 235 | Principles of Paleontology (0.5) |
| Year 2A | Earth 236 | Stratigraphy (0.5) |
| Year 2A | Electives | Three half credits, normally two from courses in Science and/or Mathematics and one from Arts. |

| Year 2B | Earth 221 | Geochemistry 1 (0.5) |
| Year 2B | Earth 232 | Petrography (0.5) |
| Year 2B | Earth 260 | Introductory Structural Geology (0.5) |
| Year 2B | Electives | Three half credits, normally two from courses in Science and/or Mathematics and one from Arts. |

**Note**

By the end of Year 2, students must have completed Phys 111-112 and Phys 111L-112L, General Physics (or an equivalent physics course), Math 113, Calculus, and a course involving computer programming (for example, CS 118 or Gen E 121).
## Science
### Academic Programmes

#### Year 3A
- Earth 332: Metamorphic Petrology (0.5)
- Earth 333: Sedimentology (0.5)
- Earth 345: Historical Geology (0.5)
- Earth 370: Economic Geology (0.5)
- Earth 390: Field Camp
- Electives: Two half credits, normally one from Science or Mathematics and one from Arts.

#### Year 3B
- Earth 331: Igneous Petrology (0.5)
- Earth 360: Applied Geophysics 1 (0.5)
- Earth 439: Engineering Geology (0.5)
- Civ E 200: Civil Engineering Project (0.5)
- Civ E 260: Fluid Mechanics (0.5)
- Civ E 354: Foundation Engineering (0.5)

#### Year 4
- Earth 490: Field trip
- Earth 436: Thesis (1.0)
- Earth 427: Crustal Evolution (0.5)
- Earth 435: Advanced Structural Geology (0.5)
- Earth 438: Engineering Geology (0.5)
- Earth 440: Quaternary Geology (0.5)
- Earth 355: Statistical Methods in Geology (0.5)
- Civ E 244: Probability and Statistics (0.5)
- Electives: 3 half-credits from Earth Sciences or Civil Engineering with at least one half-credit from Civil Engineering. One credit from Arts.

### Geotechnical Option
This co-operative programme follows the same timetable as the geology option described above. The course selection has been made with both the traditional geology and the geotechnical professions in mind. As such it also provides a good undergraduate background for fields such as hydrogeology. The number of students admitted to this programme is limited by the space available.

In the first year, students take the Year 1 Science programme described on page 197.

In addition to the prescribed course work, attendance is required on two Earth Sciences field trips (Earth 390-490) (see Undergraduate Course Description, Ch. 14) and in Civ E 291, a non-credit field course in surveying. Civ E 291 may be taken immediately prior to either the 2A, 3B or 4A terms.

#### Year 2A
- Earth 231: Mineralogy (0.5)
- Earth 235: Stratigraphy (0.5)
- Civ E 203: Statics (0.5)
- Civ E 221: Calculus (0.5)
- Math 114: Algebra and Vectors (0.5)
- Arts elective (0.5)

#### Year 2B
- Earth 221: Geochemistry 1 (0.5)
- Earth 232: Petrology (0.5)
- Earth 260: Introductory Structural Geology (0.5)
- Civ E 222: Differential Equations (0.5)
- Civ E 205: Mechanics of Deformable Solids (0.5)
- Civ E 293: Engineering Economics (0.5)

#### Year 3A
- Earth 332: Metamorphic Petrology (0.5)
- Earth 333: Sedimentology (0.5)
- Earth 338: Rock Mechanics (0.5)
- Earth 345: Historical Geology (0.5)
- Earth 370: Economic Geology (0.5)
- Earth 390: Field Camp
- Civ E 353: Soil Mechanics (0.5)

#### Year 3B
- Earth 331: Igneous Petrology (0.5)
- Earth 360: Applied Geophysics 1 (0.5)
- Earth 439: Groundwater Geology (0.5)
- Civ E 200: Civil Engineering Project (0.5)
- Civ E 260: Fluid Mechanics (0.5)
- Civ E 354: Foundation Engineering (0.5)

#### Year 4
- Earth 490: Field trip
- Earth 436: Thesis (1.0)
- Earth 427: Crustal Evolution (0.5)
- Earth 435: Advanced Structural Geology (0.5)
- Earth 438: Engineering Geology (0.5)
- Earth 440: Quaternary Geology (0.5)
- Earth 355: Statistical Methods in Geology (0.5)
- Civ E 244: Probability and Statistics (0.5)
- Electives: 3 half-credits from Earth Sciences or Civil Engineering with at least one half-credit from Civil Engineering. One credit from Arts.

### Honours Physics
The Honours programme is in the form of a core of required courses, plus appropriate electives. The elective courses may be chosen from a wide range of courses offered by the Physics Department and by other departments of the University. By careful selection of his electives, a student can deepen his knowledge of experimental or theoretical physics, or obtain a background in another subject (e.g., Astronomy, Geophysics, Chemistry, Mathematics, Computing, Business Administration). The choice of electives must be made to fit the student's timetable, and must be approved by the Chairman of the Department of Physics. The programme must include a total of twenty-four credits (including Year one). It is recommended that students intending to take an Honours Physics programme should take six lecture credits in first year. Examples of possible elective programmes are given on the pages following the core programme which is listed below. Detailed descriptions of the courses start in Chapter 14.

#### Year 1
(For a complete discussion of Year 1, see page 197).
### Science

#### Academic Programmes

<table>
<thead>
<tr>
<th>Year</th>
<th>Core</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td></td>
</tr>
<tr>
<td>Phys 10</td>
<td>Physics Seminar (0.0)</td>
</tr>
<tr>
<td>Phys 256</td>
<td>Wave Motion and Optics (0.5)</td>
</tr>
<tr>
<td>Phys 256L</td>
<td>Physical Optics Lab (0.25)</td>
</tr>
<tr>
<td>Phys 254</td>
<td>Thermal Physics and Properties of Matter (0.5)</td>
</tr>
<tr>
<td>Phys 253</td>
<td>Electricity and Magnetism (0.5)</td>
</tr>
<tr>
<td>Phys 253L</td>
<td>Electricity and Magnetism Lab (0.25)</td>
</tr>
<tr>
<td>Phys 255</td>
<td>Quantum Physics (0.5)</td>
</tr>
<tr>
<td>Math 213</td>
<td>Advanced Calculus (1.0)</td>
</tr>
<tr>
<td>Math 216</td>
<td>Differential Equations (0.5)</td>
</tr>
</tbody>
</table>

**Note 1**

In order to satisfy core requirements, another 0.25 credit lab must be elected from Phys 270, 271, 258 and 259L.

<table>
<thead>
<tr>
<th>Year</th>
<th>Core</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Phys 10</td>
<td>Physics Seminar (0.0)</td>
</tr>
<tr>
<td>Phys 360A</td>
<td>Intermediate Laboratory (0.25)</td>
</tr>
<tr>
<td>Phys 360B</td>
<td>Intermediate Laboratory (0.25)</td>
</tr>
<tr>
<td>Two of Phys 371A, 371B, 352L or 353L</td>
<td></td>
</tr>
<tr>
<td>Phys 362</td>
<td>Classical Mechanics 1 (0.5)</td>
</tr>
<tr>
<td>Phys 363</td>
<td>Classical Mechanics 2 (0.5)</td>
</tr>
<tr>
<td>Phys 364</td>
<td>Mathematical Physics 1 (0.5)</td>
</tr>
<tr>
<td>Phys 365</td>
<td>Mathematical Physics 2 (0.5)</td>
</tr>
<tr>
<td>Phys 354</td>
<td>Atomic and Molecular Physics (0.5)</td>
</tr>
<tr>
<td>Phys 358</td>
<td>Thermodynamics (0.5)</td>
</tr>
<tr>
<td>Phys 359</td>
<td>Statistical Mechanics (0.5)</td>
</tr>
</tbody>
</table>

**Note**

Students desiring Phys 444 must elect Phys 355.

<table>
<thead>
<tr>
<th>Year</th>
<th>Core</th>
</tr>
</thead>
<tbody>
<tr>
<td>4</td>
<td></td>
</tr>
<tr>
<td>Phys 10</td>
<td>Physics Seminar (0.0)</td>
</tr>
<tr>
<td>Phys 434A</td>
<td>Introductory Quantum Mechanics (0.5)</td>
</tr>
<tr>
<td>Phys 441</td>
<td>Electromagnetic Theory (1.0)</td>
</tr>
<tr>
<td>Phys 355</td>
<td>Nuclear and Particle Physics (if not taken in Year 3) (0.5)</td>
</tr>
<tr>
<td>Phys 433</td>
<td>Experimental Research Project (1.0)</td>
</tr>
<tr>
<td>or Phys 437A</td>
<td>Theoretical Physics Project (0.5)</td>
</tr>
</tbody>
</table>

**Note**

Phys 434B is strongly recommended for students intending to do graduate work, and Phys 443 is strongly recommended for students intending to do graduate work or intending to work as industrial physicists.

### Elective Programmes

The flexibility of this "core plus electives" structure is demonstrated by the following examples of possible programmes, all of which are sufficient preparation for graduate work in Physics, although each has a slightly different emphasis. Details of other possible programmes may be obtained from the Chairman of the Physics Department. In choosing electives, the student should make sure that his programme contains a minimum of 24 credits. All suggested programmes are subject to timetable restrictions.

#### Ex 1 Honours Physics

(with extra emphasis on experimental physics)

Core plus: Year 2
Phys 259, 259L, 270-271, CS 210 and CS 240.

Core plus: Year 3
Phys 352-353, 352L-353L, 371A, 371B

Core plus: Year 4
Phys 432, 433, 435, 464, 465
Two of: Phys 442, 443, 445, 452, 453

#### Ex 2 Honours Physics

(especially suitable as preparation for secondary school teaching)

Core plus: Year 2

Core plus: Year 3

Core plus: Year 4
Phys 433 or 437A, 435, Sci 400, Arts Electives

#### Ex 3 Honours Physics

(with Biophysics)

Core plus: Year 2
Stat 220
Three of: Chem 254, 255, 266, 267, Biol 245, 246

Core plus: Year 3
Three of: Phys 352, 352L, 353, 353L, 380, 381
One of: Biol 341, 343, 239, Chem 356, 357, 332, 333, 353

Core Plus: Year 4
Phys 433, 434B, 435, 480, 481
2.0 credits from: Biol 434, 448, 449, Chem 432, 433, 434, 453, 454, 457

#### Ex 4 Honours Physics

(with Computing)

Core plus: Year 2
Phys 259, 259L, CS 210, CS 240, Arts Elective

Core plus: Year 3
Phys 352, 352L, 353, 353L
Two of: Stat 220, CS 340, 350, CS 370, 371
Core plus: Year 4  
Phys 435, 452, 453, El E 222, Elective.

**Ex 5 Honours Physics**  
(with Chemistry)

Core plus: Year 2  
Chem 218-219, 254-255, CS 210 or CS 240

Core plus: Year 3  
Phys 352, 352L, 371A, Chem 266-267, Elective

Core plus: Year 4  
2.0 credits from Phys 434B, 435, Chem 350, 355, 358, 312, 311, Elective

**Ex 6 Honours Physics**  
(with Astrophysics)

Core plus: Year 2  
Phys 250, 251, 270, CS 210, CS 240

Core plus: Year 3  
Two of: Phys 350, 351, 352-352L, 353-353L, 449, 459, 451, Arts Electives totalling 1.0 credit

Core plus: Year 4  

**Ex 7 Honours Physics**  
- Business Administration Option  
See comments regarding the Business Administration Option under General Science & Business on page 221.

Core plus: Year 1 Special Requirements  
Econ 101-102, CS 116, or CS 140

Core plus: Year 2  
Econ 201-202, 191-192

Core plus: Year 3  
Bus (WLU) 352-362, 255-275, M Sci 46

Core plus: Year 4  
Econ 393-394, Bus (WLU) 385-395, 388-398, M Sci 47  
(Phys 360A and 360B are not normally taken with this option)

**Ex 8 Honours Physics**  
(with Geophysics)

Core plus: Year 2  
Phys 259, 259L, Earth 231, 232, 235

Core plus: Year 3  
Phys 368, 369, Earth 260, 1.0 credit from Earth Sciences

Core plus: Year 4  
Three credits from: Phys 352-352L, 353-353L, CS 210-240, selected Earth Science courses

**Ex 9 Honours Physics**  
(with Electrical Engineering)

Core plus: Year 1 Special Requirements  
Sy De 183 or Gen E 115 (Fall term), and CS 140 (Winter term)

Core plus: Year 2  
Phys 259, 259L, El E 222, 241

Core plus: Year 3  
Phys 352, 353, 352L, 353L, El E 316 and one or two of El E 323, 380, 261

**Note**  
It may be possible to replace Phys 360a-360b by an Electrical Engineering course if two of the Electrical Engineering courses chosen have labs associated with them.

Core plus: Year 4  
Phys 435, 453, El E 418, 419, 435, 436

**Theoretical Physics Programme**  
Students with an interest in theoretical physics may wish to emphasize the more mathematical aspects of the subject. A suitable programme consists of the "Honours Physics" core plus the following elective scheme:

Core plus: Year 2  
Phys 259, 259L, Math 231a-231b, elective

Core plus: Year 3  
Phys 355, Mathematics Elective, elective

Core Plus: Year 4  

**Note**  
Students interested in this programme are advised to take Math 111a-111b, and a computing course in Year 1 to ensure having the necessary prerequisites for later year Mathematics courses. Suggested Mathematics electives are the following: CS 370, 371, C & O 351a-351b, C & O 352a-352b, AM 362, AM382, CS369, CS360, AM461, C & O 437a-437b, C & O 453a, AM 468, AM 478, CS 484, P Math 470.
Co-operative Applied Physics (Honours)

Applied Physics is an Honours programme 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.

Through the co-operative part of the programme 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 starting in Chapter 5 p. 56. The normal progress of students in the Applied Physics programme is shown on p. 57.

The programme must include a total of twenty-four credits (including Year 1). It is recommended that students intending to take an honours physics programme should take six lecture credits in first year. Examples of possible elective programmes are given in the following pages.

The core programme is listed below. A detailed description of the courses starts in Chapter 14.

**Year 1**
*(For a complete discussion of Year 1, see page 197).*

<table>
<thead>
<tr>
<th>Year 2A Core</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Phys 10</td>
<td>Physics Seminar (0.0)</td>
</tr>
<tr>
<td>Phys 256</td>
<td>Wave Motion and Optics (0.5)</td>
</tr>
<tr>
<td>Phys 256L</td>
<td>Physical Optics Lab (0.25)</td>
</tr>
<tr>
<td>Phys 254</td>
<td>Thermal Physics and Properties of Matter (0.5)</td>
</tr>
<tr>
<td>Math 213A</td>
<td>Advanced Calculus (0.5)</td>
</tr>
<tr>
<td>Math 216</td>
<td>Differential Equations (0.5)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Year 2B Core</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Phys 10</td>
<td>Physics Seminar (0.0)</td>
</tr>
<tr>
<td>Phys 253</td>
<td>Electricity and Magnetism (0.5)</td>
</tr>
<tr>
<td>Phys 253L</td>
<td>Electricity and Magnetism Lab (0.25)</td>
</tr>
<tr>
<td>Phys 255</td>
<td>Quantum Physics (0.5)</td>
</tr>
<tr>
<td>Math 213B</td>
<td>Advanced Calculus (0.5)</td>
</tr>
</tbody>
</table>

**Note**

In order to satisfy core requirements, another 0.25 credit lab must be elected from Phys 270, 271, 258, and 259L, in 2A or 2B.

**Year 3A Core**

<table>
<thead>
<tr>
<th>Phys 10</th>
<th>Physics Seminar (0.0)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Phys 354</td>
<td>Atomic and Molecular Physics (0.5)</td>
</tr>
<tr>
<td>Phys 358</td>
<td>Thermodynamics (0.5)</td>
</tr>
<tr>
<td>Phys 360A</td>
<td>Intermediate Laboratory (0.25)</td>
</tr>
<tr>
<td>Phys 362</td>
<td>Classical Mechanics 1 (0.5)</td>
</tr>
<tr>
<td>Phys 364</td>
<td>Mathematical Physics 1 (0.5)</td>
</tr>
</tbody>
</table>

**Note**

Students desiring Phys 444 must elect Phys 355.

**Year 3B Core**

<table>
<thead>
<tr>
<th>Phys 10</th>
<th>Physics Seminar (0.0)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Phys 359</td>
<td>Statistical Mechanics (0.5)</td>
</tr>
<tr>
<td>Phys 363</td>
<td>Classical Mechanics 2 (0.5)</td>
</tr>
<tr>
<td>Phys 365</td>
<td>Mathematical Physics 2 (0.5)</td>
</tr>
</tbody>
</table>

**Note**

Phys 434B is strongly recommended for students intending to do graduate work and Phys 443 is strongly recommended for students intending to do graduate work or intending to work as industrial physicists.

**Options**

Some suggested programmes are given below. In choosing his electives the student should make sure that his programme contains a minimum of 24 credits.

**Ex 1 Co-op Applied Physics**
*(Solid State)*

<table>
<thead>
<tr>
<th>Core plus: Year 2A</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Phys 270, CS 210</td>
<td></td>
</tr>
<tr>
<td>Core plus: Year 2B</td>
<td></td>
</tr>
<tr>
<td>Phys 259, 259L, 271, Chem 311 or CS 240</td>
<td></td>
</tr>
<tr>
<td>Core plus: Year 3A</td>
<td></td>
</tr>
<tr>
<td>Phys 352, 352L, 371A</td>
<td></td>
</tr>
<tr>
<td>Core plus: Year 3B</td>
<td></td>
</tr>
<tr>
<td>Phys 353, 353L, 355, 371B</td>
<td></td>
</tr>
</tbody>
</table>
Core plus: Year 4A
Phys 433, 435, 452, 464

Core plus: Year 4B
Phys 433, 434B, 442, 453, 465

**Ex 2 Co-op Applied Physics**
(Biophysics)

Core plus: Year 2A
1.0 credit from Chem 254, 266, Biol 245, 203, 341, 239, Phys 380

Core plus: Year 2B
1.0 credit from: Chem 255, 267, 332, 353

Core plus: Year 3A
1.0 credit from: Chem 332, 353, Phys 352, 353L, 371A

Core plus: Year 3B
1.0 credit from: Chem 255, 267, 333, 357, Biol 246, 343, Phys 353, 353L, 355, 381

Core plus: Year 4A and 4B

**Ex 3 Co-op Applied Physics**
(with Chemistry)

Core plus: Year 2A
Chem 254, 212

Core plus: Year 2B
Chem 264, Phys 259, 259L, Arts Elective

Core plus: Year 3A
Chem 255, or 364, Phys 352, 352L

Core plus: Year 3B
Phys 353, 353L, Chem 311

Core plus: Year 4A
Phys 433, 435, 464, Chem 332 or 353 or 455

Core plus: Year 4B
Phys 433, 434B, Chem 332 or 333

**Ex 4 Co-op Applied Physics**
(with Computing)

Core plus: Year 2A
Math 221A, CS 210

Core plus: Year 2B
Math 221b, CS 240, Phys 259, 259L

Core plus: Year 3A
CS 340, Phys 352, 352L

Core plus: Year 3B
CS 350, Phys 353, 353L

Core plus: Year 4A
CS 472, Phys 435, 452, 464

Core plus: Year 4B
CS 474, Phys 453, 465

**Ex 5 Co-op Applied Physics**
- Business-Administration Option
See comments regarding Business Administration Option under General Science and Business on page 221.

Core plus: Year 1 Special Requirements
Econ 101-102, CS 118 or CS 116

Core plus: Year 2
Econ 201-202, 191-192

Core plus: Year 3
Bus (WLU) 352-362, 255, 275, M Sci 46

Core plus: Year 4
Econ 393-394, Bus (WLU) 385-395, 388-398, M Sci 47
(Phys 360A and 360B are not normally taken with this Option).

**Ex 6 Co-op Applied Physics**
(with Electrical Engineering)

Core plus: Year 1 Special Requirements
Sy De 183 or Gen E 115 (Fall term), and CS 118 (Winter term).

Core plus: Year 2A
EI E 222

Core plus: Year 2B
Phys 259, 259L, EI E 316

Core plus: Year 3A
Phys 352, 352L

Core plus: Year 3B
Phys 353, 353L, EI E 241 and one or two of EI E 323, 380

**Note**
It may be possible to replace Phys 360A-360B by an Electrical Engineering course if two of the Electrical Engineering courses chosen have labs associated with them.
Core plus: Year 4A and 4B
Phys 433, 435, 453, Ei E 418, 419, 435, 436

Honours Psychology

Year 1
is a normal Year 1 programme of the Faculty of Science
(see page 197) with Mathematics 113, Physics 111-112,
or 121-122 and 121L-122L Biol 111-112, 111L-112L or
121-122, 121L-122L. Chemistry 121-122 and 121L-122L,
Psychology 101-102

Year 2
Psych 201 Statistical Methods in Psychology (0.5)
Psych 202 Experimental Design (0.5)
One of Research (0.5)
Psych 293,
295, or 297.
Psych Electives* (1.5)
Science Electives** (2.0)
Unspecified Elective (1.0)

Year 3
Psych 301 Tests and Measurements (0.5)
One of Research (0.5)
Psych 393,
395, or 397
Psych Electives* (2.0)
Science Electives** (2.0)
Unspecified Elective (1.0)

Year 4
Psych 499 Senior Honours Essay (1.0)
Psych Elective (1.0)
Science Elective (1.0)
Unspecified Elective (2.0)

*This includes a 0.5 credit prerequisite to the specific research course selected
**No more than two Science credits may be taken from Science labelled courses

Optometry Programme

Admission to the Professional Programme, September
1980: The curriculum of the four year professional programme of the School of Optometry will be revised in 1980-1981. Academic prerequisites will continue to include those subjects specified in the present pre-professional programme, and are expected to include some additional subjects (see page 197).

The School of Optometry of the Faculty of Science offers a four year professional programme leading to the degree of Doctor of Optometry. It is the only School of Optometry in Canada offering a programme with English as the language of instruction. The immediate purpose of the programme is to qualify men and women for the practice of optometry and graduates are eligible to apply for registration as optometrists in the province of their choice. The programme 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 graduate programme in Physiological Optics leading to the Master of Science degree is now available at the School and a programme leading to the Doctor of Philosophy degree has been proposed and is expected to be available soon.

Requirements for Admission

Citizenship
Applications are accepted from candidates who are Canadian citizens or from legal residents of Canada who have held landed immigrant status for at least twelve months prior to the registration day of the Fall term. Proof of landed immigrant status must accompany the application. Applications will not normally be accepted from foreign students on student visa.

Prerequisites
The minimum requirements for admission are successful completion of at least a full year of university work beyond Ontario Year 5 or equivalent level. The university credits required are for full courses in General Chemistry, General Biology, General Physics, Calculus and Introductory Psychology. The courses in Chemistry, Biology and Physics should include laboratory sections. Applicants hoping to be admitted
after fulfilling the minimum requirements should have at least an overall second class standing ("B") in the university programme. Specific information on the preprofessional programme for optometry is given on page 197. Additional admission requirements and regulations for Examinations and Standings will be found on pages 192-195.

Selection Factors
All applicants should note that enrolment in the first professional year is limited to sixty and that in 1978 there were approximately three hundred and fifty applications for those places. Consequently, neither acceptance to nor successful completion of the preprofessional programme 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 preprofessional programme at the University of Waterloo, but applicants to Year 1 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 1 regular Science as given at the University of Waterloo.

The provinces of Alberta, Manitoba and Saskatchewan have entered into an agreement with the School of Optometry regarding admission of applicants from those provinces. The agreement establishes that a maximum of seven applicants from Alberta, a maximum of three applicants from Saskatchewan and a maximum of three applicants from Manitoba may be admitted to the first professional year. Applicants from these three 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. Information on the residency qualifications for applicants from Alberta, Saskatchewan and Manitoba can be obtained by writing the Admissions Officer of the School of Optometry.

There is no age limit for applicants but only in exceptional circumstances will applicants older than thirty years be seriously considered for admission.

Application Procedures
Students enrolled at the University of Waterloo make application to the optometry programme by preregistering for the first professional year during the spring preregistration in March. Graduates of the University of Waterloo or persons who were at one time registered at the University of Waterloo in any type of programme also apply by preregistering in March. In January an interview with the admissions committee will be arranged for the student. Students who have completed the preprofessional programme at another university must apply through the Ontario Universities Application Centre. 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 15, 1979. The completed OUAC form should reach the Centre in Guelph no later than April 1, if the copy is to reach the Registrar at Waterloo by the deadline of May 1. After the OUAC form has been processed by the Centre the applicant will receive a supplementary application package from the Registrar of the University of Waterloo. This will contain details on required transcripts, letters of reference and the autobiographical resume. The deadline for receipt of academic transcripts and other material is June 15. It is expected that the decisions of the admission committee will be mailed by July 15.

Students granted direct admission to the first professional year who have taken courses equivalent to those required in the upper years of the programme may apply for exemptions from these courses immediately after acceptance into the programme. Details on the policy of exemptions may be obtained by writing to the Admissions Officer of the School.

²As with other health care professions, graduates in optometry must hold the certificate of the licensing body of the province in which they choose to practice.

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 practice optometry in their country of origin may in certain instances be admitted to a more advanced level in a programme leading to the O.D. degree. For more information write the Admissions Officer, 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 over age 30.
2) Applicants with undergraduate or graduate training who have not completed prerequisites for the first professional year and who are considering a "make-up" year.

3) Applicants considering a "make-up" year to repeat courses for the purpose of raising grades.

4) Applicants who are presently engaged in another vocation such as teaching, engineering, research, etc., and who may find it necessary to terminate employment before the admissions decision had been made.

Appointments for interviews can be made by phone or letter to the Admissions Officer of the School of Optometry.

**Academic Programme**

**Year 2**

**Fall Term**

- Biol 201 Anatomy, Histology and Embryology (first term) (0.5)
- Chem 268 Introductory Organic Chemistry (0.5)
- Chem 268L Introductory Organic Chemistry Laboratory (0.25)
- Optom 200 History and Orientation (0.5)
- Optom 206 Geometrical Optics (0.5)
- Optom 224 Anatomy of the Eye and Associated Structure (0.5)
- Psych 283 Statistical Methods in Psychology (0.5)

**Winter Term**

- Biol 201 Anatomy, Histology and Embryology (second term) (0.5)
- Optom 211 Physiological Optics (0.5)
- Optom 234 Anatomy of the Eye and Associated Structures (0.5)
- Phys 246 Physical Optics (0.5)
- Phys 246L Optics Laboratory (0.25)
- Chem 237 Introductory Biochemistry (0.5)
- Chem 237L Introductory Biochemistry Laboratory (0.25)

**Year 3**

**Fall Term**

- Biol 301 Vertebrate Physiology (first term) (0.5)
- Optom 301 Physiological Optics (0.5)
- Optom 302 Clinical Optometry (0.5)
- Optom 305 General Pathology (0.5)
- Optom 306 Optometrical Optics (0.5)
- Optom 309 Light and Illumination (0.5)

**Winter Term**

- Biol 301 Vertebrate Physiology (second term) (0.5)
- Optom 311 Physiological Optics (0.5)
- Optom 312 Clinical Optometry (0.5)
- Optom 315 General Pathology (0.5)
- Optom 316 Optometrical Optics (0.5)
- Psych 206 Perceptual Processes (0.5)

**Year 4**

**Fall Term**

- Optom 401 Physiological Optics (0.5)
- Optom 402 Clinical Optometry (0.5)
- Optom 404 Physiology of Visual Systems (0.5)
- Optom 405 Ocular Pathology (0.5)
- Optom 406 Optometrical Optics (0.5)
- Optom 407 Optometric Specialties: Contact Lenses (0.5)
- Optom 408 Optometry Clinic (0.5)
- Optom 409 Light and Illumination (0.5)

**Winter Term**

- Optom 411 Physiological Optics (0.5)
- Optom 412 Clinical Optometry (0.5)
- Optom 414 Physiology of Visual Systems (0.5)
- Optom 415 Ocular Pathology (0.5)
- Optom 408 Optometry Clinic (0.5)
- Optom 427 Optometric Specialties: Aniseikonia and Low Vision Aids (0.5)
- Optom 428 Spring Clinic (1.0)

**Note**

Subject to the availability of programmes students in good standing are required to participate in vision care projects involving up to 400 hours during the period between their fourth and fifth years.

**Year 5**

**Fall Term**

- Optom 500 Optometrical Jurisprudence and Praxis (0.5)
- Optom 501 Physiological Optics (0.5)
- Optom 502 Advanced Clinical Optometry (0.5)
- Optom 504 Ocular Pharmacology (0.5)
- Optom 508 Optometry Clinic (0.5)
- Optom 509 Community Health Optometry (0.5)
- Psych 357 Psychopathology (0.5)

**Winter Term**

- Optom 510 Optometrical Jurisprudence and Praxis (0.5)
- Optom 511 Physiological Optics (0.5)
- Optom 512 Advanced Clinical Optometry (0.5)
- Optom 513 Optometric Communication (0.5)
- Optom 514 Genetics for Optometrists (0.5)
- Optom 518 Optometry Clinic (0.5)
- Optom 519 Community Health Optometry (0.5)

**Note**

Students with a particular interest in and an aptitude for research in physiological optics may substitute Optom 505-517 for Psych 357 and Optom 513. A student is required to complete one or the other of these alternatives.
The Honours Science Programme

The Honours Science programme allows a student to study sciences in greater depth than permitted in the General Science programme, but without as intense a degree of specialization as required in the more specialized programmes such as Honours Biology, Honours Chemistry, etc. Students desiring a somewhat broader background in the Sciences might find this programme more suitable than the more traditional specialized programmes. However, students contemplating graduate study in the traditional disciplines following their undergraduate studies are advised to pursue the more specialized Honours programmes.

Course programmes must be discussed with and approved by the appropriate Department Undergraduate Officer or his delegate.

A 60% cumulative overall average in all Faculty of Science courses is required in programme (1) outlined below; a 60% cumulative average in the field of specialization for all other programmes. This is the same as for all honours programmes in the Science Faculty.

All programmes require the successful completion of 22 or more credits, the number depending on the respective programme, including at least 14 Faculty of Science credits.

No more than 4 credits offered under the "Science" label may be applied to any programme.

One of the five programmes described below should be selected: Programme (1) is non-specialized; programmes (2), (3), (4) and (5) have a field of specialization: Biology, Chemistry, Earth Sciences or Physics respectively. All programmes lead to the degree of "Honours Science".

Specific Requirements

Programme (1)
Honours Science (non-specialized)
Year 1
5 lecture credits, exclusive of laboratory credits. At least two of these must be Science, courses chosen from:
Year 1 Biology courses; Chem 121-122 + labs; Earth 121-122; Phys 111-112 or Phys 121-122 + labs or Phys 162-163 + labs.

Years 2, 3 & 4
4 Science credits per year plus 2 other course-credits per year in Years 2 and 3; 1 other credit in Year 4. Of the total required 14 Faculty of Science credits, at least 10 must be at the 200-level or higher and at least 4 of them other than any Science labelled credits must be at the 300 or 400-level.

Programme (2)
Honours Science (with specialization in Biology)
(For Year 1, see page 197)
Year 2
3 credits from Biology 231, 232, 234, 235, 237, 238, 239. Chemistry 266-267 and 267L
2 other credits (Stat 202 is recommended).

Year 3
2 other credits.

Year 4
4 Science credits at least 2 of which are Biology credits from the 400-level or the list of 300-level courses above. 1 other credit

Programme (3)
Honours Science (with specialization in Chemistry)
(for Year 1, see page 197 under "Chemistry").
Year 2 (see notes below)
3 Chemistry lecture credits, at least 2 of which must be chosen from Chemistry 212, 220, 221, 264, 254, 255. 1 lecture credit to be chosen from Physics, Biology or Earth Sciences. (Not Science-labelled courses) Elective credits to give a total of at least 6 credits in the Year.

Year 3 (see notes below)
3 Chemistry credits at the 300-level or higher. 1 lecture credit to be chosen from Physics, Biology or Earth Sciences (Not Science-labelled courses) 2 Elective credits

Year 4 (see notes below)
2 Chemistry credits at the 300-level or higher. At least 1.0 must be at the 400-level. 2 lecture credits chosen from Physics, Biology, Chemistry or Earth Sciences (Not Science-labelled courses) 1 Elective credit

Note 1
Before graduation a student must obtain at least 20.0 lecture credits.

Note 2
Before graduation a student must obtain at least one lecture credit in each of the following areas of Chemistry: Analytical, Inorganic, Organic, Physical.
Note 3
Before graduation a student must obtain at least 0.5 laboratory credits in each of the four areas of Note 2. Wherever possible, the laboratory chosen should accompany the appropriate lecture-course.

Note 4
All students in Chemistry programmes are also required to register in Chemistry 10 in each term of their programme beyond Year 1.

Programme (4)
Honours Science (with specialization in Earth Sciences)

In total, at least 23.0 credits of which 10 are Earth Sciences credits, selected as indicated below. In addition at least four other Science credits and eight other course-credits must be chosen. Science-labelled courses may not be used for Science course-credits. (Chem 121-122 and 121L-122L, a Year 1 Physics course, Math 113, CS 118 or equivalent must be among these choices). A suggested year by year breakdown is as follows:

(For Year 1, see page 197)

Year 2
Earth 221, 231, 232, 235, 236, 260
1 other Science credit
2 other credits

Year 3
3 or 4 Earth credits at the 300-level (chosen from Earth 331, 332, 333, 336, 342, 345, 360, 370)
At least 1 other Science credit
At least 1 other credit (for a total of 6 credits in Year 3)
Attendance on field trips (Earth 390, Earth 490) is required.

Year 4
4 Science credits of which at least 2 are Earth credits at the 300-level shown above or from the 400-level.
1 other credit.

Programme (5)
Honours Science (with specialization in Physics)

This programme was designed to allow a student the broadest possible selection of courses consistent with specialization in Physics. A total of 22 credits are required, 14.0 of which must be Faculty of Science credits.

The following Honours Courses from Physics and Mathematics should be included.

(For Year 1, see page 197)
the original. Students may transfer from one of these options to the other, for transfer from the three- or the four-year programme, the student must have the necessary course selection and standing required for a major field.

**General Science - Three-year Programme**

The three-year programme BSc requires the successful completion of 15 credits at least 14 of which must be lecture credits. Normal progress is 5 lecture credits per year. At least half of the 15 credits must be in Science and normally no more than 7 are allowed from the same subject area (i.e. no more than 7 Biology credits or 7 Mathematics credits or 7 English credits, etc.). Also, at least 6 of the 15 credits must be at the 200-level or higher.

If students wish to specialize in a particular subject area in Science they are advised to follow the recommendations of Year 1-3 of the four-year programme. Alternatively, a broader selection of science subjects may be chosen but students should be warned not to make their course selection so broad and varied as to find their background of little use following graduation. The responsibility of arranging a programme selection over the three years ultimately rests with the student and he/she should ensure it meets his/her needs. To ensure that proper advice is available and given regarding course selection, the student's programme must be approved at Registration time each year by a Faculty advisor.

Students are encouraged to take at least 4 courses (an average of better than one per year) from non-Science areas such as Arts or Mathematics.

The minimum standard for graduation from the three-year programme will be a cumulative (overall average of 50% calculated for all courses taken (in any year - whether passed or failed).

**Recommended Programme**

**Year 1**

5 lecture credits, exclusive of laboratory credits. At least two of these must be Science courses chosen from:

- Year 1 Biology courses: Chem 121-122 + labs; Earth 121-122; Phys 111-112 or Phys 121-122 + labs or Phys 162-163 + labs.

**Year 2**

5 credits of which 2 or 3 should normally be in Science.

**Year 3**

5 credits of which 2 or 3 should normally be in Science.

The following list, while not complete, indicates some of the courses from which a choice should be made. Since some Departments offer Honours or General equivalents of the same course area, or co-operative or regular versions of the same course area, duplication of subject matter is not allowed. It is usually obvious from the course descriptions where such duplication is possible and care should be taken to avoid it as credit for only one such overlapping course will be allowed (e.g. credit for one of Chemistry 220-221, 226-227; one of Physics 111-112; 121-122, 162-163; etc.). In addition, where Departmental course listings clearly indicate an elective is available only to Arts students, or Engineering students, or Human Kinetics and Leisure Studies students, etc., such courses may not be selected in the General Science programme. Students must also have any necessary prerequisites listed before attempting upper year courses; these are listed in the Departmental descriptions.

(No more than 4 credits may be selected from the courses under the "Science" label).

**Science courses recommended**

*other than Year 1 courses*


**Mathematics courses recommended**

- Mathematics 113, 111a, 111b, 215, or 216, CS 118, 250, 180, 210; AM 101, 111; Stat 204, 205.

**Arts courses recommended**

It is impossible to list all options here since tastes vary. Many students select first or second year options from the following subject areas: Anthropology, Arts, Economics, English, French, Geography, German, History, Philosophy, Political Science, Psychology, Russian, Sociology, Religious Studies. Subject to prerequisites and timetable, a wide range of Arts courses is available.
General Science - Four-year Major Programmes
The four-year programmes require the successful completion of at least 20.0 or more credits for the BSc, the number depending on the respective programme. Of this total at least 18.0 must be lecture credits. At least half of the 20.0 credits presented must be in Science. Students are encouraged to take at least 4 courses (an average of one per year) from non-Science areas such as Arts or Mathematics. No more than 4 credits may be selected under the "Science" label. An official major field (from Biology, Chemistry, Earth Sciences and Physics) must be selected; at least 8 credits from this major field must be completed as specified and normally not more than 10 from the major field area will be allowed.

The only exception to the requirement of a major field is in the General Science and Business programme where a selection of both Business and Science courses are required.

While considerable flexibility to take electives exists in this programme, students must take the courses required by their major Departments (there are at least 8 free credits available in each programme; Departments may have published recommendations regarding electives which should be strongly considered although they are not compulsory).

The minimum standard for graduation from the four-year majoring programmes will be a cumulative (overall) average of 50% calculated for all courses taken (in any year - whether passed or failed) plus a 60% cumulative average for the major field courses. Students who do not maintain their major field average in the four-year programme will be transferred to the three-year ("non-major") programme where a major field average is unnecessary.

Recommended Programme
The selection of courses in upper years will be restricted partly by limitations imposed by the timetable, and partly by the necessity in many courses of having completed prerequisites. Each student's programme must, therefore, be approved by the Undergraduate Officer of the Department of his major field.

The following programmes are those recommended by the department of major study in their fields. The University will make every effort to ensure that the timetable accommodates these programmes.

Biology Major

Year 1
Including Biol 121-122, 121L-122L and Chem 121-122 and 121L-122L (see page 197)

Year 2
Two credits from: Biol 231, 232, 234, 235, 247, 238, 239 Chem 266-267 and 267L
Two other credits

Science
General Science Programme

Year 3
Three or two non-Biology credits (Chem 332-333 and 332L-333L recommended).

Year 4
Five credits at least two of which are 400-level Biology courses or from the above list of 300-level Biology courses.

†Students wishing to apply for the Ontario Department of Education Type A certificate must choose three credits in Biology in Year 3 or take a third Biology credit as an extra course. In Year 4, three Biology credits should be selected.

Note
Some possible electives are shown in the list under the three-year programme. These courses would be suitable choices here. (Physics 301-302 is especially recommended.)

Chemistry Major

Year 1
Including Chem 121-122 and 121L-122L and Math 113 and a full-year Physics course

Year 2†
Chem 226-227 and 226L-227L, 266-267, 267L, 218, 219
2 Elective credits†

Year 3†
Chem 316-316L, 356-357, 356L-357L, 366-366L
2 Elective credits†

Year 4†
Five elective credits to complete the requirements for the degree†

†Electives can be freely chosen provided that before graduation at least two Chemistry credits are obtained at the 300- or 400-level, in addition to the required courses listed above. At least 19.0 lecture credits must be obtained before graduation.

††All students in Chemistry programmes must also register in Chem 10 in each term of their programme beyond Year 1.

Earth Sciences Major

Year 1
Including Earth 121-122 and Chem 121-122 and 121L-122L, and at least 1-1/2 credits from courses discussed in Note 4 (see page 198)
General Science Programme

Year 2
Earth 221, 231, 232, 235, 236, 260
Two elective credits

Note
Students should note that Phys 111-112 is a prerequisite for the Applied Geophysics course Earth 350 given in the third year. Math 113 and an introductory course in computer programming are prerequisites for Earth 355, 458 and 461 given in the third and fourth years.

Year 3
Two or three credits from:
Earth 331, 332, 333, 336, 342, 345, 355, 360, 370,
Two or one course-credits from Science or Mathematics
Arts elective: One credit. Attendance on field trips (Earth 390, Earth 490) is required.

Year 4
Two or three credits from:
Earth 421, 427, 432, 433, 434, 435, 438, 439, 440, 456, 461, 470
Three or two credits from non-Earth Sciences courses

Physics Major (a minimum of 20.0 credits required)

Year 1
(Including Phys 121-122 or 162-163 and Math 113 (see page 197)

Year 2
Phys 222-223 and 222L-223L, 226-227 and 226L-227L
One of: Math 216, 220a, b or a course in computing
One of: Chem 218-219, 266-267, Sci 251-252, Earth 121-122 or 231-232
Elective

Year 3
Phys 324-325
One or two of: Phys 250-251, 352L, 353 and 353L, 358-359, 368-369, 380-381, or 364-365
Two or one of: Math 221a, b or Stat 204-205:
Chem 218-219 or 356-357
Arts or Mathematics Elective

Year 4
Two or three of: Phys 250-251, 352 and 352L, 353 and 353L, 358-359, 362-363, 364-365, 368-369, 480-481, 441
Two or one non-Physics Science credits
Arts or Mathematics Elective

General Science and Business
There is a growing need for graduates who have a competence in the combined disciplines of science and business administration. For those students whose leanings are towards administration in industry, marketing, analysis, etc., the following programme is recommended. The business and economic courses normally provide the prerequisite background for a Master of Business Administration course. Admission requirements for postgraduate studies in Business Administration depend on the admitting university. In some instances, an entrance examination may be required. It is the student's responsibility to obtain information regarding admission from the university of their choice.

The programme is made up of at least 20 credits with 10 required in Science (including at least 4 at the 300-level or higher) and the remainder in Mathematics, Economics and Business Administration. The Business courses are given at Wilfrid Laurier University and may be taken by University of Waterloo students through co-operation between the two Universities; Economics courses are offered by the Department of Economics, University of Waterloo. Because courses for this option are given by several faculties at two universities, timetable changes may occur from time to time. It is the student's responsibility to keep informed of these changes.

These Changes are Effective for Students Entering Year 2 in September 1978

Year 1
5 lecture credits:
At least 2.0 lecture credits must be from Biol 111-112 + labs or Biol 121-122 + labs, Chem 121-122 + labs, Earth 121-122 and Phys 111-112 or 121-122 + labs.
plus
Math 113
Econ 101-102
CS 118 and CS 115

Years 2, 3 and 4
Students must take during years 2 through 4, at least 5 lecture credits from one of the departments in Science, viz. Biology, Chemistry, Earth Sciences or Physics and at least 2 of these credits must be at the 300 level or higher. In addition 3 more lecture credits in Science must be taken and can be chosen from any science offering.

plus at year 2
Econ 191-192
Econ 193-194

plus at Year 3
Stats 202 or Econ 221
Bus 275 (WLU)
Bus 352-362 (WLU)

plus at Year 4
Econ 291-292
Bus 385-395 (WLU)
One credit taken from:
Econ 294, 391, 392, 393, 394, Bus 388 (WLU), 396.
Undergraduate Course Descriptions

Line-up for Bookstore during first week of lectures
Course Description Information

Explanatory Notes and Terminology
Each course description begins with a line of coding as shown in the sample below. The course numbers are prefixed by a subject code, 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.

The course descriptions follow the format of the Timetable Enrollment Report and the Course Offerings List, two documents students use when preregistering. However students should keep in mind that the calendar is not a preregistration document. Information in the calendar is subject to change; students should consult the Course Offerings List and the Timetable Enrollment Report when preregistering.

Sample Course Description

<table>
<thead>
<tr>
<th>Course Number</th>
<th>Term(s) Offered</th>
<th>Type of instruction and Number of hours/wk</th>
<th>Credit weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fr 131</td>
<td>F,S,A</td>
<td>4C, 1L</td>
<td>.5</td>
</tr>
</tbody>
</table>

Course Name — Basic French

Course Description — An elementary course designed to give the student a solid beginning in oral expression in the French language, as well as an understanding of the basics of French sentence structure.

Extra information about course requirements — Prereq: Consent of Department

Terminology

<table>
<thead>
<tr>
<th>Terms Offered</th>
<th>Description</th>
<th>Type of Instruction</th>
</tr>
</thead>
<tbody>
<tr>
<td>F</td>
<td>Fall term</td>
<td>C Lecture</td>
</tr>
<tr>
<td>S</td>
<td>spring term</td>
<td>L Laboratory</td>
</tr>
<tr>
<td>W</td>
<td>winter term</td>
<td>T Tutorial</td>
</tr>
<tr>
<td>J</td>
<td>summer, first half, July</td>
<td>S Seminar</td>
</tr>
<tr>
<td>A</td>
<td>summer, second half, August</td>
<td>D discussion</td>
</tr>
<tr>
<td>M</td>
<td>summer, both terms, July, August</td>
<td>R reading course</td>
</tr>
<tr>
<td>Y</td>
<td>September - April - 8 month session</td>
<td>wkshp workshop</td>
</tr>
<tr>
<td></td>
<td></td>
<td>std studio</td>
</tr>
<tr>
<td></td>
<td></td>
<td>fldlab fieldlab</td>
</tr>
<tr>
<td></td>
<td></td>
<td>prereq prerequisite</td>
</tr>
<tr>
<td></td>
<td></td>
<td>coreq corequisite</td>
</tr>
<tr>
<td></td>
<td></td>
<td>P Practicum</td>
</tr>
<tr>
<td>Subject Codes</td>
<td></td>
<td></td>
</tr>
<tr>
<td>----------------</td>
<td></td>
<td></td>
</tr>
<tr>
<td>AM</td>
<td>Applied Math</td>
<td>ISS</td>
</tr>
<tr>
<td>Anth</td>
<td>Anthropology</td>
<td>Kin</td>
</tr>
<tr>
<td>Arch</td>
<td>Architecture</td>
<td>Lat</td>
</tr>
<tr>
<td>Arts</td>
<td>Arts</td>
<td>MSci</td>
</tr>
<tr>
<td>Biol</td>
<td>Biology</td>
<td>MEnv</td>
</tr>
<tr>
<td>Bus</td>
<td>Business</td>
<td>Math</td>
</tr>
<tr>
<td>Cd St</td>
<td>Canadian Studies</td>
<td>MTHEL</td>
</tr>
<tr>
<td>Ch E</td>
<td>Chemical Engineering</td>
<td>M E</td>
</tr>
<tr>
<td>Chem</td>
<td>Chemistry</td>
<td>Music</td>
</tr>
<tr>
<td>Civ E</td>
<td>Civil Engineering</td>
<td>Optom</td>
</tr>
<tr>
<td>CCiv</td>
<td>Classical Civilization</td>
<td>PACS</td>
</tr>
<tr>
<td>C &amp; O</td>
<td>Combinatorics &amp; Optimization</td>
<td>Phil</td>
</tr>
<tr>
<td>CS</td>
<td>Computer Science</td>
<td>Phys</td>
</tr>
<tr>
<td>Dance</td>
<td>Dance</td>
<td>Plan</td>
</tr>
<tr>
<td>Drama</td>
<td>Drama</td>
<td>PMath</td>
</tr>
<tr>
<td>Earth</td>
<td>Earth Sciences</td>
<td>P SCI</td>
</tr>
<tr>
<td>Econ</td>
<td>Economics</td>
<td>Psych</td>
</tr>
<tr>
<td>Elec</td>
<td>Electrical Engineering</td>
<td>Rec</td>
</tr>
<tr>
<td>Engl</td>
<td>English</td>
<td>RS</td>
</tr>
<tr>
<td>Env St</td>
<td>Environmental Studies</td>
<td>Russ</td>
</tr>
<tr>
<td>Fine</td>
<td>Fine Arts</td>
<td>Sci</td>
</tr>
<tr>
<td>Fr</td>
<td>French</td>
<td>Socwk</td>
</tr>
<tr>
<td>GenE</td>
<td>General Engineering</td>
<td>Soc</td>
</tr>
<tr>
<td>Geog</td>
<td>Geography</td>
<td>Span</td>
</tr>
<tr>
<td>Ger</td>
<td>German</td>
<td>Stat</td>
</tr>
<tr>
<td>Grk</td>
<td>Greek</td>
<td>Sy Da</td>
</tr>
<tr>
<td>Health</td>
<td>Health Studies</td>
<td>Ukran</td>
</tr>
<tr>
<td>Hist</td>
<td>History</td>
<td>Polish</td>
</tr>
<tr>
<td>Ital</td>
<td>Italian</td>
<td></td>
</tr>
</tbody>
</table>
Course Descriptions
Anthropology

Anth 101B 3C 0.5
Human Ecology and Adaptability
This course focuses on various ecological systems which include human populations. Emphasis will be on societal and individual adaptations to environmental problems such as altitude, cold, and fluctuations in food supply.
Formerly Anth 105A

Anth 101C 3C 0.5
Ancient Man the Hunter
This is a general introduction to Prehistoric Archaeology. It examines the evidence for ancient man in the Old World and New World with emphasis on tool making and cultural ecology. The popular view is contrasted with the traditional anthropological approach.
Formerly Anth 105B

Anth 101D 3C 0.5
Cultural Evolution and Human Adaptation
The technological and social transformations of the past 14 million years are examined as uniquely human solutions to the problems of survival in a changing natural and cultural environment. Based on archaeological and comparative ethnological and primatological evidence.
Formerly Anth 105D

Anth 102A 3C 0.5
Introduction to Social and Cultural Anthropology
The dynamic nature of socio-cultural systems is examined. Topics include language, technology, social organization, economics, politics, and religion. Data are drawn from a broad ethnographic base, including both "primitive" cultures and modern developed societies.

Anth 102B 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.
Formerly Anth 105F

Anth 102C 3C 0.5
The Cultural Anthropology of Canada
The principles of cultural anthropology will be taught by using the ethnic cultures in Canada as a descriptive base.
Formerly Anth 105H
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 104 W 3C 0.5
**Language Learning**
First and second language learning are considered from linguistic and anthropological points of view, with emphasis on problems arising in second language learning. Examples stress English, French, and the Native languages of Canada.

Anth 202 F 3C 0.5
**Principles of Social Organization**
An introduction to basic concepts used by social anthropologists for the analysis of social, economic, political, and ideational systems. Recommended to Honours Anthropology students.
*Prereq: Anth 102 or Anth 105 or permission of instructor.*

Anth 203 F 3C 0.5
**Prehistoric Man in North America**
This is a general introduction to North American Archaeology. The traditional cultural ecological approach is compared and contrasted with the more revolutionary ideas recently expounded by popular writers.

Anth 205
**Anthropology of Race and Racism in Canada**
Not offered in 1979-80.

Anth 208 F 3C 0.5
**History of Ethnological Theory**
This course deals with the basic theoretical approaches to the study of the socio-cultural aspect of humankind. Students will be introduced to the works of major anthropological thinkers from the mid-19th century to the present.

Anth 210 F 3C 0.5
**Anthropology of Religion**
An introduction to the way in which anthropologists study the system of behaviour and belief known as religion.

Anth 211 F 3C 0.5
**Anthropology of Religious Movements**
This course will apply anthropological models to understand the formation and growth of cults and religious movements in pre-literate and contemporary society.

Anth 214 Conflict, Feud, and Warfare
Not offered in 1979-80.

Anth 220 Old World Prehistory. The Food Procuring Phases
Not offered in 1979-80.

Anth 221 W 3C 0.5
**Old World Prehistory. The Food Producing Phases**
Examination of the transition to an economy based on food production, the spread of food producing economies, the rise of civilization in the Near East to the early literate periods. Consideration of later prehistoric developments in Africa, Asia, and Europe.
*Not acceptable for Honours Anthropology credit.*

Anth 222 Prehistoric Man in the Great Lakes Area - A Survey
Not offered in 1979-80.

Anth 223 W 3C 0.5
**New World Civilizations**
Problems in cultural dynamics will be considered as exemplified in the rise and effects of the civilizations of Meso and South America.

Anth 227 Peoples of Africa
Not offered in 1979-80.

Anth 228 Peoples of the Pacific
Not offered in 1979-80.

Anth 231 F 3C 0.5
**North American Indians 1**
The society and culture of North American Indian hunters and gatherers (excluding big game hunters dependent upon the horse) is surveyed. The course concentrates on the adaptation exhibited by these peoples at the time they were first contacted by Europeans.
*Prereq: Second year standing (Anth 102 or 105 is desirable)*

Anth 232 W 3C 0.5
**North American Indians 2**
Pastoral (big game hunting dependent upon the horse) and horticultural (farming) societies north of the high civilizations of Mexico are described as they existed when initially contacted by Europeans.
*Prereq: Second year standing (Anth 102 or 105 or 231 is desirable)*

Anth 233 Eskimo Cultures
Not offered in 1979-80.
Anth 236J  W  3C  0.5  
Social and Cultural Change in South East Asia
This course analyzes the traditional social structure as well as changes in social, economic, and cultural spheres in selected Asian countries. Historical perspective will be emphasized. Current topics such as land reform, the consequent changes, or changing values in the traditional societies will also be discussed. 
Prereq: Sociology 101 or Anth 101, 102
Offered at St. Jerome's College

Anth 238J  Caribbean Society
Not offered in 1979-80.

Anth 241  The Contemporary Canadian Indian Scene
Not offered in 1979-80.

Anth 247  F  3C  0.5  
Urban Anthropology
Various approaches to the study of urban centres as undertaken by anthropologists are surveyed. Topics examined include urbanism, urbanization, and urban poverty in pre-industrial and industrial societies. Special emphasis is on Canada. 
Prereq: Anth 102 or Anth 105 or permission of the instructor.

Anth 248  Peasant Societies
Not offered in 1979-80.

Anth 250  S  3C  0.5  
Regional Studies in Archaeology
On location study of archaeological sites and collections in particular regions, focusing on particular sequences, periods or problems. Stress will be on the regional and local settings of prehistoric cultures. Topics and regions will vary from year to year.

Anth 258  W  3C  0.5  
Anthropology and the Future of Man
Anthropological theories pertaining to culture change and cultural evolution are examined in the context of the modern world. Long and short term trends in technology are examined using data from Archeology, Ethnography, History, Technology and Science. 
Prereq: Anth 101 or Anth 102 or permission of the instructor

Anth 260  F  3C,1L  0.5  
Human Evolution
Data, methods, and theory in the study of the origin and evolution of humans are surveyed. Topics will include osteology, growth and development, the fossil record, and genetics. 
Prereq: Anth 101 or Anth 105 or permission of the instructor.

Anth 261  W  3C  0.5  
Primate Behaviour
An introduction to the behaviour of the non-human primates with emphasis on the relevance to the origin of man. Topics will include sexual behaviour, mating systems, aggression, territoriality, and communication.

Anth 263  Evolution of Human Behaviour
Not offered in 1979-80.

Anth 265  Anthropology of Aging
Not offered in 1979-80.

Anth 271  S  0.5  
Archaeological Field Methods
Data gathering techniques will be studied and applied in field work on archaeological sites. Two weeks' of eight hour days involvement with archaeological sites in the Waterloo area. Materials and transportation fee of $20-$30.

Anth 275  F  3C  0.5  
Principles of Archaeology
An introduction to the working assumptions, analytic approaches, and integrative and descriptive methods of archaeological anthropology. 
Recommended to Honours Anthropology students

Anth 283  F  3C  0.5  
Phonology of Non-Linguists
Devising adequate writing systems for unwritten languages. The class will simulate field sessions with an informant who speaks an unfamiliar language.

Anth 285  F  3C  0.5  
Descriptive Grammar 1 - Morphology
A survey of word formation in different languages. Linguistic approaches to the analysis and description of words, with examples and class problems based on a number of actual languages. Consideration will be given not only to languages with a relatively simple morphology, such as Chinese and English, but also to languages like Turkish and Ojibwa.

Anth 286  W  3C  0.5  
Descriptive Grammar 2 - Syntax
How composite utterances are formed in various languages. The syntactic mechanisms used in different languages will be examined in relation to the transformationalist theory that all languages work along basically similar lines. Examples from Eskimo, Latin, Swahili, Ojibwa, English and Japanese will be examined in some detail. 
Prereq: Anth 285

Anth 290  Language and Culture
Not offered in 1979-80
Anth 310 Indians of the Canadian Subarctic
Not offered in 1979-80

Anth 320 Pleistocene Prehistory in the Old World
Not offered in 1979-80

Anth 321 W 3C 0.5
Recent Prehistory in the Old World
Cultural development from the agricultural revolution to
the rise of literacy. Special attention to the development
of agriculture as a means of subsistence and to the rise
of early civilization in the Near East. Primarily for
Honours Anthropology students
Prereq: Anth 275 or permission of the instructor

Anth 322 Prehistoric Man in the Great Lakes Area
Not offered in 1979-80

Anth 330 W 3C 0.5
Cultural Ecology
An examination of the relationships among
environment, technology, society, and culture. The
increasing levels of complexity will be considered in the
context of hunting and foraging bands, horticultural
tribes and chiefdoms, pastoral tribes, and agricultural
peasantry.
Prereq: Full credit in Anth or consent of the instructor

Anth 333 Canadian Communities and Planned Change
Not offered 1979-80

Anth 334 W 3C 0.5
Ethnicity and Ethnic Diversity in Canada
Various approaches to the phenomenon of ethnicity will
be examined and illustrated from a social
anthropological perspective. Special emphasis will be
placed on the ethnography of ethnicity/ethnicities and
on vertical and horizontal differentiation in Canada.

Anth 335 Anthropology and Education
Not offered in 1979-80

Anth 342 Introduction to the Study of Acculturation
Not offered 1979-80

Anth 345, 346, 349
Special Problems in Anthropology
Lecture or seminar in special problems in anthropology.
Topics may include problems in archaeology, physical
anthropology, linguistics, or social/cultural
anthropology and will vary by term and instructor.

Anth 347
Special Topic: Research Seminar in Urban
Anthropology
Students in this seminar will participate in a group
research project dealing with some aspect of our urban
environment. Our data and conclusions will be made
into a film.
Prereq: Anth 247 or permission of the instructor

Anth 350 Sex Roles in Anthropology
Not offered in 1979-80

Anth 355J Ethnic and Cultural Pluralism in World
Perspective
Not offered in 1979-80

Anth 359 Political Anthropology
Not offered in 1979-80

Anth 365 F 3C,1L 0.5
Fossil Man
A detailed examination of the fossil evidence for human
evolution with particular emphasis on interpretation
and reconstruction.
Prereq: Anth 260 or permission of the instructor

Anth 370 W 3C 0.5
Ethnographic Field Methods
The techniques and problems of ethnographic field
work will be explored. Emphasis will be on field work in
contemporary society and students will be expected to
complete a field project on their own.
Prereq: Anth 202 or consent of the instructor

Anth 372 Archaeological Techniques
Not offered in 1979-80

Anth 373 W 3C 0.5
Archaeological Reporting
Various ways of processing archaeological data will be
demonstrated and discussed. The major emphasis will
be on writing up archaeological reports. Primarily for
Honours Anthropology students
Prereq: Permission of the instructor

Anth 375 Genetics and Variability in Human
Populations
Not offered in 1979-80

Anth 376 Human Population Genetics
Not offered in 1979-80.
Anth 377 F 3C 0.5
Early Man in the New World
Prehistoric cultural systems in the Americas prior to the advent of horticulture are studied. The major emphasis is on North American Paleo-Indian cultural-ecological systems.
Prereq: Anth 203, 222, or 322, or permission of the instructor

Anth 449 Honours Seminar
Not offered in 1979-80

Anth 450 Honours Seminar
Not offered in 1979-80

Anth 451 The Formative Years of Cultural Theory
Not offered in 1979-80

Anth 452 Contemporary Cultural Theory
Not offered in 1979-80

Anth 460 W 3S 0.5
Advanced Physical Anthropology
An examination of selected topics of current research interest in physical anthropology. Students will be encouraged to undertake guided research projects.
Prereq: Anth 260 and permission of instructor.

Anth 480 0.5
Theoretical Approaches to Linguistic Description
Different theoretical approaches - stratificational, transformational, and signals grammar, one approach to be emphasized during each offering.
Prereq: Anth 286 or Eng1375 or permission of the instructor. Given on request

Anth 499 Y 1.0
Honours Essay
Directed reading and research in a selected area of anthropology inquiry.
Open only to Honours Anthropology students

Anth 381 Semiology
Not offered in 1979-80

Anth 388 Applied Anthropology
Not offered in 1979-80

Anth 390, 392 Y 1.0
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, 395, 397 S.F,W. 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 401 W 3C 0.5
Comparisons of Systems of Thought

Anth 402 Seminar in the Literature of Social and Cultural Anthropology
Not offered in 1979-80

Anth 420 F 3S 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

Anth 430
Anthropological Perspectives on Stratification and Class
Not offered in 1979-80
School of Architecture

Professor, Director
R. H. Sims, AADip (Hon), (London), RIBA

Associate Professor, Associate Director
A. H. Schrecker, BA (Kalamazoo), MA (Wellesley), PhD (Bryn Mawr), BArch (Toronto)

Associate Professor, Associate Dean (Special Programmes)
D. B. McIntyre, BArch (Toronto) MRAIC

Associate Professor, Undergraduate Officer
B. R. Hunt, AADip (London), RIBA, MRAIC

Professors
L. A. Cummings1, AB (Washington), AM (Missouri), PhD (Washington)
C. K. Knapper2, BA Hons (Sheffield), PhD (Saskatchewan)
P. H. Nash3, BA, MA (UCLA) CE (Grenoble), MCP, MPA, PhD (Harvard), MCP
F. H. Watts, AA Dip (London), MLA (Harvard), RIBA, MRAIC (on sabbatical leave 1974-80)

Associate Professors
A. Banerji, MArch (Calcutta), BArch (North Dakota State) (on sabbatical 1979)
M. Elmitt, National Diploma in Design (High Wycombe)
R. M. Schuster2, BS, MS (North Dakota State), PhD (Iowa State), PEng (sabbatical, 1979)
J. C. Somfay, BArch (N.S.W. Sydney), MArch (Toronto), MRAIC
F. Thompson, BArch, MArch (Toronto), MRAIC
J. Zvilina (on sabbatical leave 1979-80)

Assistant Professors
A. Brown, BArch (Toronto)
O. Dutt, BA (Punjab), BSc (Hon) (London), MS (Wisconsin), PhD (Waterloo), PEng
E. R. Haldenby, BES, BArch (Waterloo)
R. Wiljer, BArch (Waterloo), MA (Ottawa) (on leave 1979-80)

Adjunct Professor
P. J. Stokes, BArch, LLD (Toronto), FRAIC

Adjunct Assistant Professors
E. Gustavs, BArch, MArch (Toronto), MRAIC
G. Schorn, BSc, MASc, PhD (Waterloo) PEng

Visiting Critics
B. Barron, BES, BArch (Waterloo)
D. J. Clark, BArch (Toronto), MRAIC
D. D. McKay, BArch (Toronto)
K. Stevens, BArch, (Manitoba) MArch (Harvard), MRAIC

Special Lecturers
W. G. Dailey, BArch (Liverpool)
D. K. Lansdowne

Faculty members holding cross and/or joint appointments as shown
1Architecture and English
2Architecture and Civil Engineering
3Environmental Studies and Psychology
4Environmental Studies

Course Descriptions

Courses for Bachelor of Environmental Studies (Pre-Professional Architecture)

For Recommended Programme, see page 142.
For Elective Course Requirements, see page 237.

Systems and Measures

Courses in this theme area give preparation leading to the application of mathematics, statistics and computer science as tools for analyzing 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.

Arch 102 F 3C, 2L 0.5
Mathematics
Calculus and Vector Geometry
Elementary differential and integral calculus, applications to problems involving rates of change, areas, volumes, centroids, moments of inertia; introductory vector geometry in two and three dimensions.
Prereq: None

Arch 103 W 3C 0.5
Statistics
Descriptive statistics, sampling, curve fittings, regression and correlation; elementary queuing models, emphasis on the description of environmental processes through observation data.
Prereq: Arch 102 or Math 130

CS 116
Introduction to Computers
See Computer Science course descriptions, page 362.
Arch 163  W  1C,2L  0.5  
**Statics**
Basic concepts, forces, moments, systems of forces, resolution of forces, transformation of couples; resultant of force systems; centre of gravity of a system of forces and of composite bodies; equilibrium, free body diagrams; shears, moments, bar forces in simple trusses; friction, moment of inertia.  
Prereq. Arch 102 or Math 130

Arch 212  F  2C,2L  0.5  
**Computer Science Simulation**
Simulation programming is developed in Fortran so as to build up meaningful architectural simulation concepts necessary in architectural planning. Specific simulation languages such as G.P.S.S. is introduced.  
Prereq: none

Arch 213  S  4C  0.5  
**Computer Generated Design 1**
*Architectural Design 1*
An overview of design logic and computer system requirement currently used for architectural design.  
Prereq: Arch 212 or 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 263  S  2C,2L  0.5  
**Theory of Structures 1**
Historic review of building structures, live and dead loading, wind, snow, earthquake, reactions, stability, and indeterminacy of structural systems; shears, moments and qualitative deflected shapes; bar forces in pin-connected frameworks; approximate methods of analysis for high rise building frames; deflection calculations by the moment area method, influence lines, introduction to arches and cables.  
Prereq: Arch 262

Arch 265  S  1C,2L  0.5  
**Structural Morphogenesis**
Prereq: Architecture students should have completed first year; other students require consent of instructor.

Env St 271
*Introduction to Quantitative Research Methods*
See Env St course descriptions, page 301.

Env St 272
*Computer Programming in Environmental Studies*
See Env St course descriptions, page 301.

Arch 313  F,W  4C  0.5  
**Computer Generated Design 2**
*Architectural Design 2*
Input from various other courses is formulated into comprehensive data structures and simulated behaviour patterns; methods of synthesis problem-solving techniques, analysis of thought processes and protocol analyses. Course is project oriented.  
Prereq: Arch 213

Arch 363  F  2C,2L  0.5  
**Theory of Structures 2**
Advantages, limitations and principles of indeterminate structures; analysis of continuous beams and rigid frames by consistent deformations, moment distribution, slope deflection methods.  
Prereq: Arch 263

Arch 372  W  2C,2L  0.5  
**Mechanical Systems 1**
Plumbing and drainage; heating, ventilating and air-conditioning systems; electrical distribution for power and light; illumination; acoustics, geometrics and materials, vertical transportation systems.  
Prereq: Arch 293, or consent of instructor

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.

Env St 111  *Introduction to the Study of the Future*
See Env St course descriptions, page 300.

Env St 195A  *Introduction to Environmental Studies*
See Env St course descriptions, page 301.

Env St 195B  *Introduction to Environmental Problems*
See Env St course descriptions, page 301.
Env St 200 Field Ecology
See Env St course descriptions, page 301.

Env St 201 Introduction to Environmental and Planning Law
See Env St course descriptions, page 301.

Arch 223 S 2C 0.5
Human Ecology
Social Behaviour as the Human/Physical Interface
The biological and psychological basis of perception and cognition of environments; factors affecting percepts, images and meanings, small groups and the social environment; the structure, functioning and change of neighbourhoods and communities.
Prereq: Env St 195A

Arch 224 F,S 1C,3std 0.5
An Introduction to Landscape Design
An introduction to the design of landscape with emphasis upon the architectural attributes of plants and landforms.
Prereq: Arch 192 or 193 or consent of instructor

Env St 252 Media Tools for Environmental Studies
See Env St course descriptions, page 301.

Env St 253 Media Tools for Environmental Studies - Advanced Level
See Env St course descriptions, page 301.

Env St 333 Parkland Management
See Env St course descriptions, page 301.

Env St 358 Environmental Pollution and its Control
See Env St course descriptions, page 301.

Env St 380 Environmental Studies Workshop
See Env St course descriptions, page 301.

Env St 400 Professional Development in Environmental Management
See Env St course descriptions, page 302.

Env St 401 Environmental Law
See Env St course descriptions, page 302.

Env St 402 Planning and Municipal Law
See Env St course descriptions, page 302.

Env St 411 Alternative Future Environments 1
See Env St course descriptions, page 302.

Env St 412 Alternative Future Environments 2
See Env St course descriptions, page 302.

Env St 417 Land Use History and Landscape Change 1
See Env St course descriptions, page 302.

Env St 418 Land Use History and Landscape Change 2
See Env St course descriptions, page 302.

Env St 444 Land Evaluation and Resources Management
See Env St course descriptions, page 302.

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 of 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.
Arch 192 F IT, IS, 8 Std 1.5

Design Fundamentals and Workshop Design Studio
Development of the means to appreciate the 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.
Prereq: Architecture students only.

Arch 174/175
Experimental Courses
These courses offer a vehicle for introducing additional electives to the programme on a short term basis, and for developing future permanent courses.
Prereq: Consent of instructor

Arch 193 W IT, IS, 14 Std 1.5

Design Fundamentals and Studio
Reinforcement and development of the Arch 192 programme, but with emphasis upon the application of design method and practice to specific architectural problems.
Prereq: Arch 192

Arch 194 W 2 C 0.5

Visual Interdisciplinary Language
Theory and practice of visual form based on formative processes and hierarchical structures. Propositions: form follows process, rotation is a universal form-generating process, symmetric form is a result of an asymmetric process and freedom is the single organizing principle.
Prereq: Consent of instructor

Arch 252 W 0.5

Creative Problem Solving
Development of creative skills through group behaviour in problem solving sessions by: 1) developing a clear understanding of each participant’s own creative thought processes; 2) increasing his/her ability to consciously and deliberately make use of his/her own creative potential; 3) 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 instructors.

Arch 274/275
Experimental Courses
These courses offer a vehicle for introducing additional electives to the programme on a short term basis, and for developing future permanent courses.
Prereq: Consent of instructor

Arch 284, 285 F, W 3 C 0.5

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 3 C, 11 Std 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 193

Arch 293 S 3 C, 11 Std 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.
Prereq: Arch 292

Arch 374/375
Experimental Courses
These courses offer a vehicle for introducing additional electives to the programme on a short term basis, and for developing future permanent courses.
Prereq: Consent of instructor

Arch 384, 385 F, W R 0.5

Architectural Research
This offers a student an opportunity for independent research into architectural problems not offered in the regular curriculum. It allows guided exploration of a specific architectural problem area, of appropriate complexity to the particular term.
Prereq: Approval of (in house) UGAC

Arch 392 W 4 C, 17 Std 2.0

Design Concepts and Studio
Design of complex environments; the effect of legal and administrative controls on the design 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 293
Arch 393  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 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 392*

---

**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 a 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.

Arch 142  W  2C,2L  0.5  
**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  2C,2L  0.5  
**Iconography 2**

A survey of the symbolic Nature of the Environment
A study centred on ancient life to initiate the student into the stream of cultural history and the complex problems of what the artist is, the quality of human existence, culture, environment, as well as the working of the icon from raw state of perceived image to its function as an expressive symbol in poetry, music, dance, architecture and other works of art; a study of modern work in comparison to ancient achievement.
*Prereq: Arch 142*

Arch 244  W  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: Arch 142, 143, and 246 for architecture students and completion of first year for others or consent of instructor*

Arch 245  W,S  1C,2L  0.5  
**Survey of Contemporary Architecture**

Formative years in Europe, early North American scene, study of contemporary works in Architecture, analyses of important buildings of twentieth century. Philosophies of internationally known architects and designers. Study of the development of architectural styles, trends and schools of thought in North America and other countries.
*Prereq: Second year standing*

Arch 246  F  2C,2L  0.5  
**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.
*Prereq: Arch 143*

Arch 247  S  2C,2L  0.5  
**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 modes, 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 disenchanted view of Reason.
*Prereq: Arch 246*

Arch 345  W  2C,1S  0.5  
**Architectural Theory 1850 - 1940**

An introduction to the development of architectural theory from the mid-19th century to the 2nd World War, through an examination of architectural movement and philosophies of the period and of the architecture, built and imagined, which they generated.
*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 fulfilling of natural law is replaced by a notion of order as the creation of the autonomous human will through a study of selected works in philosophy, literature, art and architecture.
*Prereq: Arch 247 or consent of instructor*
The Roots of Civilization
The course attempts to establish a basis for the understanding of the functions of myth, ceremony and ritual, the structures of primitive and ancient built environments, man's attitude towards nature, and his use of the resource environment, the development of classical culture, and the beginnings of science.  
Prereq: Arch 346 or consent of instructors

Courses for Bachelor of Architecture
(For Recommended Programme, see page 143)
The courses for the Bachelor of Architecture Programme 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.

Arch 452  F  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

Arch 455  W  2C  0.5
Management and Estimating  
Exposure of the student to the administrative responsibilities of the practicing architect's work in the building industry, which includes: bidding, bid opening and analysis; contract award; administration of the contract; contractors organization; sub-contractors; labour relations, estimating and cost control. 
Prereq: BES standing

Structural Synthesis 1
Steel and Concrete Design
Design and behaviour of structural steel systems, application of current building specifications, proportioning structural elements based on pertinent design considerations, bolted and welded; criteria for choosing steel systems; introduction to plastic design.  
Prereq: BES standing

Arch 463  W  2C,2L  0.5
Structural Synthesis 2
Concrete and Timber Designs
Design and behaviour of structural concrete systems, application of building specifications; analysis and design of concrete elements using ultimate strength principle; criteria for choosing structural concrete systems; introduction to prestressed concrete. Behaviour and design of modern wood structures; fasteners, ring connectors and their significance in timber construction; proportioning and design of sawn and laminated timber members.  
Prereq: Arch 462

Arch 472  F  2C  0.5
Mechanical Systems 2
Heating, ventilating and air conditioning systems for buildings; plumbing and drainage; electrical distribution for power and light in buildings; illumination; acoustics, geometries and materials; and vertical transportation systems.  
Prereq: Arch 372

Arch 474/475
Experimental Courses
These courses offer a vehicle for introducing additional electives to the programme on a short term basis, and for developing future permanent courses.  
Prereq: Consent of instructor

Arch 484, 485  F,W  3R  0.5
Architectural Research
This offers a student an opportunity for independent research into architectural problems not offered in the regular curriculum. It allows guided exploration of a specific architectural problem area, of appropriate complexity to the particular term. 
Prereq: Approval of (in house) UGAC
Arch 492, 493 F.W 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 projects 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.

*Prereq: BES or its equivalent*

Arch 554 W 3C 0.5

**Development and Financing**
Introduction to the important determinants of the development, growth and re-planning of the various man environments, including development law, land use development, land use planning, appraisal, mortgage lending and accounting.

*Prereq: Arch 455*

Arch 555 S 2C 0.5

**Architectural Practice**
*The Profession*
Discussion of the legal and ethical aspect 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.

*Prereq: BES standing*

Arch 563 W 3C 0.5

**Suspended and Space Structures**
State-of-the-art review of cable-suspended construction. Analysis of cable networks, basic equations. Effect of live loads on cables; dynamic considerations. Double cable systems; synclastics and anticlastic surfaces. Cable-stayed systems; analysis of space structures; space frames and roof systems; one and two-way design.

*Prereq: 4B architecture standing or equivalent*

Arch 574/575

**Experimental Courses**
These courses offer a vehicle for introducing additional electives to the programme on a short term basis, and for developing future permanent courses.

*Prereq: Consent of instructor*

Arch 584, 585 W,S 3R 0.5

**Architectural Research**
This offers a student an opportunity for independent research into architectural problems not offered in the regular curriculum. It allows guided exploration of a specific architectural problem area, of appropriate complexity to the particular term.

*Prereq: Approval of (in house) UGAC*

Arch 592, 593 W,S 32C 3.0 each

**Design Studio**
The course provides 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 8 (4b) and all research work completed by the end of the 8 month co-op work term 5. Terms 9 and 10 (5a and 5b) will be spent developing the thesis for presentation during term 10. The thesis is to be a vehicle for thinking and design at an innovative level. Thus considerable emphasis is placed on both theory and development of design solutions.

*Prereq: 492 and 493*

**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 inter-disciplinary communications.

Electives are divided into the following two categories:

(TE) Theme Elective (BES Degree) courses within the Faculty of Environmental Studies which deal with ecological issues. Theme Elective (BArch Degree) any course within the School of Urban and Regional Planning.

Each student pursuing a BES degree must have accumulated one and a half-course credits in the theme area of Ecology by or before his/her 6th academic term.

Each student pursuing a BArch degree must have one half course credit in the theme area of Planning by or before his/her 10th academic term.

(FE) Free Elective Courses selected by the student without restrictions as long as the course is approved by Senate.

*Note*
Department approval is mandatory for both TE and FE.
Arts

Professors
W. Klaassen, BA (McMaster), BD (McMaster Divinity School), DPhil (Oxford) G
P. H. Smith, Jr., BA (Harvard), PhD (Pennsylvania) G
D. E. Smucker, BA (Bluffton), BD (Princeton Theological Seminary), MA, PhD (Chicago) G

Research Professor
G. T. Barrett-Lennard, BSc, BA (Western Australia), PhD (Chicago) G

Lecturers
C. C. Wang, BS (Taiwan Provincial Chung-Hsing University), BA, MA (National Taiwan University)

Course Descriptions

Courses designated “Arts”, those listed below, usually cover some topics and themes of general interest to several disciplines and their presentation is often made with this interdisciplinary perspective in view. With the exception of Chinese language and literature courses, Arts courses are elective courses in General and Honours programmes and do not satisfy either the Group A or Group B requirements. Chinese language courses with the Arts designation satisfy the Aii requirement. Arts courses are administered through the Office of the Dean of Arts.

Arts 105 Introduction to the Science of Man
Not offered in 1979-80

Arts 122G/123G F,W 2C,1D 0.5
Quest for Meaning in the 20th Century 1 and 2
Against the background of rapidly shifting values in western culture, this course asks the student to examine his or her perspective and then face the resources of others in answering the question of Who am I? What is my obligation to society? What is my relationship to the natural world? Is there an ultimate meaning to life? Teaching methods include personal statements, thematic and biographical books and films.

Arts 190/191 0.5/0.5
Introductory Chinese
A course designed to impart a knowledge of the basic structure and grammar of modern Chinese. Emphasis will be divided equally between reading and conversation. The student will be expected to master a minimum of 500 characters. Limited to students with no prior knowledge of Chinese.
Prereq: Permission of instructor, in addition, Arts 190 is a prereq for Arts 191

Arts 200G Issues in Mass Communication 1
Not offered in 1979-80.

Arts 201G Issues in Mass Communication 2
Not offered in 1979-80.

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. Applications will include word indexes, text concordances, methods of computer-aided text comparison. Arts 212 will stress data management, JCL, SORTing, and the use of programme utilities.
No previous knowledge of computing is assumed. 212 presupposes 211 or permission of the instructor.

Arts 215 Y 3C 1.0
Man in Crisis (Literary Views)
A critical study of such themes as freedom vs. happiness, nihilism, collectivism vs. individualism, old tablets vs. utopias, alienation, earthbound fragmentation vs. the transcendental in the artistic writings of Kafka, Brecht, Hesse, Nietzsche, Solzhenitsyn, Dostoevsky, Zamiatin, Camus, and others. Taught in English.
Prereq: none

Arts 215A F 3C 0.5
Man in Crisis 1 (Literary Views)
A critical study of Dostoevsky's The Grand Inquisitor, Nietzsche's Thus Spake Zarathustra, Tolstoy's What Man Live By, and works by Aldous Huxley, Zamiatin, Turgenev, and Andres. The two major themes are Utopia, the yearning for and the shape of perfectibility, and Nihilism, the denial and/or destruction of "Old Tablets" or "God is dead."

Arts 215B W 3C 0.5
Man in Crisis 2 (Literary Views)
A critical study of Brecht's The Caucasian Chalk Circle, Kafka's The Metamorphosis, and works by Ibsen, Hesse, Dostoevsky, Tolstoy, and Solzhenitsyn. The two major themes are Nihilism (see above) and Alienation, the divided self in exile, or the inability to give and to accept love.

Arts 219G W 0.5
Dissent
A study of individuals who emerge in every society to challenge the prevailing consensus as advanced agents of a new cultural outlook. Consideration will be given to Socrates, Jeremiah, Jesus, Galileo, Conrad Grebel, Marx, Wilberforce, Woodsworth, Riel, Gandhi and Martin Luther King. Through these studies the course will formulate a conception of innovation and social change.
Arts 220R  F  3C  0.5
Chinese Thought and Culture 1
An examination of traditional culture, institutions and
the modern development of China as the context for the
examination of contemporary Chinese society.
Prereq: none

Arts 221R  W  3C  0.5
Chinese Thought and Culture 2
An investigation of the dynamics of the new China:
education, medicine, the arts, the position of women,
foreign policy, the Cultural Revolution and subsequent
developments, rural and urban organization, the role of
the army, the role of the Chinese Communist Party, and
the philosophy of Mao Tse Tung.
Prereq: Arts 220R or consent of instructor.

Arts 230G  0.5
Non-Violence and Political Reality
This course will concentrate on the question of the
possibility 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.

Arts 249J  J,Y,  1.0
Current Problems in Family Life Education
The course will examine human sexuality from a
biological, psychological, and social perspective. The
significant principles of sex education and some of the
most relevant methods and programmes will be
discussed as well.

Arts 250J  A  1.0
Basic Issues in Family Life Education
This course will study marriage and the family from
psychological, sociological, philosophical and
theological perspectives. Methods for incorporating
significant knowledge about marriage and the family
into family life programmes will also be given attention.

Arts 241R  F  3C  0.5
Art and Society 1
An examination of man and society through the arts. Art
as need: personal expression, display, celebration,
communication. Themes of love and relatedness, death
and illness, anxiety and despair, politics and ideology,
festivity and fantasy.

Arts 242R  W  3C  0.5
Art and Society 2
A continuation of Arts 241R.
Prereq: Arts 241R or consent of instructor

Arts 271G/272G  J,A  3C  0.5/0.5
Introduction to Peace Research 1 and 2
This course will focus on the current basic issues
including personality and aggression, international
tension, cause of war and the predictability of war,
United Nations voting patterns, disarmament studies,
and case studies in non-violence and peace activism.

Arts 290/291  0.5/0.5
Intermediate Chinese
This course is designed to extend the knowledge of the
structure and grammar of Mandarin Chinese beyond
the base provided by Arts 190/191.
Prereq: Arts 190/191; Arts 290 is a Prereq. for Arts 291

Arts 320R/321R  F/W  3C/3C  0.5/0.5
Special Topics in Chinese Thought and Culture
An examination in depth of selected issues growing out
of Arts 220R/221R which influence or determine
cultural patterns in modern China.

Arts 360  Y  3C  1.0
Taoism
A study of the TAO TE CHING and the CHUANG TZU
that involves a search for an understanding of their
profound insights on the nature of life, an appreciation
of their literary forms, and consideration of their
influence on Chinese culture.
Some reading knowledge of Chinese required.

Arts 381  Y  3C  1.0
Confucianism
This course involves a careful literary analysis of the
basic source materials upon which Confucianism was
built - The Analects, The Mencius, The Great Learning,
and The Doctrine of Man.
Some reading knowledge of Chinese required.

Arts 391/392  3C  0.5/0.5
Classical Chinese
A study of the grammatical structure of classical
Chinese literature, based on a critical analysis of
selected readings from seminal works in the
pre-modern literary, historical and philosophical
traditions of China.
Prereq: Arts 190/191 or permission of the instructor.

Arts 397a/397b  F,W  0.5/0.5
Directed Reading in Chinese Classic Literature
Advanced study in Chinese classic literature.
Prereq: Arts 391/392 or permission of instructor

Arts 398G/399G
Special Topics in Peace and Conflict Studies
**Department of Biology**

Professor, Chairman of Department  
J. K. Morton, BSc, PhD (Durham), FLS

Professor, Associate Chairman of the Department  
J. E. Thompson, BSA (Toronto) PhD (Alberta)

Professor, Graduate Officer  
A. D. Harrison, MSc, PhD (Capetown)

Professor, Graduate Officer  
C. H. Fernando, BSc (Ceylon), DPhil (Oxford)

Associate Professor, Undergraduate Officer  
H. R. N. Eydt, MSc, PhD (McMaster)

Assistant Professor, Undergraduate Officer  
J. C. Carlson, MSc (Massachusetts)

Assistant Professor, Undergraduate Officer  
W. R. Hawthorn, MSc (McMaster), PhD (W.Ont.)

Professors  
C. R. Barnes, BSc (Birmingham), PhD (Ottawa)  
H. B. N. Hynes, PhD, DSc (London), ARCS, FRSC  
W. B. Kendrick, BSc, PhD (Liverpool)  
J. Kruuv, MSc (Waterloo), PhD (W.Ont.)  
J. J. Pasternak, MA (Toronto), PhD (Indiana)  
G. Power, BSc (Durham), PhD (McGill)

Associate Professors  
R. D. Beauchamp, BA (McMaster), MA, PhD (Brown)  
J. C. H. Carter, BA (Toronto), MSc, PhD (McGill)  
A. M. Charles, MSc, PhD (Manitoba)  
R. G. H. Downer, MSc (Queen’s Belfast), PhD (W.Ont.)  
E. B. Dumbroff, MForestry, PhD (Georgia)  
H. C. Duthie, BSc, PhD (Wales)  
W. E. Issniss, MSA (Toronto), PhD (Michigan State)  
A. G. Kempston, MSA (Toronto), PhD (Michigan State)  
C. I. Mayfield, BSc, PhD (Liverpool)  
P. E. Morrison, MSc (W.Ont.), PhD (McMaster)  
G. G. Mulamoottil, BSc (Mysore), MSc (Bombay), PhD (Delhi)  
J. Sivak, LScO (Montreal), MS (Indiana), PhD (Cornell)  
S. M. Smith, MSc (McMaster), PhD (Manitoba)  
J. B. Theberge, BSc (Georgia), MSc (Toronto), PhD (Br.Col.)  
K. Zachariah, BSc (Madras), BA Hons (Oxford), MA, PhD (Princeton)

Assistant Professors  
N. Bols, BSc (S Fraser), MSc (Br.Col.), PhD (Toronto)  
M. Globus, MSc (McGill), PhD (Toronto)  
R. J. Hebda, BSc (McMaster), PhD (Br.Col.)  
J. R. Lepock, MS (W. Virginia), PhD (Penn. State)  
C. A. Paterson, MSc (Alberta), PhD (California, Davis)  
J. C. Semple, BSc (Tufts), MA, PhD (Washington U, St Louis)  
L. W. Stobbs, MSc (Brock), PhD (Guelph)

Adjunct Faculty  
R. W. McCauley, MA (Toronto), PhD (W. Ont.)  
Wilfrid Laurier University

Faculty members holding cross appointments as shown  
1Biology and Earth Sciences  
2Biology and Physics  
3Biology and Urban and Regional Planning  
4Biology and Optometry

**Course Descriptions**

**Biology**

All Honours Biology students who have completed their third year are required to participate in an off-campus field course (Biol 450 or 498) before entering Year 4. These courses are held either in April (following examinations but before the end of term) or the following September (after Labour Day). The cost will range from $50 to $200 per student.

**Note**

The Huntsman Marine Laboratory, St. Andrews, New Brunswick offers a summer course “Introduction to Marine Biology”. This course will be accepted as 0.50 transfer credit towards a BSc if taken by students of the University of Waterloo.

**Biol 111** F 2C 0.5  
**Introductory Biology 1**  
An introduction to basic concepts in biology, including aspects of genetics, evolution and plant biology. 
(For all students other than those intending to major in Biology or to enter the School of Optometry)

**Biol 111L** F 3L 0.25  
**Introductory Biology 1 Laboratory**  
A laboratory course only for students taking Biology 111. Take-home problems and/or assignments will alternate with in-house labs. 
(For all students other than those intending to major in Biology or to enter the School of Optometry)

**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. 
(For all students other than those intending to major in Biology or to enter the School of Optometry)
Biol 112L  W  3L  0.25
Introductory Biology 2 Laboratory
A laboratory course only for students taking Biology 112. Labs. on alternate weeks.
(For all students other than those intending to major in Biology or to enter the School of Optometry)

Biol 121  F  2C  0.5
Introduction to Biology 1
The principles of biology are explored at the organismic level. Topics include: evolution, natural selection and phylogeny; structure and function of the major groups of animals, plants and microorganisms; ecology of populations and communities.
(For Science students intending to major in Biol or to enter the School of Optometry)

Biol 121L  F  3L  0.25
Introduction to Biology 1 Laboratory
For students taking Biol 121.

Biol 122  W  2C  0.5
Introduction to Biology 2
The principles of biology are explored at the cellular and sub-cellular level. Topics include: cell structure and function; photosynthesis; cell metabolism; cell division; genetics; molecular biology and developmental biology.
(For Science students intending to major in Biol or to enter the School of Optometry)

Biol 122L  W  3L  0.25
Introduction to Biology 2 Laboratory
For students taking Biol 122.

Biol 151  F  2C,3L  0.5
Introductory Cell Physiology
An introduction to the principles of cell physiology with emphasis on human systems and their basic physiological processes.
(Primarily for students in Kin. Available to all students other than those intending to major in Biol or enter the School of Optometry.)

Biol 152  W  2C,3L  0.5
Introductory Human Physiology
A study of the physiological processes of principal organ systems in the human body.
(Primarily for students in Kin. Available to all students other than those intending to major in Biol or enter the School of Optometry.)

Biol 201  Y  2C,3L  1.0
Anatomy, Histology and Embryology
A survey of functional mammalian anatomy and histology, with particular emphasis on the human, and an introduction to basic embryology.
(For Optometry Students only)

Biol 203  F  2C,3L  0.5
Human Physiology
An integrated study of basic physiological processes with particular emphasis placed on the cardiovascular and respiratory system. Other topics which will be discussed include digestion, excretion and endocrinology.
Not open to students who have taken Biol 342 (Available to other students except those whose major field is Biol)

Biol 204  W  2C,3L  0.5
Human Physiology
A detailed study of physiological processes associated with nerve and muscle function, and consideration of the integrative role of the central nervous system.
Not open to students who have taken Biol 342 (Available to other students except those whose major field is Biol)

Biol 231  F  3C/3d/3lab  0.5
Concepts of 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.
Field trips as required

Biol 232  F  2C,3L  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.
Prereq: Biol 111-112, 111L-112L or 121-122, 121L-122L

Biol 234  W  2C,3L  0.5
Vascular Plants
An introductory course which will survey the evolution, morphology, ecology and importance to man of the vascular plants.
Prereq: Biol 111-112, 111L-112L or 121-122, 121L-122L

Biol 235  Y  2C,3L  1.0
Fundamentals of Microbiology
Introduction to fundamental theories, principles and methods of microbiology. Structure, systematics, growth and metabolism of microorganisms. Outline of the major groups of microorganisms. Discussion of their role in natural habitats, industrial processes and disease.
Prereq: Biol 111-112, 111L-112L or 121-122, 121L-122L
(Only for students in Biol Honours Programmes and 4-year Biol majors)
**Course Descriptions**

**Biology**

**Biol 237** F 2C,3L 0.5
**Introductory Invertebrate Zoology**
A study of the functional anatomy of selected invertebrate types with special emphasis on the various grades of organization and development in the different phyla.
Prereq: Biol 111-112, 111L-112L or 121-122, 121L-122L

**Biol 238** W 2C,3L 0.5
**Introductory Vertebrate Zoology**
Comparative functional anatomy and development of selected vertebrate types, with special emphasis on the broad aspects of evolution within this group.
Prereq: Biol 111-112, 111L-112L or 121-122, 121L-122L

**Biol 239** W 2C,3L 0.5
**Cytogenetics**
Chromosomes as the physical basis of heredity. Chromosomal mechanisms in mitosis and meiosis. The origin, inheritance and adaptive significance of aberrations and changes in number. Variant chromosomal systems.
Prereq: Biol 111-112, 111L-112L or 121-122, 121L-122L

**Biol 245** F 2C,3L 0.5
**General Microbiology 1**
History and scope of microbiology. Study of the characteristics of bacteria and other microorganisms.
(Available to students excluded from Biol 235)

**Biol 246** W 2C,3L 0.5
**General Microbiology 2**
Relationships of microorganisms to man and his environment.
Prereq: Biol 245
(Available to students excluded from Biol 235)

**Biol 247** F 2C,3L 0.5
**Introductory Invertebrate Zoology**
A study of the functional anatomy of selected invertebrate types with special emphasis on the various grades of organization and development in the different phyla.
(Not available to Hons Biol or Hons Biol and Chem students).

**Biol 301** Y 2C,3L 1.0
**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.
(For Optometry students only)

**Biol 331** W 2C,3L 0.5
**Vertebrate Zoology**
Major topics in vertebrate zoology as exemplified by both living and fossil members of the subphylum Craniata.
Prereq: Biol 238

**Biol 332** W 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 237 or 247

**Biol 333** F 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 237 or 247

**Biol 334** F 2C,3L 0.5
**The Flowering Plants**
(Students entering this course are required to make a flowering plant collection. Instructions should be obtained from the Herbarium prior to the summer break.)

**Biol 335** F 2C,3L 0.5
**Identification and Variety of Microorganisms**
Principles of classification and identification of microorganisms. Identification procedures and systems. The study of selected groups of transitional microorganisms.
Prereq: Biol 235 or permission of instructor

**Biol 337** W 2C,3L 0.5
**Microorganisms in Foods**
Food preservation, spoilage, poisoning and modern concepts in quality assurance programmes 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 335 or permission of instructor

**Biol 338** W 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 234

**Biol 340** W 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 341  F  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 111-112, 111L-112L or 121-122, 121L-122L*  
*Coreq: Chem 332-333*

Biol 343  F  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 111-112, 111L-112L or 121-122, 121L-122L*

Biol 345  W  2C,3L  0.5  
**Plant Physiology**
An integrated study of plant function: the dynamics of nutrient and water movement, photosynthesis, control mechanisms of growth and development.  
*Prereq: Biol 234*  
*Coreq: Chem 332-333*

Biol 346  F  2C,1T  0.5  
**Population Ecology 1**
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 231 and Stat 202*

Biol 347  F  2S,3L  0.5  
**Mycology 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 232*

Biol 348  F  2C,3L  0.5  
**Vertebrate Physiology 1**
A general study of selected physiological topics in vertebrates including nutrition, digestion, respiration, circulation and endocrinology, osmoregulation and excretion.  
*Not open to students who have taken Biol 203, 204*

Biol 349  W  2C,3L  0.5  
**Vertebrate Physiology 2**
A general study of selected physiological topics in vertebrates including nerve and muscle physiology, endocrinology, osmoregulation and excretion.  
*Not open to students who have taken Biol 203, 204*

Biol 430  F  2C,3flab/T  0.5  
**The Analysis of Communities**
Sampling procedures to estimate abundance and distribution of organisms in time and space. Methods to analyze succession. The classification and ordination of ecosystems. The response of ecosystems to exploitation. The role of biological management in conservation programmes.  
*Prereq: Biol 231 and Stat 202*

Biol 431  W  2C,3flab/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 346*

Biol 432  Y  2C,3L  1.0  
**Microbial Ecology**
The roles of microorganisms in selected habitats including fresh water, soil, plants and animals will be studied. Microbial functions in nutrient cycling, biodegradation, and symbiotic and parasitic relationships will also be examined.  
*Prereq: Biol 235*

Biol 433  Y  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 434  W  2C,3L  0.5  
**Genetics**
A survey of genetics with emphasis on bacterial and bacteriophage genetics and the molecular basis of gene action.  

Biol 435  Y  2C,3L  1.0  
**Microbial Physiology**
The study of microorganisms with special reference to the physiology and metabolism of bacteria, cell-permeability, macromolecular biosynthetic processes, cellular regulatory mechanisms, quantitative experimental methodology.  
*Prereq: Biol 235, Chem 332-333*

Biol 436  F  2C,3L  0.5  
**Quaternary Ecology**
A consideration of the Quaternary environment. Pollen, plant macrofossil and faunal remains as indicators of past environments. Relationship of fossil assemblages to modern ecosystems. Pollen analysis and the interpretation of fossil deposits.  
*Prereq: an introductory course in biology or geology, or permission of the instructor.*
Biol 437 W 3C/S 0.5  
**Biosystematics and Evolution**  
A study of the processes of evolution: the differentiation of populations and the origin of new forms of life.  
*Prereq: Biol 239*

Biol 440 F 2C,3L 0.5  
**Plant Growth and Development**  
A study of the plant hormones and the mechanisms that control growth, dormancy and development.  
*Prereq: Biol 345*

Biol 441 W 2C,3L 0.5  
**Stress Physiology and Aging in Plants**  
A study of stress tolerance and aging in plants.  
Mechanisms of adjustment to temperature, moisture, salt and chemical stress will be emphasized.  
*Prereq: Biol 345*

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 337*

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 335*

Biol 445 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 347*

Biol 446 W 2C,3L 0.5  
**Phycology**  
A study of selected topics in the biology of algae.  
*Prereq: Biol 232*

Biol 447 F 3C 0.5  
**History of Biology**  
The development of biological thought from Greek and Roman times to the present; i.e. from classification to the present experimental approach.  
*(Not to be taken in conjunction with Sci 400)*

Biol 448 F 2C,3L 0.5  
**Developmental Biology**  
Analysis of embryonic development of selected organisms with emphasis on growth and the processes of sub-cellular, cellular and organ differentiation stressing recent experimental methodology.  
*Prereq: Biol 235, 451*

Biol 449 W 2C,3L 0.5  
**Virology**  
The nature of viruses and their interaction with their plant, microbial and animal hosts.  
*Prereq: Biol 235, 451*

Biol 450 F 2C,3S/fldlab 0.75  
**Aquatic Biology**  
An introduction to physical, chemical and biological oceanography. A study of the flora and fauna of selected aquatic environments. Includes an intensive 2-week field course at Huntsman Marine Laboratory, St. Andrews.  
*N.B. Limited to 24; priority will be given to Honours students.*  
*Prereq: Biol 332, 333*

Biol 451 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 235*

Biol 452 F 2C,3L 0.5  
**Comparative Animal Physiology 1**  
A comparative study of respiratory, circulatory and endocrinological systems of animals: emphasis will be placed on invertebrate groups.

Biol 453 W 2C,3L 0.5  
**Comparative Animal Physiology 2**  
A comparative study of the endocrine and reproductive systems of mammals. Major topics include hormone assay, chemistry, regulation of secretion, mechanism of action, neurosecretion and reproductive cycles.

Biol 498 F or W fldlab 0.25  
**Field Course**  
Required of all Honours Biology students except those who take Biol 450. This field course may be any of several arranged by the Department, and should be taken after completion of the 3rd year.

Biol 499 Y 1.0  
**Senior Honours Project**  
The aim of this course is to provide able undergraduate students the opportunity to pursue original research, under the close supervision of a member of the Biology department. The results of this study will be presented in thesis form and will be critically examined by members of this and, where pertinent, other departments. Before selecting this course students must obtain approval for doing so from both the professors under whose direction they wish to work and the undergraduate officers in Biology. Normally, only students attaining at least a 75% average in the major field(s) will be accepted into this course.  
*Graded on a Credit/No Credit basis.*
Canadian Studies

Professor, Chairman of the Canadian Studies Group
J. M. Wilson, BA, MA (Toronto)

Assistant Professor, Director of the Programme
S. E. McMullin, BA, MA (Carleton), PhD (Dalhousie)

Members of the Canadian Studies Group
Professors
D. W. Hoffman, BSA, MSA (Toronto), PhD (Waterloo)
J. H. Hotson, BA (Colorado College), MA, PhD (Penn)
H. MacKinnon, BA (Montreal), PhL, STL (Gregorian), MA (Toronto), DPhil (Oxford)
W. U. Ober, BA (Washington and Lee), PhD (Indiana)
L. H. Russwurm, BA, MA (W. Ont.), PhD (Illinois)

Associate Professors
J. R. Dugan, BA, MA (Toronto), PhD (Yale)
S. M. Weaver, BA, MA, PhD (Toronto)
K. Westhues, BA (Conception), MA, PhD (Vanderbilt)

Participating Faculty (1978-79)
Professors
R. R. Krueger, BA, MA (W. Ont.), PhD (Indiana)
J. M. Wilson, BA, MA (Toronto)

Assistant Professors
S. E. McMullin, BA, MA (Carleton), PhD (Dalhousie)
P. Socken, BA (Toronto), MA (Iowa), PhD (Toronto)

Lecturer
S. T. Burt, RA, MA (Waterloo)

Guest Lecturers
Wallace Clement, Sociology, McMaster University

The core course for each year of the programme is an inter-disciplinary study of Canadian problems, offered either in a lecture/tutorial format or a seminar format (depending on the number of students registered), and staffed by interested faculty members of the participating departments and of the University and by eminent scholars from other parts of Canada who will visit the University for brief or extended periods during the year.

Core Courses

Cd St 201 F 2C,1S 0.5
Social Regionalism
An interdisciplinary course offered both through lectures and discussion groups devoted to the Canadian social and physical environments. The course works from the assumption that regional identities are varied and complex in Canada, and that an understanding of this complexity is essential in the process of dealing with Canadian problems.
### Economics

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>Econ 100A/B</td>
<td>Introduction to Modern Economics</td>
</tr>
<tr>
<td>Econ 101</td>
<td>Introduction to Microeconomics</td>
</tr>
<tr>
<td>Econ 102</td>
<td>Introduction to Macroeconomics</td>
</tr>
<tr>
<td>Econ 241</td>
<td>Cost-Benefit Analysis and Project Evaluation</td>
</tr>
<tr>
<td>Econ 263</td>
<td>Economic History of Canada</td>
</tr>
<tr>
<td>Econ 333</td>
<td>Interregional Economics</td>
</tr>
<tr>
<td>Econ 341</td>
<td>Public Finance</td>
</tr>
<tr>
<td>Econ 343</td>
<td>Urban Economics</td>
</tr>
<tr>
<td>Econ 347</td>
<td>Industrial Organization</td>
</tr>
<tr>
<td>Econ 351</td>
<td>Labour Economics</td>
</tr>
<tr>
<td>Econ 353</td>
<td>Population Economics</td>
</tr>
<tr>
<td>Econ 355</td>
<td>Economics of Energy and National Resources</td>
</tr>
<tr>
<td>Econ 363</td>
<td>Contemporary Canadian Problems</td>
</tr>
<tr>
<td>Econ 364</td>
<td>Contemporary Canadian Problems</td>
</tr>
</tbody>
</table>

### English

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>Engl 205R</td>
<td>The Canadian Short Story</td>
</tr>
<tr>
<td>Engl 214</td>
<td>Themes in Canadian Literature</td>
</tr>
<tr>
<td>Engl 215</td>
<td>Canadian Regional Literature</td>
</tr>
<tr>
<td>Engl 313</td>
<td>Canadian Literature to 1920</td>
</tr>
<tr>
<td>Engl 314</td>
<td>Canadian Poetry Since 1920</td>
</tr>
<tr>
<td>Engl 315</td>
<td>Canadian Prose Since 1920</td>
</tr>
<tr>
<td>Engl 316</td>
<td>Canadian Drama</td>
</tr>
<tr>
<td>Engl 415</td>
<td>Major Canadian Writers</td>
</tr>
<tr>
<td>Engl 495</td>
<td>Senior Honours Essay (Canadian Literature option)</td>
</tr>
</tbody>
</table>

### French

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fr 151</td>
<td>Basic French (For students who have not passed the equivalent of Year 5 French)</td>
</tr>
<tr>
<td>Fr 152</td>
<td>Basic French (For students who have not passed the equivalent of Year 5 French)</td>
</tr>
<tr>
<td>Fr 191</td>
<td>French Language and Literature</td>
</tr>
<tr>
<td>Fr 192</td>
<td>French Language</td>
</tr>
<tr>
<td>Fr 205</td>
<td>Spoken French</td>
</tr>
<tr>
<td>Fr 206</td>
<td>Spoken French</td>
</tr>
<tr>
<td>Fr 207</td>
<td>Spoken French</td>
</tr>
<tr>
<td>Fr 208</td>
<td>Spoken French</td>
</tr>
<tr>
<td>Fr 250</td>
<td>Intensive Language Training</td>
</tr>
<tr>
<td>Fr 273</td>
<td>Aspects of Quebec</td>
</tr>
<tr>
<td>Fr 274</td>
<td>Survey of French-Canadian Literature</td>
</tr>
<tr>
<td>Fr 300</td>
<td>Advanced Instruction in Written French</td>
</tr>
<tr>
<td>Fr 375</td>
<td>Contemporary French-Canadian Novel</td>
</tr>
<tr>
<td>Fr 401</td>
<td>Advanced Language Study</td>
</tr>
<tr>
<td>Fr 402</td>
<td>Advanced Language Study</td>
</tr>
<tr>
<td>Fr 471</td>
<td>French-Canadian Poetry</td>
</tr>
<tr>
<td>Fr 472</td>
<td>Contemporary Quebec Theatre</td>
</tr>
<tr>
<td>Fr 501</td>
<td>Problems of French Language</td>
</tr>
<tr>
<td>Fr 502</td>
<td>Problems of French Language</td>
</tr>
</tbody>
</table>

### Geography

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>Geog 195</td>
<td>Environmental Studies: Introduction to Environmental Problems</td>
</tr>
<tr>
<td>Geog 300</td>
<td>Geomorphology and the Southern Ontario Environment</td>
</tr>
<tr>
<td>Geog 322</td>
<td>Geographical Study of Canada</td>
</tr>
<tr>
<td>Geog 341</td>
<td>Historical Geography of Canada 1</td>
</tr>
<tr>
<td>Geog 342</td>
<td>Historical Geography of Canada 2</td>
</tr>
<tr>
<td>Geog 352</td>
<td>The Rural-Urban Fringe of Canadian Cities</td>
</tr>
<tr>
<td>Geog 411</td>
<td>Resource Studies</td>
</tr>
<tr>
<td>Geog 422</td>
<td>Canada</td>
</tr>
</tbody>
</table>

### History

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hist 123</td>
<td>Canada: Unity in Diversity</td>
</tr>
<tr>
<td>Hist 225</td>
<td>Canadian Culture and Society</td>
</tr>
<tr>
<td>Hist 265</td>
<td>Canadian History</td>
</tr>
<tr>
<td>Hist 266</td>
<td>The History of Selected Racial and Regional Minorities</td>
</tr>
<tr>
<td>Hist 267</td>
<td>Canadian Non-Indigenous Minorities 1</td>
</tr>
<tr>
<td>Hist 268</td>
<td>Canadian Non-Indigenous Minorities 2</td>
</tr>
<tr>
<td>Hist 273</td>
<td>History of French Canada</td>
</tr>
<tr>
<td>Hist 275</td>
<td>Twentieth Century Canada</td>
</tr>
<tr>
<td>Hist 381A/-</td>
<td>Studies in the History of Canadian Regionalism</td>
</tr>
<tr>
<td>Hist 381B</td>
<td></td>
</tr>
<tr>
<td>Hist 382</td>
<td>Canadian Intellectual History</td>
</tr>
<tr>
<td>Hist 386</td>
<td>Ontario History to Confederation</td>
</tr>
<tr>
<td>Hist 387</td>
<td>Ontario History Since Confederation</td>
</tr>
<tr>
<td>Hist 388</td>
<td>History of Canada/American Relations</td>
</tr>
<tr>
<td>Hist 389</td>
<td>Canada in World Affairs: The Twentieth Century</td>
</tr>
<tr>
<td>Hist 390</td>
<td>History of Canadian Indians</td>
</tr>
<tr>
<td>Hist 420</td>
<td>Senior Seminar in Nineteenth-Century Canadian History</td>
</tr>
<tr>
<td>Hist 421</td>
<td>Senior Seminar in Ontario History</td>
</tr>
<tr>
<td>Hist 423</td>
<td>Senior Seminar in Modern Quebec</td>
</tr>
<tr>
<td>Hist 425</td>
<td>Senior Seminar in 20th Century Canadian History</td>
</tr>
<tr>
<td>Hist 450</td>
<td>Marxism and Canadian History</td>
</tr>
</tbody>
</table>

### Political Science

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>P Sci 102</td>
<td>Introduction to Politics 2</td>
</tr>
<tr>
<td>P Sci 260</td>
<td>Canadian Government and Politics</td>
</tr>
<tr>
<td>P Sci 272</td>
<td>Political Behaviour 2</td>
</tr>
<tr>
<td>P Sci 291</td>
<td>The Canadian Legal Process</td>
</tr>
<tr>
<td>P Sci 292</td>
<td>Aspects of Canadian Law</td>
</tr>
<tr>
<td>P Sci 293</td>
<td>Political Journalism</td>
</tr>
<tr>
<td>P Sci 331</td>
<td>Public Administration 1</td>
</tr>
<tr>
<td>P Sci 332</td>
<td>Public Administration 2</td>
</tr>
<tr>
<td>P Sci 341</td>
<td>Provincial Politics</td>
</tr>
<tr>
<td>P Sci 342</td>
<td>Politics in Quebec</td>
</tr>
<tr>
<td>P Sci 343</td>
<td>Urban Politics 1</td>
</tr>
<tr>
<td>P Sci 344</td>
<td>The Politics of Local Government</td>
</tr>
<tr>
<td>P Sci 351</td>
<td>Comparative Federal Systems</td>
</tr>
<tr>
<td>P Sci 352</td>
<td>Comparative Legislative Systems</td>
</tr>
<tr>
<td>P Sci 373</td>
<td>Political Parties</td>
</tr>
</tbody>
</table>
Course Descriptions
Canadian Studies

Urban and Regional Planning
Plan 156 Introduction to Urban and Regional Planning Concepts
Plan 222 Canadian Regional Issues
Plan 255 Planning Surveys and Analysis
Plan 330 Urban Social Planning
Plan 332 The Sociology of Regions
Plan 333 The Sociology of Regional Planning
Plan 342 Urban and Regional Planning 1
Plan 343 Urban and Regional Planning 2
Plan 344 Principles of Recreation Planning
Plan 358 Regional Planning and Development
Plan 370 Land Development Planning
Env St 401 Environmental Law
Env St 402 Planning Law
Plan 414 Housing Policies
Plan 430 Social Policy Planning
Plan 431 Citizen Involvement, Planning and Social Change

Principal Canadian Content Courses Offered by Other Arts Departments

Fine Arts
Fine 316 Canadian Art
Fine 317 Canadian Art

Inter-Disciplinary Social Science
ISS 221R Community Issues

Philosophy
Phil 225 Problems in Social and Political Philosophy: Canadian Problems

Psychology
Psych 212 Educational Psychology
Psych 454 Senior Seminar in Educational Psychology

Religious Studies
RS 220 Evangelical Christianity
RS 221 Religions of Waterloo County
RS 264P Religion in Canada 1
RS 265P Religion in Canada 2
RS 268B Religious Perspectives in Contemporary Canadian Literature

P Sci 374 Interest Group Politics
P Sci 431 Canadian Public Policy 1
P Sci 432 Canadian Public Policy 2
P Sci 434 Canadian Foreign Policy
P Sci 435 The Politics of Canadian Resource Development
P Sci 442 Politics in Ontario
P Sci 443 Politics in Western Canada
P Sci 445 Politics in the Atlantic Provinces
P Sci 461 Problems in Canadian Politics 1
P Sci 462 Problems in Canadian Politics 2
P Sci 473 Voting Behaviour
P Sci 475 Political Socialization
P Sci 476 Research Seminar in Political Behaviour

Sociology
Soc 101 Introduction to Sociology
Soc 120R Fundamentals of Sociology
Soc 201 Canadian Society: Structure and Development
Soc 205 Sociological Analysis of Social Problems
Soc 215 Sociology of Sex Roles
Soc 216 An Introduction to the Sociology of Marriage and the Family
Soc 217 Family Origin and Personal Identity
Soc 231 Industrial Sociology
Soc 250 Crime and Society
Soc 251 Ethnic and Racial Relations
Soc 260 French-English Relations in Canada
Soc 262 Population in Canadian Society
Soc 272 Medical Sociology
Soc 300 Canadian Social Institutions
Soc 301 Urban Sociology
Soc 303 Crisis in Social Structure and Character
Soc 311 Social Structure and Character in Crisis
Soc 315 Social Stratification
Soc 323 Project in Sociological Research
Soc 324 Social Indicators and Their Use
Soc 327R Canadian Ethnic and Cultural Minorities
Soc 328R Canadian Ethnic and Cultural Minorities
Soc 330 Comparative Social Structure
Soc 351 Research Seminar in Canadian Society
Soc 352 Seminar in Nationalism and Ideology in Canada and Quebec
Soc 365 Sociology of the Contemporary University
Soc 398 Seminar in Nationalism and Ideology in Canada and Quebec

Urban and Regional Planning
Plan 247 Urban and Regional Planning
Plan 256 Introduction to Urban and Regional Planning
Plan 258 Principles of Recreation Planning
Plan 330 Urban Social Planning
Plan 332 The Sociology of Regions
Plan 333 The Sociology of Regional Planning
Plan 342 Urban and Regional Planning 1
Plan 343 Urban and Regional Planning 2
Plan 344 Principles of Recreation Planning
Plan 358 Regional Planning and Development
Plan 370 Land Development Planning
Env St 401 Environmental Law
Env St 402 Planning Law
Plan 414 Housing Policies
Plan 430 Social Policy Planning
Plan 431 Citizen Involvement, Planning and Social Change

Principal Canadian Content Courses Offered by Other Arts Departments

Fine Arts
Fine 316 Canadian Art
Fine 317 Canadian Art

Inter-Disciplinary Social Science
ISS 221R Community Issues

Philosophy
Phil 225 Problems in Social and Political Philosophy: Canadian Problems

Psychology
Psych 212 Educational Psychology
Psych 454 Senior Seminar in Educational Psychology

Religious Studies
RS 220 Evangelical Christianity
RS 221 Religions of Waterloo County
RS 264P Religion in Canada 1
RS 265P Religion in Canada 2
RS 268B Religious Perspectives in Contemporary Canadian Literature
**Course Descriptions**

**Chemistry**

**Department of Chemistry**

Professor, Chairman of Department
D. E. Irish, BSc (W. Ont.), MSc (McMaster),
PhD (Chicago), FCIC

Professor, Associate Chairman of Department
R. G. Wooldred, MSc (W. Ont.), PhD (Illinois), FCIC

Associate Professor, Associate Dean of the
Faculty of Science
D. A. Drisbin, DSc (Alberta), PhD (Toronto)

Professor, Director of the Guelph-Waterloo Centre for
Graduate Work in Chemistry
A. J. Carty, BSc, PhD (Nottingham)

Professors
J. Cizek², RNDr (Charles University, Prague),
CSc (Czechoslovak Academy of Sciences, Prague)
B. O. Fraser-Reid, MSc (Queen's), PhD (Alberta)
W. A. E. McBayde, MA (Toronto), PhD (Virginia), FCIC
H. G. McLeod, MA, PhD (Toronto)
J. B. Moffat, BA, PhD (Toronto), FCIC
K. F. O'Driscoll³, BChE (Pratt Inst.), MA PhD (Princeton)
J. Preuss³, RNDr (Charles University, Prague),
CSc (Czechoslovak Academy of Sciences, Prague)
W. B. Pearson¹, DFC, MA, DSc (Oxon), FRSC, FCIC
L. W. Reeves, BSc, PhD, DSc (Bristol), FCIC
A. Rudin³, BSc (Alberta), PhD (Northwestern)
G. Scoles¹, Dottore in Chimica (Genova), LibDoc
H. D. Sharma, MSc (Delhi), PhD (California)
J. G. Smith, MA, PhD (Toronto)
T. Viswanatha, MSc, PhD (Mysore)

Adjunct Professor
R. G. A. Rodrigo, BA (Ceylon), PhD (Nottingham)

Associate Professors
G. F. Atkinson, MA, PhD (Toronto), FRIC, FCIC
L. J. Brubacher, BA (Goshen College, Indiana),
PhD (Northwestern)
J. B. Capindale, MA, DPhil (Oxford)
W. L. Elson, MSc (W. Ont.), PhD (McGill)
R. J. Friesen, BSc, MSc (Maritimes)
T. E. Gough, BSc, PhD (Leicester)
R. J. LeRoy, BSc, MSc (Toronto), PhD (Wisconsin)
J. L. Koppel, BA, PhD (Toronto), FCIC
D. Mackay, BSc, PhD (Aberdeen)
A. D. Maynes, MA, PhD (Toronto)
F. R. McCoun², BSc, PhD (Br. Col.)
G. L. Rempe³, BSc, PhD (Br. Col.), FCIC
V. A. Snieckus, BSc (Alberta), MS (California),
PhD (Oregon)
G. E. Toogood, BSc, PhD (Nottingham)

Assistant Professors
P. C. Chich, BSc (Nat. Taiwan), MSc (Nat. Tsing Hua),
PhD (Br. Col.)
G. I. Dmitrienko, BSc, PhD (Toronto)
M. F. Tchir, BSc (Alberta), PhD (W. Ont.)

Senior Demonstrators
C. Folzer (Mrs.), BSc (Purdue), MSc, PhD (Rutgers)
M. C. Michael, MSc (Miss), BSc (Waterloo)
T. Rudensky, BSc (Waterloo)
M. Vatcher, HNC (Bolton Technical College),
BSc (Waterloo)

Lecturer
N. J. Taylor, BSc, PhD (Surrey)

Faculty Members holding cross appointments as shown
¹Chemistry and Physics
²Chemistry and Applied Mathematics
³Chemistry and Chemical Engineering

**Course Descriptions**

Details of the undergraduate programmes offered by
the Faculty of Science are to be found in Chapter 13.
Prerequisites for a course are a reliable guide to the
background necessary for the course. In lieu of the
specific courses listed, an equivalent background from
Waterloo or elsewhere is acceptable. With consent of
the instructor, prerequisites may be waived in
exceptional cases.

**Chem 001 T 0**

**Pre-University Chemistry**
The course covers the material considered essential
preparation for first year chemistry courses. Included
are formulae, nomenclature, stoichiometry, and an
introduction to thermochemistry, solution chemistry,
chemical equilibria, acids, bases and 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.

**Chem 10 F,W,S, 1C 0**

**General Chemistry Seminar**
Required for all Chemistry students beyond Year 1, 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 121 F 3C 0.5
Chemical Structure
Stoichiometry and structure; periodic atomic properties and their chemical implications; descriptive chemistry of selected compounds; special interest topics.
Prereq: Yr 5 Chem, Math (Functions and Relations; and Calculus)
Science students must take Chem 121L with this course

Chem 121L F 3L 0.25
Chemical Structure Laboratory
Selected experiments for students taking Chemistry 121.

Chem 122 W,S 3C 0.5
Chemical Reaction
Ionic equilibria in aqueous solutions; oxidation-reduction; reaction kinetics and mechanisms in aqueous solutions; special interest topics.
Prereq: Chem 121
Science students must take Chem 122L with this course

Chem 122L W,S 3L 0.25
Chemical Reaction Laboratory
Selected experiments for students taking Chemistry 122

Students electing a Year 1 Chemistry course are expected to take 121-122 and the associated laboratories, 121L-122L.

When selecting Chemistry courses beyond Year 1 students must obey the following rules, unless specific permission to do otherwise has been granted by their Undergraduate Officer.

1) All Students must have passed the listed prerequisites. In addition students are expected to have successfully completed at least 2 years of their programmes before selecting 300-level courses, and 3 years before selecting 400-level courses. In some cases, especially where 400-level courses are offered only in alternate years, this rule may be waived with the consent of the instructor.

2) Honours Chemistry Students (all Options, including Co-op) may not take General Chemistry courses for credit. Honours students from other Science Departments should follow the same regulations as Honours Chemistry students unless permission to do otherwise has been approved by their Department Undergraduate Officer.

3) General Chemistry Students (4-year) may not take Core Honours courses but must take the General Programme equivalent e.g. 218 not 212; 226 not 220, etc. General Science (4-year with a Major) students should follow the same regulations as General Chemistry (4-year) students unless permission to do otherwise has been approved by their Department Undergraduate Officer.

4) General Science Students (non-major) may not take Core Honours courses; nor may they take 400-level Chemistry courses (unless the consent of the instructor is obtained). Certain 300-level Chemistry courses may also be excluded – see the specific prerequisites for each course to be sure.

5) Students cannot obtain "Double-Credit" for courses which clearly overlap to a significant extent. In particular, no more than 0.5 credit may be obtained within the following groups of Chemistry lecture courses.

(212,218); (219,313); (26,266,264); (226,220); (227,221); (36,267,364); (312,316); (254,356); (255,356); (358,357); (366,365).

The same principle applies to laboratory courses. If in doubt consult your instructor and Undergraduate Officer.

Note
Most 300- and 400-level honours courses are listed as 2 hour lectures; an additional 1 hour tutorial may be scheduled at the discretion of the instructor.

The Courses Listed Below are Core Courses for Honours Students only.

Chem 212 F 2C 0.5
Structure and Bonding
Ionic and valence bond models; molecular orbital theory; bond lengths and bond energies, hydrogen bond and other weak interactions; properties, structures and stereochemistries of typical inorganic compounds; acid-base behaviour; nomenclature.
Prereq: Chem 121

Chem 220† F,W 2C 0.5
Introductory Analytical Chemistry
The principles underlying quantitative measurements.
Prereq: Chem 121-122
†Students registering in Chem 220 must also register in Chem 220L

Chem 220L F,W 3L 0.25
Analytical Chemistry Laboratory 1
Selected experiments for students taking Chemistry 220.
Chem 221‡ W,S 2C 0.5
Analytical Chemistry of Multi-Component Systems
Applications of electroanalytical methods, spectroscopic methods, and analytical separations to the quantitative description of multi-component systems.
Prereq: Chem 220
‡‡Students registering in Chem 221 must also register in Chem 221L

Chem 221L W,S 6L 0.50
Analytical Chemistry Laboratory 2
Selected experiments for students taking Chemistry 221.

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 121-122, Math 113 or equivalent.

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

Chem 264 W,S 2C,1T 0.5
Organic Chemistry
Preparation and reactions of typical organic functional groups examined from the basis of the reaction mechanisms. Introduction to spectroscopic correlations of these functional groups. Stereochemistry of organic molecules.
Prereq: Chem 121-122

Chem 264L W,S 3L 0.25
Organic Chemistry Laboratory 1
Selected experiments for students taking Chemistry 264.

Chem 313 W 2C 0.5
The Chemistry of the Main Group Elements
A systematic approach to the syntheses, properties, reactions and structures of main group element compounds. Trends in chemical behaviour, bonding and stereochemistry. Electron deficient compounds, the rare gases, chemistry of phosphorus, nitrogen and sulphur will be dealt with in detail.
Prereq: Chem 212

Chem 314L F,W,S 3L 0.25
Inorganic Chemistry Laboratory 1
An introduction to practical inorganic chemistry.

Chem 315L F,W 6L 0.5
Inorganic Chemistry Laboratory 1
Advanced experiments in inorganic chemistry.
Prereq: Chem 314L

Chem 355 F,W,S 2C 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 and Math 215 or equivalent.

Chem 355L F,W,S 3L 0.25
Physical Chemistry Laboratory 1
Selected experiments for students taking Chemistry 355.

Chem 358 F,W 2C 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

Chem 358L F,W 6L 0.5
Physical Chemistry Laboratory 2
Selected experiments for students taking Chemistry 358.
Prereq: Chem 355L

Chem 364 F,W 2C,1T 0.5
Organic Chemistry 2
The treatment of organic chemistry in Chemistry 264 is continued and extended to aromatic compounds.
Prereq: Chem 264

Chem 364L F,W 6L 0.5
Organic Chemistry Laboratory 2
Selected experiments for students taking Chemistry 364.
Chem 365  F,W,S  2C  0.5  
**Organic Chemistry 3**  
Stereorechemistry and conformational analysis of organic molecules. Acidity and basicity. Formation and reactions of enolate anions with emphasis on their synthetic utility. 
*Prereq:* Chem 364 or 267

Chem 492  Y  9L  1.5  
**Advanced Laboratory**  
9 hours laboratory. *See Chem 492 co-ordinator for details.* Normally, a cumulative Chemistry average of 70% or more is required to elect Chem 492. Year 4 honours students not electing Chem 492 must take two additional 400-level Chemistry term courses plus one other term course approved by the Department Undergraduate Officer.

**The Courses Listed Below are Electives**  
**Primarily intended for Students in Chemistry Major Programmes (Honours and General)**

*Students in other Major Programmes may elect these courses provided they have the necessary prerequisites.*

Non-major Students may select 300-level courses if they meet the prerequisites for the course, or have the consent of the instructor. They may not take 400-level courses without the consent of the instructor.

Chem 311  W  2C  0.5  
**Radiochemistry**  
*Prereq:* Chem 121 or equiv.

Chem 320  W  2C  0.5  
**Chemical Instrumentation**  
The principles of operation, practical limitations and preferred uses of various devices commonly used to make accurate measurements of importance in modern chemistry. 
*Prereq:* Chem 221 or permission of instructor. Students in the Faculty of Science taking Chem 320 must also take Chem 320L.

Chem 320L  W  3L  0.25  
**Chemical Instrumentation Laboratory**  
Selected experiments for students taking Chem 320.

Chem 332  F,W  2C  0.5  
**Biochemistry 1**  
*Prereq:* Chem 264 or 267

Chem 332L  F,W  3L  0.25  
**Biochemistry 1 Laboratory**  
Qualitative and quantitative measurements of biochemically important materials for students taking Chemistry 332.

Chem 333  F,W  2C  0.5  
**Biochemistry 2**  
Introduction to the chemistry and metabolism of carbohydrates and lipids. 
*Prereq:* Chem 332

Chem 333L  F,W  3L  0.25  
**Biochemistry 2 Laboratory**  
A continuation of Chemistry 332L for students taking Chemistry 333.

Chem 350  F  2C  0.5  
**Spectroscopy and Molecular Structure**  
Ensembles, postulates of statistical mechanics; Boltzmann, Fermi-Dirac, and Bose-Einstein statistics; microcanonical, canonical and grand canonical ensembles; Equilibrium statistical mechanics and statistical thermodynamics; application to ideal gases. 
*Prereq:* Chem 358. In years when Chem 351 is not offered, students wishing this material should take Phys 359.

Chem 351  W  2C  0.5  
**Statistical Thermodynamics**  
Ensembles, postulates of statistical mechanics; Boltzmann, Fermi-Dirac, and Bose-Einstein statistics; microcanonical, canonical and grand canonical ensembles; Equilibrium statistical mechanics and statistical thermodynamics; application to ideal gases. 
*Prereq:* Chem 358. In years when Chem 351 is not offered, students wishing this material should take Phys 359.

Chem 353  F,S  3C  0.5  
**Introduction to Polymer Science**  
Basic definitions and polymer nomenclature, molecular weight averages and distributions, polymer stereochemistry, step-growth and chain-growth polymerization reactions, applications of polymers. 
*Prereq:* Chem 254 or equivalent

Chem 354 (no longer given)  
**Applied Kinetics**  
Students wishing this type of course should consider taking Chemical Engineering 331 – Chemical Reaction Engineering.

Chem 359  W(even years only)  2C  0.5  
**Application of Chemical Thermodynamics**

Chem 362  W  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 364  *Coreq:* Chem 365
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 364 or 267

Chem 367  W  2C  0.5
Selected Topics in Organic Chemistry
Some of the following topics will be discussed: natural products, photochemistry, organometallic compounds, carbohydrates.
Prereq: Chem 365 or 366

Chem 395  W(even 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.

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 212 and 312 or 313

Chem 411  F  2C  0.5
Organometallic Chemistry
Prereq: Chem 312

Chem 416  F  2C  0.5
Applied Inorganic Chemistry
The chemistry of inorganic compounds and processes of industrial importance will be discussed. Inorganic polymers; catalysis by inorganic systems including nitrogen fixation, hydrogenation, hydroformylation. Synthesis and purification of metals.
Prereq: Chem 312

Chem 417  W (even years only)  2C  0.5
Synthesis and Structure of Inorganic Compounds

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 alkali and alkaline earth metal cations.
Prereq: Chem 312 or 316

Chem 420  F  2C  0.5
Analytical Chemistry
Selected topics in modern analysis of inorganic materials such as rocks, ores, ceramics, metals and alloys; Atomic flame spectroscopic methods, analytical X-ray techniques, methods for ultra-pure materials, trace and micro determinations.
Prereq: Chem 221 or permission of instructor

Chem 421  W  2C  0.5
Spectrometric and Chromatographic Analysis
Techniques and fundamental principles of chromatography and mass spectrometry as applied to the identification of chemical compounds.
Prereq: Chem 221 and 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 in current use.
Prereq: Chem 221 and Phys 243 or permission of instructor.

Chem 432  F  2C  0.5
Biochemistry 3
Kinetics, stereospecificity, structure and function of enzymes, bio-energetics, oxidative phosphorylation.
Prereq: Chem 333

Chem 432L  F  3L  0.25
Biochemistry 3 Laboratory
Selected experiments for Honours Biology and Chemistry students taking Chemistry 432.

Chem 433  W  2C  0.5
Biochemistry 4
Chemistry and biosynthesis of porphyrins. Metabolism of amino acids, purines and pyrimidines. Roles of vitamins in biological transformations. Respiration, muscular contraction.
Prereq: Chem 432

Chem 433L  W  3L  0.25
Biochemistry 4 Laboratory
Selected experiments for Honours Biology and Chemistry students taking Chemistry 433.

Chem 434  W  2C  0.5
Applied Biochemistry
Chemistry and function of antibiotics; blood coagulation and related topics. Immuno-chemistry. Nutritional aspects of food.
Prereq: Chem 333
Chem 442  F(odd years only)  2C  0.5  
**Fundamentals of Quantum Mechanics**
The postulates of quantum mechanics; review of quantum mechanics of hydrogen-like systems; angular momentum and simple coupling schemes; atomic spectroscopy; a discussion of multi-electron atoms as time permits.  
*Prereq: Chem 355*

Chem 453  W  2C  0.5  
**Polymer Properties and Polymerization**
Copolymerization, emulsion polymerization, ionic and coordinate polymerization, basics of polymerization process selection.  
*Prereq: Chem 353 or equivalent*

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, absorption, and other interfacial phenomena.  
*Prereq: Chem 254 and 255*

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,3L  0.5  
**Experimental Aspects of Polymer Science**
Selected experiments to illustrate polymerization, polymer properties and fabrication processes.  
*Prereq: Chem 353 or equivalent*

Chem 458  W(odd years only)  2C  0.5  
**Quantum Chemistry**
The application of quantum mechanics to chemistry with emphasis on the investigation, correlation, and elucidation of chemical bonds and reactions.  
*Prereq: Chem 355*

Chem 464  F  2C  0.5  
**Spectroscopy in Organic Chemistry**
Elucidation and identification of organic structures by contemporary spectroscopic techniques.  
*Prereq: Chem 364*

Chem 465  W  2C  0.5  
**Special Topics in Organic Chemistry**
Topics will be selected from photochemistry, organometallics, synthesis, heterocyclics, natural products, molecular rearrangements. (May be taken in third and fourth years as 465A and 465B provided topics are different).  
*Prereq: or coreq: Chem 365*

The Following are Core Courses Primarily Intended for General Chemistry Students but they may be taken by General, Non-Major, students (provided they have the necessary prerequisites).

Chem 218  F  2C,1T  0.5  
**Development of Chemical Bonding and Structure**
*Prereq: Chem 121*

Chem 219  W  2C,1T,  0.5  
**Chemistry of Non-Transition Metals**
Group trends in main group chemistry. Emphasis will be placed on correlation of structure with physical properties in various groups of compounds.  
*Prereq: Chem 218*

Chem 226†  F  2C  0.5  
**Chemical Analysis 1**
A variety of classical and modern analytical methods.  
*Prereq: Chem 121-122  
†Students in the Faculty of Science taking Chem 226 must also take Chem 226L*

Chem 226L  F  3L  0.25  
**Chemical Analysis Laboratory 1**
Basic techniques of analytical methods.

Chem 227††  W  2C  0.5  
**Chemical Analysis 2**
The evolution of some modern analytical methods.  
*Prereq: Chem 226 or 220  
††Students in the Faculty of Science taking Chem 227 must also take Chem 227L.

Chem 227L  W  6L  0.5  
**Chemical Analysis Laboratory 2**
The application of analytical methods to contemporary problems in Chemistry and other Sciences.
Course Descriptions
Chemistry

Chem 266 F 2C,1T 0.5
**Organic Chemistry I**
The properties, preparation, reaction and basic structural theory of the common classes of aliphatic compounds. Introduction of electrophilic and nucleophilic reaction mechanisms.
*Prereq: Chem 121 and 122*

Chem 267 W 2C 0.5
**Organic Chemistry 2**
The properties, preparation, reactions and basic structural theory of the common classes of aromatic compounds. A continuation of organic reaction mechanisms. Introduction to the chemistry of carbohydrates, proteins, steroids, etc.
*Prereq: Chem 266*

Chem 267L W 3L 0.25
**Organic Chemistry Laboratory**
Selected experiments for students taking Chemistry 267.

**Note**

(For students needing a full year of Organic Chemistry as a prerequisite to medicine, the sequence 266-267 and 267L should be selected.)

Chem 316 F 2C 0.5
**An Introduction to Transition Metal Chemistry**
The transition elements and their compounds. An elementary approach to crystal and ligand field theory will be used to rationalise the spectra, magnetism, structures and properties of transition metal complex compounds.
*Prereq: Chem 218 or 219*

Chem 316L F 3L 0.25
**Inorganic Chemistry Laboratory**
Selected experiments for students taking Chemistry 316.

Chem 356 F 2C 0.5
**General Physical Chemistry 1**
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 122 and Math 113*

Chem 356L F 3L 0.25
**General Physical Chemical Laboratory 1**
Selected experiments for students taking Chemistry 356.

(A special section in Winter term will be available for Honours Biol and Chem students only)

Chem 357 W 2C 0.5
**General Physical Chemistry 2**
An introductory survey of the concepts and principles of quantum mechanics; the application of these principles to the study of atomic and molecular structure and spectra, and to photochemical phenomena. Chemical kinetics.
*Prereq: Chem 356*

Chem 357L W 3L 0.25
**General Physical Chemistry Laboratory 2**
Selected experiments for students taking Chemistry 357

Chem 366 F 2C 0.5
**Structural and Synthetic Organic Chemistry**
Stereochemistry of organic molecules; synthesis of selected organic compounds examined in detail with emphasis on cyclo-addition reactions and condensation reactions.
*Prereq: Chem 267 or 364*

Chem 366L F 3L 0.25
**Organic Chemistry Laboratory**
Selected experiments for students taking Chemistry 366.

The Following Courses are Offered by Correspondence Only

Chem 224 Y T 1.0
**Chemical Spectroscopy**
An introductory survey of the principles and applications of spectroscopic techniques used in the modern chemical laboratory. Topics will include electronic, vibrational and rotational spectroscopy, and magnetic resonance spectroscopy
*Prereq: A first year Chemistry course, and a knowledge of Calculus.*

Chem 344 Y T 1.0
**Inorganic and Nuclear Chemistry**
Survey of transition metal chemistry including ligand field theory of co-ordination compounds and an introduction to organometallic chemistry. Introduction to nuclear and radiochemistry.
*Prereq: Chem 212 or 218 or equiv. (equiv. to 311-312)*

Chem 360 F,W,S T 0.5
**Organic Chemistry 3**
Stereochemistry of organic compounds; conformational isomers, geometrical (cis-trans-) isomers, optical isomers and diastereomers. Introductory carbohydrate chemistry.
*Prereq: Chem 267*
Chem 361  W,S  T  0.5
Organic Chemistry 4
Acidity and basicity of organic compounds. Formation and reaction of enolate anions with emphasis on their synthetic utility. Cycloaddition reactions.
Prereq: Chem 360

The Courses Listed Below are for Engineering or Optometry Students only

Chem 26  F,W  3C,3L  0.5
Organic Chemistry 1
The basic chemistry of the important classes of aliphatic and aromatic compounds. A laboratory course on preparative organic chemistry and organic techniques accompanies the lectures.
(For students in year 2 Engineering)

Chem 36  F,S  3C  0.5
Organic Chemistry 2
An introduction to the important classes of heterocyclic compounds and natural products.
Prereq: Chem 26
(For students in year 2 Engineering)

Chem 237  W  3C  0.5
Introductory Biochemistry
The basic chemistry of amino acids, peptides, proteins, carbohydrates and lipids including some aspects of metabolism.
Prereq: Chem 268
(For Optometry students only.)

Chem 237L  W  3L  0.25
Introductory Biochemistry Laboratory
Selected Experiments for students taking Chemistry 237.

Chem 268  F  3C  0.5
Introductory Organic Chemistry
The basic chemistry of the important classes of aliphatic and aromatic compounds including aspects of stereochemistry and reaction mechanisms.
Prereq: Ont. Year 5 Chem.; (Yr. 1 Chem desirable). (For Optometry students only.)

Chem 268L  F  3L  0.25
Introductory Organic Chemistry Laboratory
Selected experiments for students taking Chemistry 268.
Assistant Professors
J. M. Scharer, BSc, PhD (Pennsylvania)

Faculty members having cross-appointments as shown
1Chemical Engineering and Philosophy
2Chemical Engineering and Chemistry
3Chemical Engineering, Management Science, and Statistics
4Chemistry and Chemical Engineering

Course Descriptions
Chemical Engineering

Ch E 100 F 3C,1T,6L for first six weeks 0.75
Introductory Engineering Concepts 1
An introduction to the basic methods and principles used by engineers in the analysis and design of physical processes: units, dimensions, and measurements; mass balances; behaviour of fluids. Laboratory on visual communication is included.

Ch E 101 W,S 3C,1T,3L 0.75
Introductory 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,1T 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 211 S,F 3C,2L 0.5
Transport Processes 1 (Fluid Mechanics)
Fundamentals of fluid flow; conservation laws for mass, momentum and mechanical energy; flow of fluid in conduits; flow past immersed bodies; Description, collection and separation of particulate systems.

Ch E 220 W,F 3C,1T 0.5
Applied Mathematics 1
Statistical frequency distributions, tests of significance, correlations, curve fitting, sampling theory, applications: errors, design of experiments.

Ch E 230 W,F 3C,1T 0.5
Physical Chemistry 1
Introduction to physical chemistry. Ideal and real gases, the kinetic theory of gases, first law of thermodynamics, thermochemistry, heats of reaction, second law, chemical equilibria in simple systems, phase equilibria in simple systems, third law.

Ch E 231 S,F 3C,1T 0.5
Physical Chemistry 2
Prereq: Ch E 230

Ch E 232 W,F 3C 0.5
Inorganic Chemistry 1
Wave mechanics, atomic structure and the periodic table, chemical bonding, structural chemistry of elements and compounds, introductory transition metal chemistry, some thermodynamic aspects of inorganic chemistry.

Ch E 233 S,F 3L 0.5
Physical Chemistry Laboratory
Experiments on viscosity of gases and liquids, chemical kinetics, adsorption, homogeneous and heterogeneous catalysis, thermochemistry, phase equilibria, diffusion, determination of molecular weight of polymers, training in technical report writing.

Ch E 312 W,S 3C,1T 0.5
Transport Processes 2 (Heat Transfer)
Introduction to heat transfer, momentum-heat transfer analogies and dimensional analysis, steady and transient heat conduction, convection and applications to engineering problems, radiant heat transfer and heat transfer with change of phase.
Prereq: Ch E 211

Ch E 313 W,F 3C,2T 0.5
Transport Processes 3 (Mass Transfer)
Mass transfer by diffusion and convection, applications to both stage-wise and continuous separation processes such as: distillation, extraction, absorption and others; analogies between momentum, energy and mass transport.
Prereq: Ch E 312

Ch E 315 W,F 6L 0.5
Chemical Engineering Laboratory
Experimental application of physical and chemical principles using pilot scale equipment, experiments illustrating major unit operations (distillation, absorption, extraction, drying, humidification).
Prereq: Ch E 312

Ch E 320 W,S 3C 0.5
Applied Mathematics 2
Gamma-Beta- and error-functions; sine-, cosine-, exponential- and elliptic-integrals, linear differential equations; Wronskian, Green function; initial and boundary value problems; Bessel functions; Fourier series, integrals and transforms; orthogonal functions; Laplace transforms; applications.
Prereq: Ch E 220
Ch E 330  W,S  3C  0.5
Chemical Engineering Thermodynamics
Thermodynamics of flow processes, vapour power plants, internal combustion engines, liquefaction of gases, refrigeration and evaporation, chemical equilibria in chemical reactions, thermal pollution, the energy crisis, efficient energy utilization and thermodynamics.
Prereq: Ch E 231

Ch E 331  W,F  3C  0.5
Chemical Reaction Engineering
Homogeneous reactors: batch, CSTR, tubular flow systems, ideal models, residence time distributions in ideal reactors, temperature effects, steady states, semi-batch systems, nonideal behaviour. Heterogeneous catalysis: mass transfer effects; catalytic rate equations, fixed and fluidized bed reactors.
Prereq: Ch E 231

Ch E 332  W,S  3C  0.5
Inorganic Chemistry 2
Introductory electrochemistry: electrolysis, electrolytic conductance and transport, reversible electrode processes, irreversible electrode processes and electrode kinetics, electrochemical measurements and their analytical applications, chemistry of corrosion.
Prereq: Ch E 232

Ch E 334  W,S  3L  0.5
Instrumental Methods of Chemical Analysis
An introduction to modern analysis including optical, electrochemical, radiochemical, chromatographic and spectroscopic methods.

Ch E 420  S,F  3C  0.5
Process Dynamics and Control 1
Block and signal flow diagrams, proportional-integral-derivative controllers, frequency response techniques, analytical and graphical stability criteria. Introduction to modern control theory.
Prereq: Math 216, Ch E 312

Ch E 422  S,F  3C  0.5
Engineering Economics
Mathematics of annuities, mortgages, bonds and small loans; cost accounting, including direct costing, depreciation, taxes and financial statements, estimation of sales and capital and operating costs of a new process or product, study of criteria for the appraisal of capital expenditures, critical path method, linear programming.

Ch E 482  S,F  3C  0.5
Technical Seminar and Process Design
Subject material from recent literature or industrial experience will be presented and criticized. Lectures on the sizing and costing of equipment, problems on the design of process components.

Ch E 501  W  3C  0.5
The Chemical Engineer as an Entrepreneur
How an individual engineer may develop a new small business to supply goods or services to Canadian chemical industries, while performing his/her own technical and management functions; technical, economic, legal and financial aspects.

Ch E 510  S,F  3C  0.5
Prediction of Physico-chemical Properties
Methods of estimating physico-chemical properties of gases and liquids in cases where experimental values are absent. Prediction is usually based on correlations of a form suggested in part by theory, with empirical constants based on experimental data.

Ch E 515  W  3C  0.5
Two-Phase Flow Operations
Introductory theory to one-dimensional two-phase flow: conventions, definitions, homogeneous theory, separated flow (Lockhart-Martinelli), particulate characterization and behaviour; applications: two-phase flow in pipes, boiling and evaporation, filtration.

Ch E 517  W  3C  0.5
Performance of Separation Processes
Introduction, patterns of change and computational approaches, group methods, limiting flows and stage requirements, capacity and efficiency of contacting devices, energy requirements, selection, optimal design and operation, mass transfer with chemical reaction.

Ch E 520  W,F  3C  0.5
Chemical Engineering Analysis
Application of advanced mathematical techniques to the analysis of chemical engineering processes. Prereq: Permission of Instructor

Ch E 521  W  3C  0.5
Process Dynamics and Control 2
Analog computation, timedomain analysis, control of complex chemical systems.
Prereq: Ch E 420

Ch E 523  W  4L  0.5
Process Control Laboratory
Experiments on process dynamics, control and analog simulation of chemical processes. Time constant, step and frequency response, controller settings, cascade control of thermal, liquid level, and reaction systems.
Prereq: Ch E 420

Ch E 540  S,F  3C  0.5
Introduction to Polymer Science
Basic concepts of polymer chemistry, classification of polymers, introductory physical chemistry of polymers, organic chemistry of polymerization reactions of polymers, naturally occurring polymers.
ChE 541  W  3C  0.5  
**Physical Chemistry of Polymers**
Polymer solutions, molecular characterization of polymers, molecular weight distributions, morphology, and crystallinity in polymers, reaction kinetics and mechanism of addition and condensation polymerization.  
*Prereq: Ch E 540*

ChE 543  W  3L  0.5  
**Polymer Laboratory**
Experimental studies of polymerization and physical properties of polymers: condensation and addition polymerization, copolymerization, molecular weight, extrusion rheology, etc.  
*Coreq: Ch E 541*

ChE 550  S,F  3C  0.5  
**Introduction to Extractive Metallurgy**
Physical and chemical nature of ores and intermediates, introductory pyrometallurgy, hydrometallurgy and electrometallurgy, survey of extraction processes, application of the principles of thermodynamics and kinetics to metallurgical processes.

ChE 551  W  3C  0.5  
**Metallurgical Chemistry**
Ionic equilibria, thermodynamics and kinetics of reactions in solution, bonding, stability and stereochemistry of coordination compounds and mechanisms of their reactions, introductory hydrometallurgy, corrosion and homogenous catalysis.

ChE 553  W  3C  0.5  
**Principles of High Temperature Extractive Metallurgy**
In-depth discussion of several processes of importance in Canada: blast-furnace smelting (iron, lead, zinc), steel making and other specialized refining processes, pyrometallurgical treatment of sulfide ores, and fused salt electrolysis. The emphasis is on the interplay of the underlying thermodynamic, kinetic, transport, and process-engineering considerations.

ChE 560  S,F  3C  0.5  
**Introduction to Biochemical Engineering**
Aspects of microbiology and biochemistry of interest to the biological process industries and to environmental pollution. Classification and growth characteristics of microorganisms. Physico-chemical properties of biological compounds. Metabolism and biochemical kinetics. Course includes some lab work.

ChE 561  W  3C  0.5  
**Fermentation Operations**
Engineering principles involved in the production of antibiotics, yeast, enzymes, beverage alcohol and other microbial products, and in biological waste treatment. Specialized mass transfer, heat transfer, mixing and rheology applications. Course includes some lab work.  
*Prereq: Ch E 560 or permission of instructor*

ChE 563  W  3C  0.5  
**Food Processing**
Formulation, processing, preservation and quality evaluation of natural and textured foods, food components, additives: mixing, extrusion, sterilization, separation, purification, concentration operations.  
*Prereq: Ch E 560 or permission of instructor*

ChE 570  W,F  3C  0.5  
**Air Pollution**
Treatment of gaseous waste products from representative Canadian industries; characterization and toxicity of filtration, scrubbing, cycloning, electrostatic precipitation, and other chemical treatment, legal, socio-political, economic and engineering aspects.

ChE 571  W  3C  0.5  
**Water Pollution**
Treatment of waste water from metals processing industries; waste characterization; toxicity; recycle: treatment by electro-oxidation/reduction, ion exchange, solvent extraction, absorption, electrodialysis, reverse osmosis etc; economics, regulations, moral, legal, social and political implications.

ChE 580  S,F  6L  0.5  
**Research-Design Project 1**
Individual supervised research and/or design project on any ChemEng subject chosen by the student-professor group. Written report required.

ChE 581  W  12L  1.0  
**Research-Design Project 2**
Continuation of Ch E 580. Equivalent to two one-term courses. A written report, meeting minimum technical report standards, and a public oral presentation will be required.

ChE 583  W  2T,4L  0.5  
**Process System Design**
The undergraduate curriculum is brought together to accomplish, by team effort, the basic objective of the process engineer: the design of an integrated process. A written report, meeting minimum technical report standards, and a public oral presentation will be required.

ChE 585  W  6L  0.5  
**Technical Elective Project**
An individually supervised research or design project, based on one of the technical elective courses taken in the 4A term. A written report, meeting minimum technical report standards, and a public oral presentation will be required.

Ch E 007, 280, 281, 380, 381, 480, 481  W,S,F  1C  0  
**General Awareness Seminar**
Informal discussions on the Chem Eng Programme.
Department of Civil Engineering

Professor, Acting Chairman of the Department
R. C. G. Haas, BSc, MSc (Alberta), PhD (Waterloo), PEng

Professor, Dean of Engineering
W. A. McLaughlin, PEng (Sask.) MS, PhD (Purdue), PEng

Professor, Associate Dean of Engineering
H. H. E. Leipholz, DiplEng, Dr. Ing, Docent Habil (Stuttgart), PEng. Recipient of the Distinguished Teacher Award

Professor, Associate Chairman Graduate Studies
G. M. McNiece, BASc (Waterloo), PhD (London), PEng

Associate Professor, Associate Chairman, Undergraduate Studies
D. E. Grierson, BASc, MSc, PhD (Waterloo), PEng

Professors
S. T. Ariaratnam, BSc (Eng.) (Ceylon), MSc (London), PhD (Cambridge)
D. C. Clough, BASc, MBA (Toronto), PEng
M. Z. Cohn, CSSC (Bucharest), PEng
G. M. L. Gladwell, BSc PhD, DSc (London)
R. Green, BSc (Eng) (London), MSc (Queen's), MSc (Waterloo), PhD (London), PEng
V. K. Honda, BSc (Calcutta), BSc (Eng) (London), MSc (Queen's), MSc (Waterloo), PhD (London), PEng
B. G. Hutchinson, BE (Sydney), MSc (Queen's), PhD (Waterloo), PEng
W. C. Lennox, BASc, MSc (Waterloo), PhD (Lehigh), PEng
N. C. Lind, MSc (Tech. Univ. of Denmark), PhD (Illinois), PEng
J. T. Pindera, Dr of Tech Sciences (Warsaw), Docent Habilit (Cracow), PEng
T. Prasad, BSc, MSc (Banaras Hindu Univ.), PhD (Cambridge)
J. Roorda, BASc (Waterloo), PhD (London), PEng
J. Schroeder, BEng, MEng (McMaster), PhD (Waterloo), PEng
A. N. Sherbourne, BSc (London), MS (Lehigh), MA, PhD (Cambridge), PEng
J. Shortreed, BEngSc (W. Ont), MSc (Queen's), PhD (Northwestern), PEng
S. I. Solomon, CivHyd Eng (Bucharest), PhD (City Univ., London), PEng
T. H. Topper, BASc (Toronto), PhD (Cambridge), PEng
T. E. Unny, BE (Madras), M Tech (Kharagpur), Dr Ing (Dresden), PEng

Associate Professors
E. F. P. Burnett, BSc (Capetown), DIC, MS, PhD (London), PEng
R. W. Cockfield, BSc, MSc (Queen's), PhD (Waterloo), PEng
H. J. Edens, MSc (Delft), MA Economics (York), PEng
G. J. Farquhar, BASc (Waterloo), PhD (Wisconsin), PEng
B. Le Lievre, BEng (West Australia), MASC PhD (Waterloo), PEng
E. L. Matyas, BASc (Toronto), DIC, PhD (London), PEng
A. A. McBean, BASc (Br. Coll.), SM, PhD (M.I.T.), PEng
R. M. Schuster*, BS, MS (North Dakota State), PhD (Iowa State), PEng
K. N. Smith, BASc (Toronto), MASC (Illinois), PhD (Waterloo), PEng
J. C. Thompson, BASc (Toronto), MS, PhD (Illinois), PEng
S. Yagar, BASc, MASC (Toronto), PhD (California), PEng

Assistant Professors
N. Kouwen, BASc, PhD (Waterloo), PEng
F. F. Saccomanno, BSc, MCP (Manitoba) PhD (Toronto)
J. F. Sykes, BASc, MASC, PhD (Waterloo), PEng

Adjunct Professors
P. M. Allen
T. A. F. Brookes, BASc (Toronto), LLB (Osgoode Hall), PEng
H. M. Haydl, RS (IT), MS (Columbia), Eng (Stanford), PhD (Waterloo), PEng
J. J. Munk, BSc (Sir G. W.), BEng (McGill), LLB (Osgoode Hall), PEng
D. T. McIlrue, Chartered Accountant
N. W. McLeod, BSc (Alberta), MSc (Sask.), ScD (Michigan), PEng
O. L. White, BSc (Melbourne), MASC (Toronto), PhD (Illinois), PEng

Adjunct Lecturer
J. B. Kerr, MASC (Waterloo)

Faculty members holding cross-appointments as shown

1Architecture and Civil Engineering
2Management Sciences and Civil Engineering
Course Descriptions

Civil Engineering

Civ E 110 W 3C 0.5
Urban Transport Problems and Prospects
Overview of urban development and role played by transport. Dimensions of current issues such as congestion, travel equity, pollution and energy consumption. Transport demands and relation to land use. Transport planning options; transport technology, general development options. Not intended for civil engineering students at any level Not recommended for first year students

Civ E 116 W,S 2C,4L/T 0.75
Engineering Concepts 2
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.

Year 1 Engineering

Civ E 200 S,F 2C,3T 0.5
Civil Engineering Project 1
Functional designs of standard civil engineering structures. The creation and evaluation of alternative geometric configurations in accordance with user requirements. Informational content of previous courses is augmented with lectures on typical civil engineering problems and solutions.

Civ E 203 F,W 3C,2T 0.5
Statics

Civ E 204 F,W 3C,2T 0.5
Dynamics
An introduction to the Kinematics and Kinetics of particles and rigid bodies. Kinematics of particles; Kinetics of particles; Newton’s Second Law; energy and momentum; impulsive motions; systems of particles. Kinematics of rigid bodies: plane motion of rigid bodies; equations of motion; energy and momentum; impulsive motions.

Civ E 205 F,S 3C,2T 0.5
Mechanics of Deformable Solids 1
Introduction of the concepts of stress and strain. Stress-strain relations for linearly elastic materials; Analysis of the response of prismatic members to axial, shearing, flexural and torsional loads; strain energy, failure hypotheses; instability in columns.

Civ E 221 F,W 3C,2T 0.5
Calculus

Civ E 222 F,S 3C,2T 0.5
Differential Equations

Civ E 224 F,W 3C,2T 0.5
Probability and Statistics

Civ E 265 F,W 3C,3L/T 0.5
Structure and Properties of Materials

Civ E 280 F,S 3C,2L/T 0.5
Fluid Mechanics
An introductory course in fluid mechanics. Fluid properties, fluid statics; Bernoulli equation; the momentum equation and applications; laminar and turbulent flow; closed conduit flow; pipe network analysis; unsteady flow in pipes.
Civ E 291 1 wk fld lab 0.5

Survey Camp
A one-week course in surveying. Introduction to surveying, length measurements, levelling, transit surveys.
Approximate cost to each student $60.

Civ E 292  F,W,  3C,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 294  F,S  3C,2T  0.5

Thermal Sciences
An introductory course in thermal science. Provides an understanding of thermodynamic principles as well as engineering aspects of heat transfer including applications to practical engineering problems.

Civ E 298  F,W  1S  0.0

Civ E 299  S,F  1S  0.0

Seminar
The engineer in society. Principles, methods and practice of Civil Engineering. Informal lectures.

Civ E 300  F,W  2C,3T  0.5

Civil Engineering Project 2
Projects ranging from feasibility studies to detailed designs by student teams. Each team member is responsible for a definable portion of a project. The work of the individual is integrated with other team members to produce a complete solution described in a report containing all appropriate calculations and schematics. Particular emphasis is placed on the utilization and integration of knowledge acquired in the more specialized courses, augmented with lectures on project administration.

Civ E 303  W,S  3C,2T  0.5

Structural Analysis 1

Civ E 304  F,W  3C,2T  0.5

Structural Analysis 2

Civ E 306  F,W  3C,2T  0.5

Mechanics of Deformable Solids 2
An advanced course in mechanics of solids. Torsion of non-circular sections; hollow section; Warping of cross-sections; Membrane Stresses in shells; bending of flat plates; beams on elastic foundations; buckling of columns, arches, beams and plates.

Civ E 313  W,S  3C,2T  0.5

Structural Concrete Design 1

Civ E 342  W,S  3C,2T  0.5

Transport Engineering 1

Civ E 343  W,S  3C,2T  0.5

Transport Engineering 2

Civ E 344  F,W  3C,2T  0.5

Urban and Regional Engineering
Natural system behaviour; Man’s impacts on ecosystems; Current environmental issues in Canada; Canadian urban system; Trends in resource consumption and waste production; Population forecasting; Economic forecasting; Urban spatial structure; Regional water management; Sources of water supply; Spatial aspects of network design; Impacts of urbanization on hydrological regimes; Interactions with natural systems.

Civ E 353  W,S  3C,3L,1T  0.5

Soil Mechanics
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.

Civ E 354  F,W  3C,2T  0.5

Foundation Engineering
A course in foundation engineering; earth pressure theories; retaining walls; anchors; shallow and deep foundations; braced trenches and excavations; slope stability.
Sanitary Engineering
Introduction to sanitary engineering. Water quality; waste disposal; water and wastewater treatment; physical treatment processes; chemical treatment processes; biological treatment processes; sludge handling; advanced treatment processes.

Civil E 381 W S 3C,2T 0.5
Hydraulics
Introduction to hydraulics. Dimensional analysis, hydraulic modelling; Turbo machinery, pumps and turbine characteristics; Open channel flow; Reservoir operation; Hydraulic structures; Unsteady flow; Gradually varied flow.

Civil E 383 F W 3C,2T 0.5
Water Distribution and Collection Systems
Water requirements: water and waste volumes; water storage. Water supply and distribution systems, computer models; Urban hydrology, storm sewers, flood routing; Wastewater collection, sanitary sewers. Hydraulics of treatment works.

Civil E 398 W S 1S 0.0
Civil E 399 F W 1S 0.0
Seminar
The engineer in society. Principles, methods and practice of Civil Engineering. Informal lectures.

Civil E 400 W 1C,3T 0.5
Civil Engineering Project 3
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.

Civil E 403 F S 3C,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.

Civil E 404 W 3C,2T 0.5
Structural Analysis 4
Matrix and computer methods of structural analysis. Application of the Force and Displacement Methods of analysis to space frameworks, nonlinear structures and continuum discretized into finite elements.

Civil E 405 W 3C,2T 0.5
Structural Dynamics and Stability
Dynamics of discretized structures. Free and forced vibrations of single and multidegree of freedom systems. Impact. Flexural vibrations of beams and plates. Static and dynamic instability of beams, shafts and frames.

Civil E 413 F S 3C,2T 0.5
Structural Steel Design

Civil E 414 F S 3C,2T 0.5
Structural Concrete Design 2
Sectional design principles; Element and member design; Prestressed concrete elements; Slab systems; Building systems: Elements of bridge design.

Civil E 415 W 3C,2T 0.5
Structural Systems

Civil E 430 W 3C,3L 0.5
Experimental Mechanics
Principles and techniques of experimental determination of responses of engineering structures to mechanical, thermal and wind loads, in real and simulated conditions. Foundations of modelling, observations and measurements. Selected experimental techniques: strain gages, photo-elasticity, holography, dynamic techniques, thermoelasticity, more.

Civil E 440 F S 3C,2T 0.5
Urban Traffic Management
Analysis of urban traffic flow, capacity and queueing. Methods for improved flows: signal progression, intersection design, optimization models, computer control, vehicle restrictions. Design of parking, Traffic safety. Pedestrian effects. Simulation of traffic.

Civil E 442 W 3C,2T 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.
Civil Engineering

Civ E 444 W 3C,2T 0.5
Urban Transport Planning
Application of concepts of CE 342, 343, 344 to typical urban transportation planning situations. Urban transit, a regional shopping activity centre, a major housing development considered using case studies. Methods of earlier courses linked to typical real life problems.

Civ E 453 F,S 3C,2T 0.5
Engineering Geology
A course in engineering geology; engineering properties and characteristics of typical landforms, soils, rocks, and ground water regimes; introduction to earthquake resistant design and air-photo interpretation.

Civ E 454 W 5T 0.5
Geotechnical Engineering
This course simulates geotechnical consulting practice. Students are exposed to real situations which require problem identification, evaluation of geotechnical data, analysis, design and report preparation.

Civ E 472 F,S 3C,2T 0.5
Wastewater Treatment
Introduction to wastewater treatment. Wastewater quantity; Wastewater characteristics; Primary treatment; Secondary treatment; Sludge treatment and disposal; Industrial wastewater management. Design project.

Civ E 473 W 3C,2T 0.5
Pollution in the Aquatic Environment

Civ E 480 W 3C,2T 0.5
Basic Principles of Water Resources

Civ E 486 F,S 3C,2T 0.5
Hydrology
An introduction to hydrology, the hydrologic cycle; Runoff phenomena; River basin characteristics; Statistical and probability analysis of hydrologic data; Time series analysis; Non-stationary aspects of hydrology; Forecasting.

Civ E 491 W 3C,2T 0.5
Engineering Law

Civ E 493 W 4C 0.5
Engineering in the Canadian North
Introduction to the technical, ecological and sociological problems associated with construction in the Canadian North. Major topic areas are transportation, water supply, foundations and structures. Specific topics include engineering and feasibility studies for railways, pipelines, natural resource explorations, vehicle development and marine anchorages.

Civ E 496 F,S 3C,2T 0.5
Project Management

Civ E 497 W 3C,2T 0.5
Engineering Analysis and Modelling
Analysis, optimization and modelling techniques with emphasis on applications to engineering problems: linear programming and optimization; state space representation of dynamic systems; Laplace transform methods; computational methods for engineering analysis; least squares estimation; optimal mathematical models for physical systems.

Civ E 498/499 S,F,W 1S/1S 0.0/0.0
Seminar
The engineer in society. Principles, methods and practice of Civil Engineering. Informal lectures.
**Course Descriptions**

**Classics and Romance Languages**

**Assistant Professor and Chairman of the Department**

J. R. Dugan, BA, MA (Toronto), PhD (Yale)

**Classics**

(Department of Classics and Romance Languages)

**Classics Faculty**

**Professors**

P. Keresztes, MA (Toronto), PhD (Graz)
D. C. Mackenzie, BA, MA, PhD (Princeton)

**Associate Professor**

P. Forsyth, AB (Mount Holyoke), MA PhD (Toronto)
Recipient of the Distinguished Teacher Award

**Assistant Professors**

S. B. P. Haag, BA, MA (Queen's), MA (Waterloo), MPhil (Toronto)
R. L. Porter, BA (McMaster), MA, PhD (Princeton)

**Lecturer**

J. A. Casey, BA, MA (Toronto)

**Course Descriptions**

**Classical Civilization (Courses in Translation)**

- **C Civ 101 F 3C 0.5**
  **Colossos - The Major Figures of Ancient Greece**
  An introductory study of the achievement of ancient Greece through some of its most prominent figures. Each year **two** of the following will be featured: Theseus; The Minoan-Mycenaean Age of Bronze; Pericles and the Rise of Democracy; Socrates, Man and Martyr; Alexander the Great and The Age of Expansion.

- **C Civ 102 W 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: Caesar, Cicero and the Collapse of the Republican Ideal; Augustus: The Empire Rises; Nero and the Corruption of Power; Hadrian and the Imperial Machine.

- **C Civ 201 F 3C 0.5**
  **Ancient Greek Society**
  A survey of the civilization of Classical Greece, featuring such topics as the individual (male and female), political institutions, art, religion, philosophy, literature, social life and leisure activities.

- **C Civ 202 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.

- **C Civ 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 dept.**

- **C Civ 252 W 3C 0.5**
  **Roman History**
  A military, political, social, economic survey of Rome from earliest times to the Empire's fall. **This course is acceptable for credit by the History dept.**

**Note**

With regard to the preceding two courses, Classical Civilization 251 – Classical Civilization 252, the Classics Division will accept History 255 as an alternative for Classics credit. But a student may not take both History 255 and C Civ 251- C Civ 252.

- **C Civ 255 Mediaeval Civilization**
  Not offered 1979-80.

- **C Civ 256 Mediaeval Civilization**
  Not offered 1979-80.

- **C Civ 265 F 3C 0.5**
  **Classical Verse in Translation 1**
  Greek and Roman Epic and Early Tragedy. A study of the evolution of ancient epic from Homer to Vergil. The beginnings of the art of tragic drama will be studied through the plays of Aeschylus.

- **C Civ 266 W 3C 0.5**
  **Classical Verse in Translation 2**
  Tragedy and Comedy
  A study of Classical Greek tragic drama, featuring the plays of Sophocles and Euripides. The art of Greek comedy will be examined through the plays of Aristophanes. Roman dramatic art will be studied through the plays of Seneca and Plautus. (Same as Drama 251)

**Note**

Drama majors in this course will normally be required to do additional work on Aeschylus.

- **C Civ 271 F 3C 0.5**
  **Myths of the Gods, the World and Man**
  A survey of Greek and Roman myths concerning such topics as the birth of gods; the creation of the world; various divine dynasties; Zeus' struggles for supremacy; the twelve Olympians; Prometheus and the Fall; the Flood; and the Ages of men.
Course descriptions
Classics and Romance Languages
Classical Civilization

C Civ 272 W 3C 0.5
Ancient Legends, Heroes and Mystery Religions
Legends of the great Houses of the ancient world such as Mycenae, Troy, Thebes; of heroes, such as Achilles, Odysseus; of the Argonauts; of the sons of gods. Mystery religions, such as that of Mithras, will be discussed together with their relationship to Christianity.

C Civ 283 F 3C 0.5
History of Ancient Philosophy 1
From the beginnings to Plato. (Same as Phil 280)

C Civ 284 W 3C 0.5
History of Ancient Philosophy 2
From Aristotle to the close of classical antiquity. (Same as Phil 281)

C Civ 321 Forms of Classical and Neo-Classical Satire
Not offered 1979-80.

C Civ 322 Pastoral and Mythological Aspects of Classical and Neo-Classical Poetry
Not offered 1979-80.

C Civ 351 F 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. (Same as Fine Arts 310)

C Civ 352 W 3C 0.5
Roman Art and Architecture
A survey of the art and architecture of the Roman world from Etruscan to imperial times.

C Civ 371 F 3C 0.5
Christianity and the Roman Empire 1
The relationship between Christianity and the Roman Empire from the beginning to 200 A.D., including such topics as the trial of Christ, the trials of Paul, the burning of Rome in 64 A.D. and the subsequent outlawing of Christianity.

C Civ 372 W 3C 0.5
Christianity and the Roman Empire 2
A continuation of CCiv 371. Topics included are the persecutions by the Emperors Decius and Valerian, the Great Persecution, and the triumph of Christianity under the Emperor Constantine.

C Civ 381 From Diocletian to Constantine
Not offered 1979-80.

C Civ 382 Constantine the Great
Not offered 1979-80.

C Civ 384 W 3C 0.5
The Science and Technology of Ancient Greece and Rome
A survey of the scientific thought and achievements of the classical world in such areas as astronomy, anatomy, botany, zoology and medicine. The technological skills which produced and distributed raw materials, manufactured goods and agricultural products will also be examined.
Prereq: First year science or engineering course or C Civ 201-202 or permission of instructor.

C Civ 386 Classical Prose in Translation
Not offered 1979-80.

C Civ 401 Atlantis: The Making of Myth
Not offered 1979-80.

C Civ 480 Y 2S 1.0
Greek Civilization and History
Senior seminar. An in-depth study of various problems and aspects of Greek Civilization and History.

C Civ 490 Roman Civilization and History
Not offered 1979-80.

C Civ 492-498 0.5
Senior Tutorials
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
(Department of Classics and Romance Languages)

Grk 100 Y 3C 1.0
Introductory Ancient Greek
A course designed for students beginning the study of ancient Greek or who have not yet reached the level expected in Greek 251. The aim is to attain as rapidly as possible the ability to read simple prose. The emphasis is on forms and structure: reading of connected passages will begin early in the first term.

Grk 251 F 3C 0.5
Greek Composition and Grammar
Translation, composition, and review of basic grammar, with intensive analysis of selected works.
Offered 1979-80 at Wilfrid Laurier University.

Grk 252 W 3C 0.5
Introduction to Homer
Selections from the Odyssey.
Offered 1979-80 at Wilfrid Laurier University.

Grk 261 Introduction to Attic Prose
Not offered 1979-80.

Grk 266 Y 3C 0.5
Greek Composition and Literature
Translation, composition, and review of basic grammar, with intensive analysis of selected works.
Offered 1979-80 at Wilfrid Laurier University.
Grk 271 Hellenistic and Later Greek Literature
Not offered 1979-80.

Grk 351 Advanced Composition and Grammar
Not offered 1979-80.

Grk 361 The Drama of Euripides
Not offered 1979-80.

Grk 362 F 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.
Prereq: one full 200 level Greek course.

Grk 371 An Introduction to the Greek Historians
Not offered 1979-80.

Grk 372 W 3C 0.5
Herodotus
Selections from the Persian Wars.

Grk 452 Homer
Not offered 1979-80.

Grk 451 The Drama of Aeschylus
Not offered 1979-80.

Grk 462 The Comedy of Aristophanes
Not offered 1979-80.

Grk 471 Thucydides
Not offered 1979-80.

Grk 481 The Philosophy of Plato
Not offered 1979-80.

Grk 482 The Philosophy of Aristotle
Not offered 1979-80.

Grk 490-499 Directed Studies
Not offered in 1979-80.

Latin
(Department of Classics and Romance Languages)

Lat 150 Y 3C 1.0
A Survey of Latin Literature
A general survey of Latin prose and poetry from its
beginnings to the Fall of the Roman Empire. The literary
achievement of Rome will be examined mainly through
selections in Latin with occasional readings in
translation.
Prereq: year 5 Latin, Lat 100, or instructor's permission.

Lat 251 F 3C 0.5
Latin Composition and Grammar
Composition, translation, basic grammar with intensive
analysis of selected works.

Lat 262 Latin Prose 2
Not offered 1979-80.

Lat 272 An Introduction to Vergil
Not offered 1979-80.

Lat 281 Latin Poetry 1
Not offered 1979-80.

Lat 282 W 3C 0.5
Latin Poetry 2
Selections from Ovid and Martial.

Lat 351 Cicero
The life and works of Cicero; his historical importance
and his contribution to Latin literature. Selections from
various works.

Lat 362 W 3C 0.5
Lucretius
Selections from the De Rerum Natura.
Offered 1979-80 at Wilfrid Laurier University

Lat 363 W 3C 0.5
Roman Comedy
The study in Latin of at least one play by Plautus or
Terence; supplementary readings in translation.

Lat 371 An Introduction to the Roman Historians
Not offered 1979-80.

Lat 372 Tacitus
Not offered 1979-80.

Lat 381 Mediaeval Latin
Not offered 1979-80.
Course descriptions
Classics and Romance Languages
Latin/French

Lat 382 Mediaeval Latin
Not offered 1979-80.

Lat 461 Vergil 1
Not offered 1979-80.

Lat 462 Vergil 2
Not offered 1979-80.

Lat 471 Roman Elegy
Not offered 1979-80.

Lat 481 Roman Satire 1
Not offered 1979-80.

Lat 482 Roman Satire 2
Not offered 1979-80.

Lat 491-494
0.5
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.

French
(Department of Classics and Romance Languages)

French Faculty
Associate Professor and Chairman of the Department
J. R. Dugan, BA, MA (Toronto), PhD (Yale)

Professors
A. Ages, BA (Carleton), MA, PhD (Ohio State)
J. R. Finn, CR, BA (W. Ont.), MA (Toronto), PhD (Illinois)
J. R. L. Myers, BA (W. Ont.), MA, PhD (Johns Hopkins)

Associate Professors
J. J. Binamé, L'En Phil Rom, Agrégé (Brussels)
P. H. Dubé, BA, MA (Toronto), PhD (Ohio State)
J. LaFrance, BPaed, MA, PhD (Laval)
W. D. Wilson, MA, PhD (Trinity College, Dublin)

Assistant Professors
R. J. Fournier, BA, MA, PhD (W. Ont.)
D. W. Russell, BA, MA, PhD (Toronto)
P. Socken, BA (Toronto), MA (Iowa), PhD (Toronto)

Sessional Appointments
C. C. Abbott, BA, MA, PhD (Ohio State)
H. S. Fournier, BA (Toronto), MA, PhD (W. Ont.)
M. Hennig, BA, (W. Ont.), MA (Waterloo)

Co-ordinators
M. Levert-Phillips, BA en Péd. (Quebec), Graduée du conservatoire d'art dramatique de l'Université de Montréal, BA-UCAM (Montreal), MA (Waterloo)
N. Vassiliadis, Baccalauréat ès Arts, Licence ès Lettres (Laval), MA (Toronto)

Waterloo at Laval
There is an arrangement between the Department and the Université Laval, at Québec, whereby Waterloo students may study for a year or a term at Laval. Further particulars may be obtained from the Department.

First-Year French Courses
Students should read the following carefully in order to enrol initially in the appropriate course. When in doubt, consult the Department.

Level 1: Courses for Students Who have not Completed High School Year 5 French

Fr 151 F, S 3C, 1L 0.5
Basic French
An elementary French language course designed to give a comprehensive approach to French language study to the student who does not have the equivalent of High School Year 5 French. Involves reading, writing and speaking French. Successful completion of Fr 151 qualifies a student to take Fr 152.

Note
Students will be placed into sections appropriate to their ability and background in French.
Also offered at St. Jerome's College.

Fr 152 W 3C, 1L 0.5
Basic French
A continuation of the work done in Fr 151. Successful completion of Fr 152 qualifies a student to take Fr 191 or Fr 192.
Prereq: Fr 151 or consent of Department
Also offered at St. Jerome's College

Note
Students completing Fr 152 with high standing may petition the Department for admission into the General French or Honours French Degree programmes.

Level 2: Courses for Students who Normally Have Completed High School Year 5 French, or who Have Otherwise Acquired an Equivalent Command of French

Note 1
Students wishing to enroll in these courses will be required to take the French Language Placement Test administered by the Department at the beginning of the Fall term. **(see note below)**

Note 2
Credit will not be awarded to any student for more than one of Fr 191 or 192.
Course descriptions
Classics and Romance Languages
French

Note 3
Successful completion of any course at this level automatically entitles the student to register in the General or Honours Degree programme in French.

Fr 191 Y 4C,1L 1.0
French Language and Literature
This intensive course taught in French, has two components: a) French language: emphasis on oral expression, comprehension, reading and writing; b) Lectures and discussion on a representative selection of French literature. 2 hours language study, 1 hour lab., 2 hours lecture.
Prereq: Year 5 French, Fr 152 or consent of Department. Also offered at St. Jerome's College

Fr 192 Y 4C,1L 1.0
French Language
A very intensive French language course, taught in French. Emphasis will be placed on strengthening oral expression, comprehension of spoken French, reading and writing skills.
Prereq: Year 5 French, Fr 152 or consent of Department.

Fr 192A F 4C,1L 0.5
French Language
Fall term of Fr 192; see note below

Fr 192B W 4C,1L 0.5
French Language
Winter term of Fr 192; see note below

Note
These half-courses are available only to students in the co-operative System or with the permission of the Department.

Note 2
There is no follow-up to Fr 199. Students wishing a basic French course leading to further courses should see Fr 151.

Note 3
Successful completion of Fr 199 will satisfy the "reading knowledge of French" requirement of University of Waterloo Graduate programmes.

Second-Year French Courses
Language
Fr 205 F,W 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: normally one of: Fr 152, 191, 192, 192R, or consent of Department.

French for Reading Knowledge
Fr 198 F 3C,1L 0.5
Reading French (Formerly Fr 101)
An elementary course, taught in English, designed to give the student a rapid and adequate reading knowledge of French. Basic elements of French sentence structure are explained, and reading passages from diverse academic disciplines are studied. This course will not give the student training in oral French.
Prereq: Consent of the Department.

Note
This course is intended for students who have never had French before. Students must have an adequate knowledge of the English language to enroll in this course.

Fr 199 W 3C,1L 0.5
Reading French (Formerly Fr 102)
A continuation and completion of the work begun in French 198 (formerly Fr 101).
Prereq: Fr 198, Fr 101 or consent of the Department.

Note 1
This course is intended for students who have never had French before. Students must have an adequate knowledge of the English language to enroll in this course.

Note 2
There is no follow-up to Fr 199. Students wishing a basic French course leading to further courses should see Fr 151.

Note 3
Successful completion of Fr 199 will satisfy the "reading knowledge of French" requirement of University of Waterloo Graduate programmes.
Course descriptions
Classics and Romance Languages
French

Fr 206 W, S 3C, 1L 0.5
Spoken French
Continuation and completion of work begun in Fr 205.
Prereq: Fr 205 or consent of Department.

Fr 207 F, S 3C, 1L 0.5
Spoken French
Advanced level for continued 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.
Prereq: Fr 206 or the consent of the Department.

Fr 208 W 3C, 1L 0.5
Spoken French
Continuation and completion of work begun in Fr 207.
Prereq: Fr 207 or consent of the Department.

Note 1
Each classroom section of this course will be limited to a maximum enrolment of 12 students.

Note 2
A student registered in the General French or Honours French Degree programmes may include this course as one of his/her non-French electives (regardless of the number of times he/she may repeat). He/she may not count this course as one of the French courses required to complete his/her degree.

Fr 250 Y 3C, 1L 1.0
French Language
Continued training in spoken and written French, with a concentration on more difficult problems of the language.
Prereq: Fr 191, Fr 192 or consent of Department.

Fr 251 F 3C, 1L 0.5
French Language
Fall term of Fr 250; see note below

Fr 252 W 3C, 1L 0.5
French Language
Winter term of Fr 250; see note below

Note
These half-courses are available only to students in the co-operative System or with the permission of the Department.

Fr 255 F 2C, 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 191 or Fr 192.

Note
A student registered in the General French or Honours French degree programmes may include this course as a non-French elective. This course may not be counted as one of the French courses required to complete the major.

Literature
Fr 231 F 3C 0.5
Survey of Seventeenth Century French Literature
This course will trace the development of French literature from 1600-1700. This course is taught entirely in French.
Prereq: Fr 191, 192 or consent of Department.

Fr 232 W 3C 0.5
Topics and Problems in Seventeenth Century French Literature
A more detailed study of writers/works of the classical period. This course is taught entirely in French.
Prereq: Fr 191, 192 or consent of Department.

Fr 253 F 3C 0.5
Survey of Nineteenth Century French Literature
This course will trace the development of French literature from the French Revolution to the end of the nineteenth century. This course is taught entirely in French.
Prereq: Fr 191, 192 or consent of Department.

Fr 254 W 3C 0.5
Topics and Problems in Nineteenth Century French Literature
This course will study in depth one genre of the nineteenth century. This course will be taught entirely in French.
Prereq: Fr 191, 192 or consent of Department.

Fr 273 F 3C 0.5
Aspects of Québec
A presentation of traditional and contemporary Québec in the fields of the Arts, literature, music, politics and society. Taught in French.
Prereq: Fr 191, 192 or consent of Department.
Course descriptions
Classics and Romance Languages
French

Fr 274 W 3C 0.5
Survey of French-Canadian Literature
This course will trace the development of French-Canadian literature from its origins to the present. This course is taught entirely in French. Prereq: Fr 191, 192 or consent of Department.

Fr 291 F 3C 0.5
French and French-Canadian Civilization
This course traces the cultural development of France and Québec from their origins to the beginning of the Napoleonic Empire. Emphasis is given to the study of music, art, architecture, literature, ideas and "daily life" in their historical context.

Note
This course will be taught in English. It is open to Arts students in second year and higher, and to others in any year. Open to students majoring or honouring in French only with the permission of the Department.

Fr 292 W 3C 0.5
French and French-Canadian Civilization
This course completes the study of the cultural development of France and French Canada 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.

Note
See note under Fr 291.

Advanced Level French Courses
Language
Fr 300 Y 3C,1L 1.0
French Language
Advanced grammar and composition, including translation; oral practice and corrective phonetics. Prereq: Fr 250 or consent of Department.

Fr 301 F 3C,1L 0.5
French Language
Fall term of Fr 300 see note below

Fr 302 W 3C,1L 0.5
French Language
Winter term of Fr 300 see note below

Note
These half-courses are available only to students in the co-operative System or with the permission of the Department.

Fr 401 F 0.5
Advanced Language Study
Consult the Department for further details of this course. Prereq: Fr 300 or consent of the department

Fr 402 W 0.5
Advanced Language Study
Consult the Department for further details of this course. Prereq: Fr 401 or consent of Department

Fr 501 F 0.5
Problems of the French Language
Advanced training in stylistics and in problems of translation. Admission to the course by permission of the Department only.

Fr 502 W 0.5
Problems of the French Language
Advanced training in stylistics and in problems of translation. Admission to the course by permission of the Department only.

Literature Courses
Period Numbering System
Fr 409-419 Medieval Language or Literature
Fr 420-429 Renaissance Literature
Fr 230-239, 330-339, 430-439 17th Century French Literature
Fr 340-349, 440-449 18th Century French Literature
Fr 253-259, 350-359, 450-459 19th Century French Literature
Fr 360-369, 460-469 20th Century French Literature
Fr 270-279, 370-379, 470-479 French-Canadian Literature

Note 1
Please refer to the degree requirements outlined in the Faculty of Arts Programme Section, Chapter 7.

Note 2
Students registered in the General French degree programme must complete, one half-credit in at least three of the areas listed above, as well as Fr 300 or its equivalent.

Note 3
Students registered in the Honours French degree programme must complete, one half-credit in at least six of the areas listed above, as well as Fr 401/402 or their equivalent.
Note 4
Students registered in a Joint Honours programme combining French with another subject must complete one half-credit in at least five of the above areas, as well as Fr 401/Fr 402 or their equivalent.

Fr 342 W 3C 0.5
Survey of Eighteenth Century French Literature
This course will trace the development of French literature from 1700-1800. The course is taught entirely in French.

Fr 343 W 3C 0.5
Topics and Problems in Eighteenth Century French Literature
A more detailed study of one or more aspects of the Enlightenment. The course is taught entirely in French.

Fr 363 F 3C 0.5
Survey of Twentieth Century French Literature
This course will trace the development of French literature from 1900 to the present. The course is taught entirely in French.

Fr 364 W 3C 0.5
Topics and Problems in Twentieth Century French Literature
A more detailed study of one or more aspects of the modern period. The course is taught entirely in French.

Fr 375 W 3C 0.5
Contemporary French-Canadian Novel
A study of a limited number of texts by authors such as Gabrielle Roy; Anne Hébert; Jacques Godbout; André Langlais; Hubert Aquin; Gérard Bessette.
Taught in French.

Fr 409 F 3C 0.5
Medieval French Language
An introduction to the early development of French. Offered at St. Jerome's College.

Fr 410 W 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.

Fr 421 F 3C 0.5
French Prose of the Renaissance
Readings in sixteenth century literature: Rabelais, Montaigne, etc.
Course descriptions
Classics and Romance Languages
French/Italian

Fr 490-498 0.5
Senior Tutorials
By arrangement with the Department, an individual student or a small group of students follows a course of study under the supervision of a faculty member.

Italian
(Department of Classics & Romance Languages)

Italian Faculty
Assistant Professor
V. F. Golini, BA (McMaster), MA (Colorado) PhD (Berkeley)
Sessional Lecturer
A. Gualtieri, BA (Toronto), MA (Colorado)

The following courses are administered by St. Jerome's College

Ital 100J Y 3C, 1L 1.0
Introduction to Italian (Formerly Ital 110J)
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 101J F 3C, 1L 0.5
Introduction to Italian
Fall term of Ital 100J; see note below

Ital 102J W 3C, 1L 0.5
Introduction to Italian
Winter term of Ital 100J; see note below

Ital 190J Y 3C, 1L 1.0
Intermediate Italian (formerly Ital 210J)
Advanced study of grammar, conversation and an intensive study of one novel. Some finer points of grammar will be studied but will actually be a secondary aspect. A survey course in Italian literature of the Risorgimento (19th century) will be offered, giving special emphasis to the major writers of this period. Prereq: Ital 100J or consent of instructor.

Ital 191J F 3C, 1L 0.5
Intermediate Italian
Fall term of Ital 190J; see note below

Ital 192J W 3C, 1L 0.5
Intermediate Italian
Winter term of Ital 190J; see note below

Note
Ital 101J, 102J, 191J and 192J are available only to students in the co-operative system or with the permission of the Classics and Romance Languages Department of St. Jerome's College.

Ital 251J F 3C 0.5
Conversation and Composition
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 100J (101J/102J), or 190J (191J/192J), or permission of instructor

Ital 252J W 3C 0.5
Conversation and Composition
Continuation of Italian 251J. Prereq: See Ital 251J

Ital 291J F 3C 0.5
Italian Culture
This course, given in English, aims at giving the student a well-balanced view of Italy and her culture, through the study of her Geography, History, Religion, Literature, Arts, Music and her contribution to the world and to North America in particular. Prereq: Second year standing

Ital 292J W 3C 0.5
Italian Culture
A continuation of Ital 291J. Prereq: Second year standing

Ital 310J Y 3C 1.0
From Dante to Machiavelli
An intensive survey of major works from Dante to Machiavelli. Some attention will be given to examining the influence of Medieval and Renaissance Italian writers on European literature. Prereq: Ital 190J, or 191J/192J, or consent of instructor

Ital 320J Italian Literature from 1600-1800
Not offered 1979-80.

Ital 331J F 3C 0.5
Masterpieces of Italian Literature in Translation
Major authors will be studied to provide an understanding of the historical significance of Italian literature, especially the Medieval and Renaissance periods. Taught in English. No prereq.
Course descriptions
Classics and Romance Languages
Italian/Spanish

Ital 332J  W  3C  0.5
Masterpieces of Italian Literature in Translation
Continuation of Ital 331J.
Taught in English.
No prereq.

Ital 391J  F  2S  0.5
The Modern Italian Novel
A brief study of the development of the Italian novel since Manzoni with concentration on the novels just before and after World War II.
Prereq: Ital 190J, 191J/192J, or consent of instructor.

Ital 392J  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 190J, 191J/192J, or consent of instructor.

Ital 396J  F  2S  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.
No prereq.

Ital 397J  W  2S  0.5
Special Topics/Directed Readings
Winter term of Ital 396J
No prereq.

Spanish
(Department of Classics and Romance Languages)

Associate Professor and Chairman of the Department
J. R. Dugan, BA, MA (Toronto), PhD (Yale)

Spanish Faculty
Professor
J. C. McKeegney, BA (W. Ont.), MA (Oregon),
PhD (Washington), Diploma (Santander)

Associate Professor
C. M. Fernandez, Lic en Arq (Madrid), MA (Tulane),
D Lit et Phil Universitas Complutensis (Madrid)

Assistant Professor
B. Thalman, BA (DePauw), MA, PhD (Ohio State)

Lecturers
L. Bigford, BA, MA (Toronto)

Span 101  F,W  3C,1L  0.5
Introduction to Spanish
For students with no previous knowledge of Spanish.
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.

Span 102  W,F  3C,1L  0.5
Introduction to Spanish
A continuation of Spanish 101.
Prereq: Span 101 or consent of Division.

Span 111  F  3D,1L  0.5
Conversational Spanish
Intensive oral and aural training with particular emphasis on comprehension and speaking. Intended for students with no knowledge of Spanish. Limited to a maximum of 20 students.

Span 191  F  3C,1L  0.5
Intermediate Spanish
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 101/102 or Grade 11 or 12 Spanish.

1 Students wishing to enrol will be required to take the Spanish Language Placement Test administered by the division at the beginning of the Fall term. This test is designed to assist the student in finding the language course level best suited to his/her needs. The Division reserves the right to refuse admission to any of its language courses on any level to a student who has, in the Division's view, attained a level of competence either inferior or superior to the levels of competence outlined in each course description.

Span 192  W  3C,1L  0.5
Intermediate Spanish
A continuation of Spanish 191.
Prereq: Span 191 or consent of Division.

Span 215  F  3C,D  0.5
Spanish Civilization 1
A survey in English of Spanish history from the earliest times to the 1970's, with emphasis on cultural aspects. Several lectures will be devoted to the role of women in the history of Spain, and to the influence of the Pilgrimage to the tomb of St. James in Santiago de Compostela. No knowledge of Spanish is required.
Span 216 W 3C,D 0.5
**Spanish Civilization 2**
A survey in English of Spanish art, architecture, music and literature from the Altamira cave paintings to Picasso and Miró in painting and García Lorca in literature. *No knowledge of Spanish is required.*

Span 217 **Spanish American Civilization 1**
Not offered in 1979-80.

Span 218 **Spanish American Civilization 2**
Not offered 1979-80.

Span 251 F 3C,D 0.5
**Composition and Conversation**
Intensive language study based on literary texts, including grammar, syntax, structure. Essay writing, speeches, discussion.
*Prereq: Span 191/192 or permission of Division.*

Span 252 W 3C,D 0.5
**Composition and Conversation**
A continuation of Span 251.
*Prereq: Span 251.*

Span 255 F 3C 0.5
**Survey of Spanish Literature**
A brief survey of Peninsular Spanish literature from the *Poema de Mio Cid* to the present.
*Prereq: Spanish 191/192.
Required of all majors and honours students. Prereq. to all 3rd- and 4th-year courses.*

Span 256 W 3C 0.5
**Survey of Spanish American Literature**
A survey of literary trends and most significant works from the Conquest to the present.
*Prereq: Spanish 191/192.
Required of all majors and honours students. Prereq. to all 3rd- and 4th-year courses.*

Span 265 F 3C 0.5
**The Spanish Short Story**
Selected stories from outstanding writers in Spain, primarily of the 20th century.

Span 266 W 3C 0.5
**The Spanish American Short Story**
Selected stories from outstanding writers in Spanish America of the 19th and 20th centuries.

Span 317 F 3C 0.5
**Verse and Drama of the Golden Age**
A study of one verse drama each of Lope de Vega, Tirso de Molina, and Calderón de la Barca; also outstanding sonnets of the period by Garcilaso, Herrera, Gongora, Lope and Quevedo.

Span 318 W 3C 0.5
**Prose Fiction of the Golden Age with Particular Reference to Cervantes**
A study of short selections from *Amadís de Gaula*, the *Diana* of Montemayor, *Lazarillo de Tormes*, and *Guzmán de Alfarache*, which will provide a background for *Don Quixote* in the second half of the course.

Span 341 **Romantic Drama and Poetry in Spain**
Not offered 1979-80.

Span 342 **The Spanish Novel of the 19th Century**
Not offered 1979-80.

Span 351 F 2C,D 0.5
**Advanced Composition and Conversation**
Writing of essays and discussion based on selected themes or topics relating to Spain or Spanish America.
*Prereq: Span 251/252.*

Span 352 W 2C,D 0.5
**Advanced Composition and Conversation**
A continuation of Span 351.
*Prereq: Span 351.*

Span 385 **Spanish American Poetry from the Conquest to Modernism**
Not offered 1979-80.

Span 386 **Modern Spanish American Poetry**
Not offered 1979-80.

Span 388 F 2C,D 0.5
**Aspects of Contemporary Spanish American Theatre**

Span 389 W 2C,D 0.5
**Women in Contemporary Spanish American Theatre**
A study of the nature and role of women in modern Spanish American Theatre. Works by men and women will be analyzed in which women are seen in constantly changing forms as earth mothers, sex objects and vehicles of expression of hope for political independence.

Span 395 **Spanish American Prose**
*Not offered 1979-80.*

Span 396 **Recent Spanish American Prose**
*Not offered 1979-80.*
Course Descriptions
Dance Group

Span 417 F 2C,D 0.5
Prose and Poetry of the Generation of '99 and Followers
A study of selected prose and poetry with emphasis on Unamuno, Ortega y Gasset, Antonio Machado, Juan Ramon Jimenez.

Span 443 Medieval Spanish
Not offered 1979-80.

Span 488 F 2C,D 0.5
Problems in Literary Criticism of Spanish American Literature: XVI-XIX centuries
A study of the major writers and literary theorists and their impact on Spanish American culture.

Span 489 W 2C,D 0.5
Problems in Literary Criticism of Spanish American Literature: XXth century
A study of the major writers and literary theorists of Contemporary Spanish American literature. A detailed look at the criticism of outstanding works complemented by the close scrutiny and critical analyses of literary texts.

Span 490-494 2T 0.5
Senior Tutorials
By arrangement with the Division, an individual student or a small group of students will follow a course of study under the supervision of a faculty member.

Span 495 The Novel in Mexico
Not offered 1979-80.

Span 497 W 2C 0.5
The Spanish American Novel Outside Mexico
A study of the most important novelists in South and Central America and Cuba, with emphasis on Icaza, Vargas Llosa, Carpinter and Benedetti.

Span 498 W R 0.5
Senior Honours Reading Course
Selected readings in Peninsular and/or Spanish American Literature from the origins to the present day. List distributed on student's declaration of honours programme. Tested by the whole Division at the end of the 4th year.

Note
By arrangement, 20th century Peninsular Literature and 400-level composition and conversation will be taught at Wilfrid Laurier University. Please check Cross-Registration procedures.

Dance Group

Assistant Professor, Chairman of Dance Group
R. Priddle, BPHE (Toronto), MSc (Springfield), MA (Waterloo)

Dean, Faculty of Human Kinetics and Leisure Studies
G. S. Kenyon, BPE (Br. Col.), MS (Indiana), PhD (NYU)

Assistant Professor and Undergraduate Officer
J. Officer, ARAAD (Adv. and ATC) (London)

Assistant Professor
R. Ryman, BA (York), MA (York)

Lecturers
D. Taplin, BA (Bennington), MFA (York)
Z. Wolofsky, BSc (McGill), MSc (S. Fraser)

Instructors
V. Galea, BSc (Waterloo)
D. King

Course Descriptions

Dance 110 F 2C,2std 0.5
Introduction to the Dance
Introduces the student to a broad perspective of Dance, (functional and expressive) in Western society and other societies. Emphasis on Work of Art in Western society.

Dance 111 W 2C,2std 0.5
The Elements of Dance
Discussion and experience in the material, content and form of a work of art. Studio. Problem solving in space, dynamics and rhythm.
Prereq: Dance 110 or consent of instructor

Dance 220 W 3C 0.5
Socio-cultural Study of Western Dance
Development and significance of dance as a social phenomenon in Western Society.
Prereq: Soc 101
Offered alternate years

Dance 221 W 3C 0.5
Socio-cultural Study of Non-Western Dance
Development and significance of dance as a social phenomenon in non-Western Society.
Prereq: Soc 101 or Anth 102
Offered alternate years

Dance 225 W 2C,2std 0.5
Dance Ethnology
Study of works of art in non-Western cultures, ie., India, Japan, China, Africa.
Prereq: Anth 102
Offered alternate years
Course Descriptions
Dance Group

Dance 230  F  2C,2std  0.5
Roots of Western Theatrical Dance
History and cultural significance of dance up to and including Fokine and Duncan.
Prereq: for Dance students: Hist 105 or consent of instructor

Dance 231  W  3C  0.5
History of Ballet in the Twentieth Century
A study of the factors affecting the Ballet in the 20th century from the advent of the Russians in Paris in 1909 to the influence of contemporary dance in recent years.
Prereq: Dance 230

Dance 233  W  2C,2std  0.5
A History of Modern Dance
This course examines the major choreographic innovators who have philosophically and stylistically shaped the Modern dance idiom.
Prereq: Dance 230

Dance 241  Benesh Notation 1
Not offered Fall 1979

Dance 242  F  3C  0.5
Labanotation 1
A theoretical and practical introduction to Labanotation
Prereq: Dance 294 or permission of instructor
Offered alternate years.

Dance 336  F  3C  0.5
Philosophy and Criticism Part 1
This course will examine the literature of Dance Criticism historically and stylistically, and cultivate some practical skills in writing dance criticism through various class exercises and performance reviewing.
Prereq: Dance 231 or 233

Dance 337  W  3C  0.5
Philosophy and Criticism Part 2
This course examines the writings of various philosophers on the subject of dance; various aesthetic theories and their application to dance; and aesthetic issues that arise in dance specifically.
Prereq: Phil 331 or Phil 333J or consent of instructor
Offered alternate years beginning Winter 1980.

Dance 341  Benesh Notation 2
Not offered Winter 1980

Dance 342  W  3C  0.5
Labanotation 2
The course examines the intermediate theoretical concepts of Laban's system for the graphic notation of human movement. Emphasis is given both to the reading and writing of notated dance scores, especially modern dance scores.
Prereq: Dance 242
Offered alternate years.

Dance 346  W  3C  0.5
Applied Movement Analysis (Part 1)
A theoretical and practical study of selected aspects of technique from an anatomical point of view.
Prereq: Kin 200, Dance 292 or 294 or equivalent
Offered alternate years.

Dance 347  Applied Movement Analysis (Part 2)
Not offered 1979-80.

Dance 351  W  2C,2std  0.5
Ballet choreography
Analysis and study of the themes and styles of 20th century ballets. Through film and studio experience, consideration is given to the adaptations of the classical idiom to the artistic trends of this century.
Prereq: Dance 111, 231 and 392
Offered alternate years.

Dance 358  W  2C,2std  0.5
A History of Modern Dance
This course examines the major choreographic innovators who have philosophically and stylistically shaped the Modern dance idiom.
Prereq: Dance 230

Dance 364  F  2C,2std  0.5
Developmental Aspects of Movement
A study integrating the cognitive and perceptual developments in children and adolescents as they relate to motor development. Primary emphasis is placed on investigating movement experiences suitable for children.

Dance 410/411
Research Project
An independant research project on an approved topic, supervised by a faculty member. Required of all students enrolled in Honours Dance.

Dance 470 includes an approved design and the completion of the first segment of the paper.
Prereq: depending upon the topic selected, the student is required to achieve at least 60% in appropriate courses. A complete listing is available in the departmental office. Dance 411 includes the completion of the project begun in Dance 410.
Prereq: Dance 410

Dance 412  W  3G  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: consent of faculty.
Course Descriptions

Drama

Dance 480  F,W  wkshp  0.5

Workshop Series
The following courses are designed to give the student an opportunity to take theoretical knowledges to the applied setting. Offerings each year are determined by student interests. Topics available include:

Dance 480  Court Dance
Dance 481  Ballet Choreography
Dance 482  Dance Notation Reconstruction
Dance 483  Modern Dance Composition
Dance 484  Dance with Children
Dance 485  Dance with Adolescents and Adults
Dance 488  Dance Production

The workshop series is open only to 3rd and 4th year Honours Dance students. Two workshops may be taken in the 480 series toward the Honours degrees.

Prereq: Permission of instructor

Technique Courses  0.25

Each of the following technique courses consists of two classes per week for one term. Students should consult with a faculty advisor concerning the applicability of these courses for entry into future courses and possible careers such as teaching.

Dance 191  Basic Ballet 1, F
Dance 192  Basic Ballet 2, W
Dance 193  Basic Modern Dance 1, F
Dance 194  Basic Modern Dance 2, W
Dance 197  Folk Dance, F
Dance 198  Basic Jazz 1, W
Dance 291  Basic Ballet 3, F
Dance 292  Basic Ballet 4, W
Dance 293  Basic Modern Dance 3, F
Dance 294  Basic Modern Dance 4, W
Dance 298  Basic Jazz 2, W
Dance 391  Elementary Ballet 1, F
Dance 392  Elementary Ballet 2, W
Dance 391A  Elementary Ballet 3, F
Dance 392B  Elementary Ballet 4, W
Dance 393  Elementary Modern Dance 1, F
Dance 394  Elementary Modern Dance 2, W
Dance 398  Elementary Jazz 1, W
Dance 491  Intermediate Ballet 1, F
Dance 492  Intermediate Ballet 2, W
Dance 493  Intermediate Modern Dance 1, F
Dance 494  Intermediate Modern Dance 2, W

Drama and Theatre Arts Group

Associate Professor, Chairman of the Department
W. R. Chadwick, BA, MA (Toronto), PhD (London)

Assistant Professor
M. van Dijk, BA, MA (Wellington), PhD (Toronto)

Lecturers
T. Bentley-Fisher, Drama Centre, London
J. M. Kelman, BA (Waterloo)
S. Lobez, Drama Centre, London

Part-Time Lecturer
P. Bentley-Fisher, Drama Centre, London

Course Descriptions

Note
Laboratory sessions and rehearsal periods may be added to any course at the discretion of the instructor.

Drama 101  F  3C  0.5
Introduction to the Theatre
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 102  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.
Limited Enrolment
Prereq: Drama 101 and permission of the department

Drama 221  F  4L  0.5
Intermediate Acting 1 (Drama 221 and Drama 222 formerly Drama 225)
An extension of Drama 102. This course stresses development of the actor through scene study.
Prereq: Permission of the instructor

Drama 222  W  4L  0.5
Intermediate Acting 2
An extension of Drama 221.
Prereq: Permission of the instructor

Drama 226  F  5L  0.5
Seminar in Voice & Movement 1
Prereq: Drama 101 and Drama 102

Drama 227  W  5L  0.5
Seminar in Voice & Movement 2
Prereq: Drama 101 and Drama 102
Drama 231 F 3LD 0.5  
**Design for the Theatre 1** (Fine 228B)  
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 101*

Drama 232 W 3LD 0.5  
**Design for the Theatre 2**  
An extension of the studies described in Drama 231, concentrating on the practicalities of set design.  
*Prereq: Drama 101 and Drama 243 or consent of instructor*

Drama 243 F 1C,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: Drama 101*

Drama 244 W 1C,2L 0.5  
**Introduction to Technical Production 2**  
An extension of the studies described in Drama 243.  
*Prereq: Drama 101*

Drama 251 F 3C 0.5  
**Survey of Dramatic Literature and Dramatic Theory 1** (cross-listed with C Civ 266)  
The Greek and Roman periods.  

Note  
*This and the next four courses divide the dramatic literature and theory of the Western world into five historical periods. Each course will cover about fifteen plays and the major works of dramatic theory of the period.*

Drama 252 3C 0.5  
**Survey of Dramatic Literature and Theory 2.** (Engl 232)  
The Middle Ages, the Elizabethans and Jacobians (excluding Shakespeare) and the Spanish Golden Age.

Drama 253 3C 0.5  
**Survey of Dramatic Literature and Theory 3.** (Engl 233)  
French neo-classicism, the Restoration period, the comedy of manners tradition through to the twentieth century.

Drama 254 3C 0.5  
**Survey of Dramatic Literature and Theory 4**  
The eighteenth, nineteenth and early twentieth centuries, romanticism and naturalism.

Drama 255 3C 0.5  
**Survey of Dramatic Literature and Theory 5.**  
The twentieth century from Brecht to the present.

---

Drama 261 F 4CL 0.5  
**Introduction to Directing 1**  
Analysis of production and performance problems from the director's point of view. Study in the principles of stage direction. Special projects in directing, including the production of a workshop production.  
*Prereq: Drama 101, and at least one dramatic literature class.*

Drama 262 W 4CL 0.5  
**Introduction to Directing 2**  
Consideration of problems involved in the directing of a production. Each student in the course will be required to form his own production company and mount a play.  
*Prereq: Drama 261, two dramatic literature classes and permission.*

Drama 301 F 3C 0.5  
**Script Interpretation 1**  
Advanced study and analysis of plays in the process of production covering selected periods and types of playwriting.  
*Prereq: Drama 101, and two dramatic literature classes.*

Drama 302 W 3C 0.5  
**Script Interpretation 2**  
An extension of the studies described above in 301.  
*Prereq: Drama 101, and at least two dramatic literature classes.*

Drama 306 (ABC) F std 0.5  
**Special Studies in Theatre Production 1**  
Production participation and the study of selected problems of theatrical production.  
*Prereq: Drama 101 and permission of play director.*

Drama 307 (ABC) W std 0.5  
**Special Studies in Theatre Production 2**  
See Drama 306.  
*Prereq: Drama 101 and permission of play director.*

Drama 321 F 4L 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 and Drama 222.*

Drama 322 W 4L 0.5  
**Advanced Acting 2**  
An extension of the studies described in Drama 321.  
*Prereq: Drama 321 or permission*

Drama 326A F 5L 0.5  
**Seminar in Voice**  
A continuation of Drama 226/227  
*Prereq: Drama 226/227*
Drama 326B  F  5L  0.5
Seminar in Movement
A continuation of Drama 226/227
Prereq: Drama 226/227

Drama 327A  W  5L  0.5
Seminar In Voice
A continuation of Drama 226/227.
Prereq: Drama 226/227

Drama 327B  W  5L  0.5
Seminar In Movement
A continuation of Drama 226/227.
Prereq: Drama 226/227

Drama 343  F  2L,2C  0.5
Theatre Technology 1
Advanced study of theory and practice of specific areas
of technology in the theatre.
Prereq: Drama 243 and Drama 244.

Drama 344  W  2C,2L  0.5
Theatre Technology 2
See Drama 343
Prereq: Drama 243 and Drama 244

Drama 348  Arts Administration 1
Not offered 79/80

Drama 349  Arts Administration 2
Not offered 79/80

Drama 351  0.5
Canadian Drama
A study of plays by such dramatists as Merrill Denison,
Robertson Davies, Gratien Gelinas (in translation),
James Reaney, John Coulter, George Ryga and Michael
Tremblay (in translation). Background for 20th-century
drama will be provided in lectures.
(Cross-listed with English 316)

Drama 361  F  std  0.5
Advanced Directing 1
Each student in the course will be required to form his
own production company and mount a play.
Prereq: Drama 261, 262 and at least three dramatic
literature classes and permission.

Drama 362  W  std  0.5
Advanced Directing 2
An extension of the studies described in Drama 361.
Prereq: Drama 361 and at least four dramatic literature
classes.

Drama 371  F  3C  0.5
Theatre History 1
A survey of theatre history from Classical Greece to
1600. Students are advised to take this course in their
third year.
Prereq: Drama 101

Drama 372  W  3C  0.5
Theatre History 2
An extension of studies described in Drama 371.
Prereq: Drama 101

Drama 406 (ABC)  F  std  0.5
Theatre Workshop 1
Participation in stage production for advanced
students.
Prereq: Permission of the play director and Drama 101.

Drama 407 (ABC)  W  std  0.5
Theatre Workshop 2
Participation in stage production for advanced
students.
Prereq: Permission of play director and Drama 101.

Drama 409  F  3C  0.5
Theatre Criticism
Study and practice of the criticism of theatre production
and performance.
This course will not normally be taken until the student’s
final year.

Drama 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 499  Y  T  1.0
Senior Seminar
Open only to drama honors students in their fourth
year. It is designed to give the student an opportunity to
complete a comprehensive presentation in his/her
major area of concentration.
Department of Earth Sciences

Professor, Chairman of the Department
C. R. Barnes, BSc (Birmingham), PhD (Ottawa)

Professor, President of the University
B. C. Matthews, BSc (Toronto), AM (Missouri), PhD (Cornell)

Professor, Dean of Science
R. N. Farvolden, MSc (Alberta), PhD (Illinois)

Professors
J. A. Cherry, BE (Sask.), MS (Cal. Berkeley), PhD (Illinois), PEng
P. Fritz, Dipl. Geol, Dr Rer Nat (Technische Hochschule Stuttgart)
P. F. Karrow, BSc (Queen's), PhD (Illinois)

Associate Professors
E. C. Appleyard, BSc (W. Ont.), MSc (Queen's), PhD (Cambridge)
E. O. Frind, BASc, MASC, PhD (Toronto), PEng
D. E. Lawson, BSc, MSc (New Br), PhD (Reading)
R. W. Macqueen, BA, MA (Toronto), PhD (Princeton)
A. V. Morgan2, BSc (Leicester), MSc (Calgary), PhD (Birmingham)
R. G. Roberts, BA (Cambridge), MSc, PhD (McGill)

Assistant Professors
P. Fransham, BSc (Sir G. Wms), MSc, PhD (McGill)
J. E. Gale, BSc, BED (Memorial), MSc (W. Ont.), PhD (Cal. Berkeley) PEng
R. W. Gillham, BSA (Toronto), MSc (Guelph), PhD (Illinois)
J. P. Greenhouse, BSc, MSc (Br. Col.), PhD (California)
R. J. Hebdal, BSc (McMaster), PhD (Br. Col.)
J. A. Legault, BSc, MSc (Ottawa), PhD (Oklahoma)
E. J. Reardon, BSc (St. Francis Xavier), PhD (Penn. State)

Adjunct Professors
P. H. von Bitter, MSc (Acadia), PhD (Kansas)
R. M. Brown, BSc (Bishops), PhD (McGill)
F. A. Prantl, BSc, MSc, PhD (Innsbruck)
R. L. Thomas, BSc, PhD (Wales)

Senior Demonstrators
J. L. Lang, BSc, MBA (Queen's)
L. Pauk, BSc, MSc (Masaryk)

1Earth Sciences and Biology
2Earth Sciences and Man-Environment Studies

Course Descriptions

Earth Sciences

Details of the undergraduate programmes offered by the Faculty of Science are to be found in Chapter 13.

Earth 121-122 or the consent of the instructor, is a prerequisite for all later courses in Earth Sciences. Second and third year courses usually involve field trips in the fall. All those majoring in Earth Sciences are required to take a two-week field camp at the end of the third year and attend a week-long field excursion at the start of fourth year (Expenses in excess of $100 are to be anticipated). 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 F 2C,3L 0.5
Geochemistry 1
Origin and abundances of elements. Chemical characteristics of sedimentary, igneous, and metamorphic rocks. The geological application and interpretation of geochemical data in sedimentary and exploration geochemistry.
Prereq: Earth 121-122 and Earth 231

Earth 231 F 2C,3L 0.5
Mineralogy and Crystallography
Prereq: Earth 121-122.
Course Descriptions
Earth Sciences

Earth 232 W.S 2C,3L 0.5
Petrography
Optical properties and identification of minerals under the microscope. 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 and reference to field trip collections.
Prereq: Earth 121-122

Earth 260 W.S 2C,3L 0.5
Introductory Structural Geology
Prereq: Earth 121-122

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 231, 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. Field trip and laboratory study of fossil collections.
Prereq: Earth 236

Earth 338 W 2C,3L 0.5
Rock Mechanics
Review of stress and strain, Mohr's circle, strength theories, laboratory tests, classification of rocks. Rock mechanics considerations in the construction of shafts, drifts, tunnels, foundations and rock slopes. Laboratory exercises will deal with uniaxial, triaxial, flexure, hardness and tensile testing of rock. Problem sets will be assigned.
Prereq: A course in Statics and Mechanics of deformable materials, or consent of instructor

Earth 342 F 2C,3L 0.5
Geomorphology

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 rock 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 113 and an introductory course in computer programming.

Earth 360 F 3C,2L 0.5
Applied Geophysics 1
An introduction to seismic, gravity, electric, electromagnetic and magnetic methods of exploration geophysics.
Prereq: Physics 111-112 or consent of instructor

Earth 368 F 2C 0.5
Geophysics 1 (Identical to Phys 368)
Prereq: Math 113, Phys 121-122 or equivalent
Course Descriptions
Earth Sciences

**Earth 369**  W  2C  0.5  
**Geophysics 2** (Identical to Phys 369)  
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 113 and Phys 121-122 or equivalent*

**Earth 370**  W  3C,2L  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  field lab  
**Field Camp**  
Ten day field camp at Whitefish Falls, held at beginning of spring term.

**Earth 421**  F  3C,3L  0.5  
**Geochemistry 2**  
An introduction to geochemical processes in the Earth’s crust. Thermodynamic principles are reviewed and applied to the understanding of sedimentary rocks, the hydrosphere and hydrothermal systems. The laboratory is analytically orientated and familiarizes students with techniques used in geochemical investigations. Introduction to radiometric dating.  
*Prereq: First year chem., Earth 221*

**Earth 427**  W  2C,3S  0.5  
**Crustal Evolution**  
An analytical critique of the plate tectonics theory, its historical development, the evidence on which it is based, past and present criticisms. Tectonic syntheses based on the theory in the light of world geology.

**Earth 432**  W  2C,3L  0.5  
**Precambrian Geology**  
The geology, tectonics, stratigraphy and history of the Canadian Precambrian Shield. The early evolution of the earth’s crust. The Precambrian time scale and problems of geochronology. Life, climate and physical conditions in Precambrian time.

**Earth 433**  W  2C,3L  0.5  
**Applied Sedimentology**  
The source, migration and sedimentary environment of hydrocarbons, exploration, types of traps, extraction. Carbonate sediments and their diagenesis. The environmental impact and control of recent sedimentation.  
*Prereq: Earth 333*

**Earth 434**  F  2C,3S  0.5  
**Biostatigraphy**  
Methods of using paleontological data to solve stratigraphic problems. Faunal provinces in space and time. Effects of continental drift and climatic change on biogeography through the Phanerozoic.  
*Prereq: Earth 236*

**Earth 435**  W  3C,2L  0.5  
**Advanced Structural Geology**  
The geometry, kinematics and dynamics of structural geology. The relationship of structures from the microscopic to the megascopic scale; statistical studies of structural elements.  
*Prereq: Earth 260*

**Earth 436**  Y  5L  1.0  
**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,3Wkshp  0.5  
**Engineering Geology**  
Review of basic concepts in soil and rock mechanics. Field and laboratory methods used to define and characterize the properties of geological materials and the use in selected engineering geologic design and construction problems. Laboratory assignments will focus on the determination of physical properties and site assessment problems.

**Earth 438**  F  3C,1T  0.5  
**Groundwater Geology**  
The location, exploitation, and conservation of Groundwater. Groundwater-surface water interactions, effect of man’s activities on ground water quality, hydrogeologic aspects of subsurface waste disposal.

**Earth 439**  F  2C,3L  0.5  
**Quaternary Geology**  
Stratigraphy and history of Quaternary Period with emphasis on glaciation. Laboratory studies on glacial deposits. Field trips. A previous course in geomorphology is recommended.

**Earth 446**  W  3C  0.5  
**Numerical Methods in Geoscience**  
*Prereq: Math 113 and an introductory course in computer programming.*
Course Descriptions

Economics

Department of Economics

Professor, Chairman
J. H. Hotson, BA (Colorado College), MA, PhD (Penn)

Associate Professor, Associate Chairman
A. R. Olsen, B Comm (Sir G. Wms), MBA (W. Ont.)

Professor, Graduate Officer
L. Needleman, MA (Oxford), PhD (Glasgow)

Assistant Professor, Undergraduate Officer
G. W. Russell, B. Comm, MBA, (McMaster), RIA

Associate Professor, Director of the Accounting Programmes
R. A. Long, B. Comm (Br. Col.), MBA (Washington), CA

Professors
S. K. Ghosh, B. Sc, MSc (Calcutta), MS, PhD (Wisconsin)
A. Koutsoyiannis, BA (Athens), PhD (Manchester)
Recipient of the Distinguished Teacher Award

Associate Professors
K. M. Bennett, BA, MA (Queen's), PhD (McGill)
D. T. Carter, BComm, MBA, (Windsor), CA
F. P. Dougherty, BComm (Sir G. Wms), MSc, (Clarkson),
PhD (Penn State), CA (on leave of absence: July 78-June 79)
L. P. Fletcher, BComm (Mount Allison), AM, PhD (Brown)
H. M. Herauf, BComm (Sask), MBA, (Mich.), CA
R. R. Kerton, BComm (Toronto), MA (Carleton),
PhD (Duke), (on sabbatical: July 78-June 79)
N. E. Lavigne, CR, BA (W. Ont.), MComm (Ottawa),
MBA (Detroit), J
W. R. Needham, BComm (Carleton), MA, PhD (Queen's)
W. R. Thirsk, BA, MA (Br. Col.), PhD (Yale)

Assistant Professors
A. A. Andrikopoulos, BA (Athens), MA (Wayne State),
PhD (Southern California)
J. Brox, BA (Toronto), MA, PhD (McMaster)
J. E. Cuenca, LIC (Madrid), MA (Western Michigan),
PhD (Toronto)
S. W. Kardasz, BA (Loyola), PhD (Queen's)
T. Shastri, BComm (Osmania), LLB (Bombay),
MBA (McMaster), RIA, CA
S. Shinohara, BA (Tokyo), MA (Chicago), PhD (Waterloo)

Lecturers
E. Carvalho, BA, MA (Waterloo)
S. J. Glover, RMath, (Waterloo), CA
E. W. Lau, BA (Toronto), MA (Manchester)
P. A. Smith, BSc; (Liverpool), MBA (W. Ont.), CChem, CA
K. Stollery, BA (Southern California), MA (Queen's)
Adjunct Faculty
D. G. Craig, BMath (Waterloo), CA
I. D. Duncan, BSc, MBA (York), RIA
A. H. Headlam, FCA
W. D. Jenkins, BA: LLB (W. Ont.)
R. F. Kilmnik, BA (Waterloo), MBA (McMaster) CFA
G. A. Sheehan, MBA, PhD. (W. Ont.), CA
K. A. Tambling, BSc (McGill), MBA (W. Ont.)

Course Descriptions

Some Economics courses do not have a “term offered” indicated. This information will be available at pre-registration and students can confirm the “term offered” with their Departmental advisor.

The “normal” number of lectures per week in each course is three; however each instructor determines how often his particular class will meet.

Econ 100a/100b  F,W  3C 0.5/0.5
Introduction to Modern Economics
A study of the principles of modern economics that contribute to an understanding of the operation of the Canadian economy. Micro-and macro-concepts are integrated in a Post-Keynesian framework.

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 capitalistic enterprise system, the economic role of government, the composition of, pricing of national output, pricing of productive factors, and income distribution. Also offered at St. Jerome’s College.

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. Also offered at St. Jerome’s College.

Econ 103 Introduction to Economic Concepts and Current Problems
Not offered 1979/80.

Econ 191  F,W,S  2C,1L 0.5
Introduction to Financial Accounting 1
Recording transactions; measuring income; preparation and analysis of financial statements; accounting for assets, liabilities, and owner equity.

Econ 192  F,W,S  2C,1L 0.5
Introduction to Financial Accounting 2
Analysis of accounting principles; preparation of statements of sources and uses of working capital; cash flow analysis; basic concepts associated with manufacturing and responsibility accounting and budgeting.
Prereq: Econ 191

Econ 193/194  F,W  3C 0.5/0.5
Economics and the Administrator 1, 2
The course is designed to present an opportunity to examine and discuss a broad range of situations where analysis and decision making are required. The course divides into five parts: financial function, personnel administration, production/services function, information and marketing function, and general administration in business, non-profit organizations, and the government sector.
Prereq: Econ 190 is a prereq. for Econ 194 and should be taken prior to P Sci 231

Econ 201  F,W  3C 0.5
Microeconomic Theory
Theory of consumer demand; production theory; market structure; resource pricing and allocation under perfect and imperfect competition.
Prereq: Econ 101 or Econ 100a

Econ 202  F,W,S  3C 0.5
Macroeconomic Theory
Theory of the determination of the level of national income, employment and the price level.
Prereq: Econ 102 or Econ 100b

Econ 211  F,W  3C 0.5
Mathematics for Economists
Application of elementary mathematics to problems in economic theory. Topics include the graphing of functions, elementary exponential and logarithmic functions and differentiation - all developed within the context of economic theory.
Prereq: Econ 101/102 or Econ 100a/100b

Econ 221  F,W  3C 0.5
Statistics for Economists
An introduction to the underlying logic of statistical procedures most commonly employed by economists. No mathematical training beyond high school algebra is presumed. Emphasis is given to solving problems as a way of learning statistical theory.
Prereq: Econ 101/102 or Econ 100a/100b
### Department of Economics: Course Offerings

<table>
<thead>
<tr>
<th>1st Year</th>
<th>2nd Year</th>
<th>3rd Year</th>
<th>4th Year</th>
<th>Subject Areas</th>
</tr>
</thead>
<tbody>
<tr>
<td>100 Intro. Modern Economics</td>
<td>201 Microeconomic Theory</td>
<td>301 Intermediate Microeconomics Theory</td>
<td>401 Advanced Economic Theory</td>
<td>Economic Theory</td>
</tr>
<tr>
<td>101 Intro. Micro-Economics</td>
<td>202 Macroeconomic Theory</td>
<td>302 Monetary Theory and Banking</td>
<td>402 Economic Cycles and Stabilisation Policy</td>
<td></td>
</tr>
<tr>
<td>102 Intro. Macro-Economics</td>
<td></td>
<td>303 Economic Thought</td>
<td>403 Econ. Analysis, Forecasting, and Public Policy</td>
<td></td>
</tr>
<tr>
<td></td>
<td>211 Mathematics for Economists</td>
<td></td>
<td>411 Mathematical Economics</td>
<td></td>
</tr>
<tr>
<td></td>
<td>221 Statistics for Economists</td>
<td></td>
<td>413 Economic Growth Theory</td>
<td>Quantitative Economics</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>421 Econometrics 1</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>422 Econometrics 2</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Economics</td>
<td>332 International Monetary Theory</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>333 Interregional Economics</td>
<td>432 International Economic Policy</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>335 Economic Development</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>341 Public Finance</td>
<td>441 Economics of the Public Sector 1</td>
<td>Public Economics</td>
</tr>
<tr>
<td></td>
<td></td>
<td>343 Urban Economics</td>
<td>442 Economics of the Public Sector 2</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>345 Industrial Organisation</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>347 Economics of Transportation and Communication</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>353 Population Economics</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>355 Energy &amp; Natural Resources</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>357 Environmental Economics</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>361 North American Economic History</td>
<td>461 Comparative Economic Systems</td>
<td>Economic History and Contemporary Problems</td>
</tr>
<tr>
<td></td>
<td></td>
<td>363 Contemporary Canadian Prob. 1</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>364 Contemporary Canadian Prob. 2</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>263 Canadian Economic History</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>381-389 Special Topics</td>
<td>Special Topics and Studies</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>481-489 Special Studies</td>
<td></td>
</tr>
<tr>
<td>191 Intro. Financial Accounting 1</td>
<td>291 Intermed. Fin. Accounting 1</td>
<td>391 Cost and Management Accounting 1</td>
<td>491 Advanced Accounting 1</td>
<td>Accounting and Administration Economics</td>
</tr>
<tr>
<td>193 Economics and the</td>
<td>293 Auditing</td>
<td>393 Corporate Finance 1</td>
<td>493 Taxation</td>
<td></td>
</tr>
<tr>
<td>Administrator 1</td>
<td>294 Business Law</td>
<td>394 Corporate Finance 2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>194 Economics and the</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Administrator 2</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
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 Econ 100a/100b

Econ 241  W  3C  0.5
Cost-benefit Analysis and Project Evaluation
Methods for evaluating private and public projects; decision rules, efficiency conditions and methods of conducting cost-benefit analysis. Application of the technique.
Prereq: Econ 201

Econ 263  W  3C  0.5
Economic History of Canada
A study of the economic development of Canada; export staple theory, industrial structure and national policies analysed in a Classical-Marxian framework.
Prereq: Econ 101/102 or Econ 100a/100b

Econ 266  F,W,S  3C  0.5
Intermediate Financial Accounting 1
Includes a review of the foundations of accounting theory and the accounting process. This is followed by in-depth treatment of the accounting problems associated with the asset side of the balance sheet. Included would be cash, temporary investments, accounts receivable, inventories, plant assets and intangibles.
Prereq: Econ 191, 192

Econ 269  F,W,S  3C  0.5
Intermediate Financial Accounting 2
The major subject matter of this course will be an in-depth treatment of the accounting problems associated with the equity side of the balance sheet. This would include bonds payable, pensions and leases, accounting for income taxes and shareholder's equity (including earning per share). The treatment of accounting changes and the statement of changes in financial position will also be covered.
Prereq: Econ 291

Econ 293  F,W  3C  0.5
Auditing
Internal and external auditing, its effects and uses. A study is made of budgeting, centralized and decentralized control, internal audit, performance measurement, the role of an external auditor, the techniques used by an external auditor, services available from a Public Accounting firm and the evaluation of the services provided.
Prereq: Econ 191, 192

Econ 294  F,W  3C  0.5
Business Law
Introductory course in law, including the following subjects: Law of contracts; Discharge, Breach, Misrepresentation; Business Organizations; Creation of a business, taxation, agency termination; duties of directors, rights of shareholders, safeguard to shareholders and creditors; commercial torts, estates, wills.

Econ 301  F,S  3C  0.5
Intermediate Microeconomics
Distribution theory; production, consumption and general equilibrium analysis; welfare economics.
Prereq: Econ 201

Econ 302  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 303  F  3C  0.5
Economic Thought
A critical survey of the development of economic thought from Adam Smith through J. M. Keynes.
Prereq: Econ 201, 202, 231

Econ 311  F,S  3C  0.5
Introduction to Mathematical Economics
Mathematical treatment of some micro - and macro - partial and general equilibrium models; programming and game theoretic techniques; stability analysis; simple growth models.
Prereq: Econ 201, 202, 211 (or Math 130)

Econ 321  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  3C  0.5
International Trade Theory
An examination of the modern theory of international trade. Topics include comparative advantage and the gains from trade, tariff theory, economic integration, and the interaction between international trade and economic growth.
Prereq: Econ 201, 231
Econ 332 W 3C 0.5
International Monetary Theory
The monetary aspects of international economic relations. Topics include analyses of the foreign exchange and international capital markets, the theory of balance of payments policy, monetary integration, and reform of the international monetary system.
Prereq: Econ 202, 231

Econ 333 F 3C 0.5
Inter-regional Economics
Application of economic theory to analyses of structural characteristics, growth and development in inter-regional systems. Models examined include input-output, export-base, shift-share, neo-classical, cumulative causation.
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 3C 0.5
Public Finance
The economic rationale of governmental activity; alternative measures of fiscal operations; the structure and economic effects of government revenues and expenditures; the role of fiscal policy in economic stabilization and growth.
Prereq: Econ 201

Econ 343 W 3C 0.5
Urban Economics
Application of economic analysis to location decisions of firms and households; discussion of policy problems, for example, urban renewal and housing.
Prereq: Econ 101 or Econ 100a (Econ 201 is recommended)

Econ 345 F 3C 0.5
Industrial Organization
An analysis of the characteristics of industrial structure, behaviour and performance with special reference to Canada. Competition and “rationalization” policy in Canada and other selected countries.
Prereq: Econ 201

Econ 347 Economics of Transportation and Communication
Not offered 1979/80

Econ 351 F 3C 0.5
Labour Economics
Wage theory, training and mobility theory; economics of information in Canadian labour markets; other investments in human capital; manpower policies.
Prereq: Econ 201

Econ 353 W 3C 0.5
Population Economics
Demographic techniques; economic interrelationships with fertility, mortality, morbidity; theory of an optimum population.
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. The political economy of the world’s supply of and demand for energy resources and major issues in Canadian energy policy will be considered.
Prereq: Econ 201 (Econ 241 is recommended)

Econ 357 W 3C 0.5
Environmental Economics
Application of economic theory to problems of the environment, in particular, air, water, and land pollution. Emphasis is on the theory of the management of common property resources.
Prereq: Econ 201

Econ 361 North American Economic History
Not offered in 1979/80

Econ 363/364 F, W 3C 0.5/0.5
Contemporary Canadian Problems 1, 2
A “topic oriented” seminar course. The class agrees to study a Canadian problem selected from a list that includes poverty, unemployment, industrial policy, and so forth. The format assists the student in gaining analytical skill through work on the selected topics.
Prereq: Econ 201, 202

Econ 381-389 3S 0.5 each
Special Topics
One or more special half courses will be offered at different times as announced by the Department.
Prereq: Consent of Instructor

Econ 391/392 F, W, S 3C 0.5/0.5
Cost and Management Accounting 1, 2
Accounting and reporting of costs for inventory valuation and management control. Introduces product costing, overhead cost analysis, standard cost systems and responsibility accounting. Emphasis is placed upon the use of accounting information for decision making.
Prereq: Econ 191, 192
Econ 391 is a prereq. for Econ 392
Econ 393/394  F,W,S  3C  05/0.5
Managerial Finance 1,2
An introductory conceptual framework for decision making in financial management. Emphasis is placed upon the investment problem in long term assets, capital structure and dividend policy. Techniques studied will be applied to actual case situations.
Prereq: Econ 101, 102, 191, 221
Econ 393 is a prereq. for Econ 394

Econ 401  F  3C  0.5
Advanced Economic Theory
Production and Consumption theory; advanced theory of oligopoly; price competition; non-price competition; growth decisions of the firm; financial decisions of the firm; income distribution; general equilibrium analysis.
Prereq: Econ 301, fourth-year standing

Econ 402  W  3C  0.5
Economic Cycles and Stabilization Policy
Theory of economic policy, business cycles, inflation and unemployment problems, and balance of payments analysis.
Prereq: Econ 301, 302, fourth-year standing

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 in the impact of policies, and so forth.
Prereq: Econ 301, 302, 321

Econ 411  Mathematical Economics
Not offered 1979/80

Econ 413  W  3C  0.5
Economic Growth Theory
Classical, neoclassical, and Cambridge theories of growth, study of production, technical progress, and consumption; aggregate and two-sector models of growth; growth theory in an open economy.
Prereq: Econ 301, 302, 311

Econ 421/422  F,W  3C  0.5/0.5
Econometrics 1, 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 macroeconomics; empirical models.
Prereq: Econ 201, 202, 211, 221, 321

Econ 431  Advanced International Economics
Not offered 1979/80

Econ 432  W  3C  0.5
International Economic Policy
Analysis of selected policy problems, such as monetary and fiscal policy mix in open economies, optimum tariff policy, trade and environmental policies, trade in public goods and bads, international monetary reform, control of international capital flows, the multi-national firm, and so forth.
Prereq: Econ 301, 302, 331, 332

Econ 441  F  3C  0.5
Economics of the Public Sector 1
An overview of fiscal functions and institutions: the theory of social goods; expenditure and revenue structures; fiscal incidence.
Prereq: Econ 231, 301, 302, 341

Econ 442  W  3C  0.5
Economics of the Public Sector 2
Fiscal stabilization, fiscal federalism, public pricing, international public finance, social security and other contemporary policy issues.
Prereq: Econ 441

Econ 451  3C  0.5
Advanced Topics in Resource Economics
Advanced analysis of selected topics in the area of energy, land, and labour resources.
Prereq: Econ 201, 202, 231, 355

Econ 481-489  3S  0.5 each
Special Studies
Research and reading courses under the direction of individual instructors.
Admission by consent of instructor.

Econ 491  F,S  3C  0.5
Advanced Accounting 1
The major emphasis of the course is long-term intercorporate investments and Business Combinations. The balance of the course will deal with selected specialized accounting areas.
Prereq: Econ 291, 292

Econ 492  F,W,S  3C  0.5
Seminar in Financial Accounting Theory and Research
Analysis of the theoretical foundations of the financial accounting discipline including a survey of academic accounting literature with emphasis upon selected alternative models of accounting theory and the various methodologies and findings of selected accounting researchers. Canadian implications for accounting education will be examined.
Prereq: Econ 291, 292

Econ 493  Taxation
Not offered 1979/80
Department of Electrical Engineering

Professor, Chairman
I. F. Blake, BSc, MSc,(Queen's), MA, PhD (Princeton)

Professor, Associate Chairman for Graduate Matters
J. W. Mark, BASc (Toronto), MEng, PhD (McMaster)

Professor, Associate Chairman for Undergraduate Matters
R. S. Ramshaw, BSc, PhD (Nottingham)

Professor, Dean of Graduate Studies
L. A. K. Watt, BSc (Manitoba), MS (Chicago), PhD (Minnesota)

Professor, Director Computer Communications Network Group
E. G. Manning¹, MSc (Waterloo), PhD (Illinois)

Professors
R. G. Anthes, BASc, MASC (Toronto)
P. R. Bryant, MSc (London), MA, PhD (Cambridge)
S. G. Chamberlain, MSc, PhD (Southampton)
J. D. Cross, BSc (Cardiff) MS, PhD (Carleton)
E. L. Heassell, RSc, PhD (Imperial College, London)
R. H. MacPhie, BASc (Toronto), MS, PhD (Illinois)
S. N. Kaltre, BSc (Punjab), MS, PhD (Illinois)
H. C. Ratzi, RASC (Toronto), MS (MIT), PhD (Sask)
J. Reeve, BSc, MSc, PhD, DSc (Manchester)
D. J. Rouhston, BSc (Belfast), PhD (Imperial College, London)
K. D. Srivastava, BSc, BE (Hons) (Roorkee), PhD (Glasgow)
J. Vlach, Dipl Ing CSc (Technical University of Prague)
L. Y. Wei, BS (National Northwestern College, China), MSc, PhD (Illinois)

Associate Professors
J. D. Aplevich, BE (Sask), PhD (Imperial College, London)
Y. L. Chow, BEng (McGill), MASC, PhD (Toronto)
G. J. Dufault, BA (Ottawa), BSc (Carleton)
J. A. Field, BA (Sask), MASC, PhD (Toronto)
J. V. Hanson, BASc (Toronto), MSc, PhD (Imperial College, London)
T. Kameda, BSc, MS (Tokyo) PhD (Princeton)
J. S. Keeler, BASc, MASC (Toronto)
W. D. Little, BASc, MASC, PhD (Br. Col.)
J. C. Majithia, BSc(Hons) (London), MEng, PhD (McMaster)
W. N. Meikle, BASc, MASC (Toronto)
V. H. Quintana, BEng. (Chile), MSc (Wisconsin), PhD (Toronto)
R. G. van Heeswijk, Dipl Ing (Delft, Holland)

Assistant Professors
S. K. Chaudhuri, PhD (Manitoba)
M. I. Elmasry, BSc (Cairo), MASC, PhD (Ottawa)
W. J. Wilson, BE, MSc (Sask), PhD (Cambridge)

Visiting Professor
R. V. Patel, PhD (Cambridge)

Adjunct Professors
J. Carr, PhD (Waterloo)
A. I. Zaqhilou, PhD (Waterloo)

Faculty member holding cross-appointment as shown
¹Department of Computer Science

Course Descriptions

Electrical Engineering

El E 14 W,F 3C,3L 0.5
Electrical Engineering 1
Kirchoff’s Laws, mesh current equations, superposition theorem, measuring instruments, phasors, power distribution and three-phase circuits, power factor and its correction, magnetic circuits, transformers, introduction to dc and ac motors. Alternate weeks.
Prereq: Gen E 122, Math 110a & b, Math 114, or equivalent.

El E 32 W,S 3C,3L 0.5
Electrical Engineering 2
Introduction to electronic devices and their characteristics; integrated circuits; operational amplifiers; digital circuits and systems; electric power control using semiconductor devices and circuits; electronic instruments and instrumentation systems. Alternate weeks.

El E 116 W,S 2C,3L 0.75
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 Electrical Engineering and introduction to engineering design methods as applied to Electrical engineering and including specification development, information-gathering, concept formulation, feasibility analysis and report writing.
Year 1 Engineering

El E 201 F,W 1C 0.0
Seminar
General Seminar
EI E 202  F,S  1C  0.0
Seminar
General Seminar

EI E 205 (Math 211)  W,F  2C,2T  0.5
Advanced Calculus for Electrical Engineers 1
Differential calculus of several variables. Differential equations. Multiple integrals. Applications to Electrical Engineering will be stressed.

EI E 206 (Math 212)  S,F  2C,2T  0.5
Advanced Calculus for Electrical Engineers 2
Fourier series, partial differential equations, separation of variables, wave equations, heat equation and Laplace's equation. Fourier integral, properties of complex analytic functions, complex integration.

EI E 222  F,W  2C,1T,2L  0.5
Introduction to Digital Computers

EI E 233  F,W  3C,1T  0.5
Physical Electronics
Particle and wave theory of light, photoelectric effect, Compton effect. Structure of hydrogen atom; many-electron atoms. Solid state physics: semiconductors, n and p-type materials. Fermi levels, mass action law, charge neutrality, diffusion. Introduction to p-n junctions.

EI E 241  W,F  3C,2T  0.5
Electrical Networks 1
Introduction to network variables and laws, resistors, sources and simple circuits; resistance networks; capacitors and inductors; first order circuits, sinusoidal steady state analysis.

EI E 261  F,S  3C,1T  0.5
Energy Processing and Conversion

EI E 271  S,F  3C,1T  0.5
Electric and Magnetic Fields
Vector analysis, Coulomb's law and electric field intensity; electric flux density; Gauss' law and divergence; energy and potential; conductors, dielectrics, capacitance; experimental mapping methods; Poisson's and Laplace's equations; the steady magnetic field; magnetic forces, materials and inductance; time varying fields and Maxwell's equations.

EI E 293  W,F  1C,4L,T  1T  0.5
Measurement and Instrumentation 1
The principle objectives of this course are to introduce students to the methods and techniques for measuring electrical variables and parameters and to give them laboratory experience with electrical instruments, devices and networks. Instruments studied include oscilloscopes, multimeters, power supplies, dc and ac bridges, signal generators and electronic volt meters. The devices and networks include: linear and non-linear resistors, capacitors and inductors; RC, RL and RLC networks. 'Open Lab.'

EI E 294  S,F  1C,3L,T  1T  0.5
Measurement Instrumentation 2
Experiments related to material covered in courses EI E 261 and EI E 271 will be performed. This course also includes further topics on instrumentation and measurement techniques. 'Open Lab.'

EI E 301  W,S  1C  0.0
Seminar
General Seminar

EI E 302  F,W  1C  0.0
Seminar
General Seminar

EI E 316  W,S  2C,2T  0.5
Probability and Statistics
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.

EI E 317  W,S  2C,1T  0.5
Signal Analysis Methods
Fourier Series, Periodic functions, Fourier transforms, non-periodic functions, the discrete Fourier transform, discrete time sequences, the Z transform, discrete time systems.
EI E 323  F,W  2C,1T,2L  0.5  
Principles of Digital Circuits and Systems  
Review of switching algebra. Analysis and synthesis of  
combinational circuits. Karnaugh maps. The TTL family  
of IC’s. Design with MSI and SSI chips (decoders,  
selectors, counters, registers). Design of clocked  
sequential circuits. Hardwired and microprogrammed  
controllers. Applications of semiconductor memories.  
'Open  
Prereq: EI E 222 or equivalent.

EI E 342  W,S  2C,2T  0.5  
Electric Networks 2  
Review of sinusoidal steady-state, node, and mesh  
analysis; the Laplace transformation and applications;  
transient response of second and higher order circuits.  
Prereq: EI E 241 or Equivalent

EI E 351  W,S  2C,1T,3L  0.5  
Electronic Devices  
Review of semiconductor properties, Boltzmann  
relations. Derivation of d.c. and a.c. characteristics of  
p-n junctions and bipolar transistors. Small and large  
signal models. Introduction to field effect transistors.  
'Alternate weeks.  
Prereq: EI E 233 or equivalent

EI E 352  W,S  2C,1T,3L  0.5  
Electronic Circuits  
Large-signal amplifiers; biasing networks and stability,  
single and multi-stage small-signal amplifiers; the  
hybrid-pi model; high and low frequency effects;  
feedback amplifiers and stability criteria; oscillators;  
oise in electronic circuits. 'Alternate weeks.

EI E 362  W,S  2C,1T,3L  0.5  
Energy Conversion  
Electric motors and generators. 'Alternate weeks  
Prereq: EI E 261

EI E 372  W,S  2C,1T,3L  0.5  
Transmission Lines and Electromagnetic Fields  
Transmission lines; distributed parameters;  
telegrapher’s equations; sinusoidal waves; terminated  
lines, matching with the Smith Chart; Electromagnetic  
Fields; Maxwell’s equations; plane waves; reflection  
and refraction; Poynting vector; waveguides.  
'Alternate weeks.

EI E 380  W,F  2C,2T,3L  0.5  
Introduction to 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.  
'Alternate weeks

EI E 401  F,S  1C  0.0  
Seminar  
General Seminar

EI E 402  W  1C  0.0  
Seminar  
General Seminar

EI E 407  W  2C,2T  0.5  
Numerical Methods  
Fundamentals of numerical methods, solution of  
non-linear equations, polynomials and zeros of  
polynomials, matrix methods and systems of linear  
algebraic equations, interpolation, estimation of  
parameters by least squares, numerical integration,  
solution of ordinary differential equations.

EI E 416  F,S  2C,1T,1L  0.5  
Communication Systems  
Review of signal analysis in linear systems, linear and  
exponential modulation and demodulation; double-sideband and single-sideband modulation; FM  
spectra. Noise and distortion in circuits, amplifiers, and  
channels; receiver noise, noise figure and noise  
temperature. Performance of analogue communication  
systems in the presence of noise. 'Open

EI E 419  W  2C,1T,1L  0.5  
Digital Communications  
Sampling and quantization. Analog pulse modulations,  
PAM and PDM. Data transmission and digital data  
systems. Pulse code modulation systems; delta  
modulation. Noise and errors in pulse communications  
Matched filters, probability of error and correlation  
detection. Intersymbol interference, distortion and  
equalization. Signal design and transmission line  
coding. Introduction to channel capacity and error  
control coding. 'Open

EI E 425  S,F  2C,1T,1L  0.5  
System Simulation  
A study of computer simulation techniques; principles  
of analog computation; models, scaling procedures;  
digital simulation languages, computer simulation and  
investigation of continuous systems; differential  
equations, transfer functions, boundary value  
problems; application of hybrid computers. 'Open

EI E 426  W  3C,3L  0.5  
Software Engineering  
Block structured languages (Algol), actual and formal  
parameters, recursion, formal description, relationship  
to machine code. Structured programming. Data  
structures, arrays, lists, stacks, associative structures.  
Searching and sorting. Compilers. Operating system  
organization, co-operating processes, process  
synchronization primitives.  
Prereq: EI E 324 or equivalent
Course Descriptions
Electrical Engineering

ElE 427 S,F 2C,2L 0.5
Digital Hardware Engineering
Design of digital systems using MSI/LSI chips.
Prereq: ElE 221, ElE 324 or equivalent

ElE 434 W 2C,2T 0.5
Quantum Electronics and Magnetics
Ferromagnetism, ferrimagnetism, diamagnetism and paramagnetism, electron-spin resonance, core and bubble memories.

ElE 435 S,F 2C,2T 0.5
Semiconductor Devices 1
This course deals with the theory and characteristics of modern semiconductor devices, SCRs, power rectifiers, MOSFETs, JFETs, radiation detectors, solar cells, LEDs, CCDs, IMPATT and Gunn effect devices, step recovery diodes, P-I-N diodes, Schottky diodes, memory devices.

ElE 436 W 3C,1T 0.5
Semiconductor Devices 2
Techniques for the design and realization of discrete and integrated circuit elements, bipolar, JFET and MOSFET models. Integrated circuit biasing. Design and implementation of logic circuit elements.
Semiconductor memories; RAMs, ROMs, shift registers.

ElE 443 W 3C,1T 0.5
Electric Networks 3
Topics from the following: general passive network functions; passive driving point functions; resistance functions and reactance networks; scattering parameters, reactive passive filters; active networks and active filters, digital filters.
Prereq: ElE 342 or equivalent.

ElE 446 S,F 2C,2T 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.

ElE 453 W 2C,1T,3L 0.5
Linear Electronic Circuits

ElE 454 S,F 2C,1T,1L 0.5
Nonlinear Electronic Circuits
Switching characteristics of semiconductor devices, non-sinusoidal wave generation and shaping, voltage and current sweeps, binary circuits and gates, digital integrated circuits, DCTL, DTL, ECL, T*L and PL.

ElE 459 W 2C,1T,3L 0.5
Sound, Noise and Electroacoustics
An interdisciplinary study of acoustical physics, human response to sound and audio engineering. Main topics include: the physics of sound, electroacoustical systems, human audiology, acoustical measurements, audio electronics and applications. Every third week

ElE 463 F,S 2C,1T,1L 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. Alternate weeks.

ElE 464 W 3C,3L 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 co-ordination. Alternate weeks

ElE 465 W 2C,2T 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.
EI E 473 W 2C,1T,3L 0.5
**Microwave Engineering**
Rectangular and circular waveguides; simple waveguide discontinuity; periodic transmission systems; microwave scattering theory; ferrite components; klystrons; travelling-wave amplifiers; backward-wave oscillator, magnetron; solid-state microwave devices.
*Every third week.*

EI E 474 F,S 2C,1T,1L 0.5
**Antenna and Propagation 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; ground wave propagation, ionospheric propagation, plasmas.
*Every third week*
Prereq: EI E 372 or equivalent

EI E 481 S,F 2C,1T,1L 0.5
**Control Systems 1**
*Alternate weeks*

EI E 482 W 2C,1L 0.5
**Control Systems 2**
Review of multi-variable state space methods with emphasis on control applications. Performance indices and optimal control. Continuous and discrete time state feedback control of linear systems. Systems with inaccessible states. Stability analysis. *Open lab*
Prereq: EI E 446, EI E 481

EI E 499 A S,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. A short progress report at the end of the 4A term and a full report at the end of the 4B term are required.

EI E 499 B W 9L 0.5
**Project**
Either a continuation of EI E 449A or a separate one-term project.

L 1 indicates lab every 2nd, 3rd week or open lab.
Lecturer
L. Dorney, BA MA (Louisville) J (part-time)
J. Miller, BA BLS (McGill), MA, MPhil (Waterloo) R (part-time)

Jointly appointed from Architecture

For courses in Drama, see Drama and Theatre Arts Group in this Chapter.

Although the Department of English provides advisors to help students to choose their programmes, to arrange their courses and to conform with the University, Faculty, and departmental regulations, students are urged to study the Calendar very carefully because they are themselves responsible for failure to abide by these regulations.

Note 1
W. K. Thomas's Correct Form in Essay Writing is the official style sheet for all undergraduate English courses.

Note 2
The "normal" number of lectures per week in each course is three; however, each instructor determines how often his particular class will meet.

Note 3
In all English courses, emphasis will be placed on student essays written in connection with the reading.

Course Descriptions

Consult the time-table for an up-to-date list of courses offered in 1979-80.

Group One

1) Courses in this group count towards a degree as electives in any programme in the University. None of them, however, may be counted as an English Major credit; in other words, none of them fulfills a core requirement for a General or an Honours programme in English.

A) Courses in Group 1(A) are primarily concerned with assisting students to improve their writing.

Engl 109 Introduction to Essay Writing 1
Engl 110 Introduction to Essay Writing 2
Engl 129R Introduction to Written English
Engl 209 Advanced Essay Writing
Engl 210 Report Writing
Engl 309 Seminar in Essay Writing
Engl 335 Creative Writing

B) Courses in Group 1(B) 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 150 English as an Instrument of Thought and Communication 1
Engl 151 English as an Instrument of Thought and Communication 2
Engl 140R The Use of English 1
Engl 141R The Use of English 2
Engl 245R Form and Function

Note
R Courses are administered by Renison College.

1A)

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 twelve short writing assignments are required.
Also offered at St. Jerome's College

Engl 110 W 0.5
Introduction to Essay Writing 2
The course teaches the construction of the persuasive essay, with attention to the elements of logical thinking, to the techniques of successful persuasion, and to the demands of the library research paper. Six to eight writing assignments are required.
Prereq: Engl 109
Also offered at St. Jerome's College

Engl 129R F,W,S 1C,2L,1T 0.5
Introduction to Written English
Instruction provided in basic grammar, sentence and paragraph structures, 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 who lack language mastery sufficient for admission to other introductory English language courses.

Engl 209 F 0.5
Advanced Essay Writing
Provides further opportunities for serious students of writing to study and to practise descriptive, expository, argumentative, and persuasive writing. In addition to lectures, there are workshop sessions in which student writing is discussed.
Prereq: Second-year standing or above
**Course Descriptions**

**English**

Engl 210  F,W  0.5  
**Report Writing**  
The many functions of the report - an orderly and objective communication of factual information which serves some specific purpose - are taught. Students will receive practice in research, in organization, and in writing many kinds of reports.  
Prereq: Second-year standing or above.

Engl 309  0.5  
**Seminar in Essay Writing**  
Classical theories of rhetoric and the various devices available to an author to achieve various ends are the key theoretical principles of the course as students pursue extended and sophisticated forms of the essay.  
Prereq: Engl 209 or consent of instructor.

Engl 335  0.5  
**Creative Writing**  
Aimed at encouraging students to develop their creative and critical potentials, the course consists of supervised practice, tutorials, and seminar discussions.

1B)  
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 various 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.  
Also offered at Renison College.

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 and to examine fiction and other forms of literature. About six written exercises are assigned.  
Also offered at Renison College.

Engl 140R  F,W  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 help students to write clearly and effectively themselves.

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 245R  **Form and Function**  
Not offered in 1979-80.

**Note**  
R Courses are administered by Renison College

**Group Two**  
Courses in this group carry full degree credit and may be counted as fulfilling the minimum requirements for a General or Honours programme in English.

Engl 101  Y  1.0  
**The Living Tradition**  
An examination of examples of the greatest literature in English and its relation to the periods of its origin. Figures such as Chaucer, Shakespeare, Milton, Swift, Blake, Keats, Tennyson, Dickens, and T. S. Eliot will be examined.  
Also offered at St. Jerome's College.

Engl 102  Y  1.0  
**Poem, Play and Story**  
Different kinds of literature will be explored so as to discover how the shape of a literary work contributes to its meaning. Students will read ballad, lyric, and narrative poetry; classic tragedy and comedy and absurdist, existential and expressionist plays; novels and short stories.

Engl 108  **Themes of Literature**  
An exploration of the great variety of literature through thematic perspectives.

Engl 108A  
**The Hero**  
A study of human excellence in thought and action embodied in representative men and women, as seen through works of literature.  
Also offered at St. Jerome's College.

Engl 108B  
**Utopia and Anti-Utopia**  
This course will attempt to acquaint the student with forms of the literary artist's moral vision of man in "Utopian" writings. It will involve an examination of the role of the imagination in helping to inform and embody cultural ideas of various periods.
Course Descriptions

English

Engl 108C  Literature and Morality
Not offered in 1979-80

Engl 108D  The Quest Theme in Literature
Not offered in 1979-80

Engl 108E  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 earth mothers, people, sex objects, and bitches.

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.
Also offered at St. Jerome’s College

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.
Also offered at St. Jerome’s College

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 201  0.5
The Short Story
Examples are the stories of Hemingway, Faulkner, James, D. H. Lawrence, and modern Canadian writers.

Engl 202  Y  1.0
The Bible and Literature
The study of major themes, stories, myths, and characters of the Old and New Testaments of the King James Bible, and their influence on other English literature.

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 märchen 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,S  3C  0.5
The Canadian Short Story
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.

Note
R Courses are administered by Renison College.

Engl 208
Literary Genres and Themes

Engl 208A  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.
Also offered at St. Jerome’s College

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 by such authors as Kipling, Woolf, C. S. Lewis, George MacDonald, Kenneth Grahame, and Thurber will be studied.
Course Descriptions
English

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 satiric cartoons and nightclub satire.

Engl 208E  0.5
Women Writers of the 20th Century
A study of such major 20th-century women writers as
Woolf, Hellman, Murdoch, McCarthy, Lessing,
Laurence, Plath and Atwood. Emphasis will be on the
concerns of these writers with the roles of women, the
writers' search for new meanings, and their innovations
in literary forms.
Also offered at St. Jerome's College

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,
Hammett, Buchan, Greene, Deighton, and Le Carre will
be discussed. The course includes the examination of
critical approaches to the form of detective fiction.

Engl 211/212
The Novel
The novel, by its nature, constitutes an attempt to
formulate and to interpret the bewildering human
experience. This course undertakes an exploration of
the forms that attempt can take. British, Canadian, and
American novels will be studied. The two halves of
the course may be taken independently.
Also offered at St. Jerome's College

Engl 211J  0.5
The Novel I
A study of the novel in English from its beginnings to
the late 19th century.
Also offered at St. Jerome's College

Engl 212    W    0.5
The Novel 2
A study of the novel in English from the late 19th
century to the present.
Also offered at St. Jerome's College

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.
Also offered at St. Jerome's College

Engl 215    0.5
Canadian Regional Literature
The course will provide a survey of literature written
about a distinctive region of Canada.
Also offered at St. Jerome's College

Engl 230    0.5
Narrative Poetry
A study of the major narrative forms in English poetry
including the ballad, epic, mock epic, and dramatic
monologue.
Also offered at St. Jerome's College

Engl 231    0.5
Lyric and Other Poetry
A study of the development of various lyric forms (e.g.,
erotic, religious), the ode, elegy, meditative-descriptive
verse, and perhaps other forms.
Engl 230 is not a prereq.
Also offered at St. Jerome's College

Engl 232    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.
(Cross-listed with 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.
(Cross-listed with Drama 253).

Engl 236   Literature of Ideas 1
Not offered in 1979-80

Engl 237   Literature of Ideas 2
Not offered in 1979-80
**Course Descriptions**

**English**

**Engl 251 Y 1.0**

**The Practice and Theory of Criticism**
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.

*Also offered at St. Jerome's College*

**Engl 305 Y 1.0**

**Old English**

An introduction to the literature and language of pre-Conquest England. The principal literary methods, themes, and types of English literature up to the 12th century constitute the material of study in this course.

*Also offered at St. Jerome's College*

**Engl 310 Y 1.0**

**Middle English**

A study of Middle English literature with special emphasis on the work of Geoffrey Chaucer.

*Also offered at St. Jerome's College*

**Engl 312 0.5**

**Literature of the Commonwealth**

A survey of Australian poetry and prose, with some consideration of the literatures, in English, from South Africa and the West Indies.

*Also offered at St. Jerome's College*

**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.

*Also offered at St. Jerome's College*

**Engl 314 0.5**

**Canadian Poetry Since 1920**


*Also offered at St. Jerome's College*

**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.

*Also offered at St. Jerome's College*

**Engl 316 0.5**

**Canadian Drama**

A study of plays by such dramatists as Merrill Denison, Robertson Davies, Gratien Gélinas (in translation), James Heaney, John Coulier, George Ryga, and Michel Tremblay (in translation). Background for 20th-century drama will be provided in lectures.

(Cross-listed with Drama 351)

**Engl 330 1.0**

**Elizabethan Literature (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. Reserved for special attention is Spenser's epic poem glorifying Elizabeth I and England - The Faerie Queene.

*Also offered at St. Jerome's College*

**Engl 330A F 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.

*Also offered at St. Jerome's College*

**Engl 330B W 0.5**

**Elizabethan Literature 2 (excluding Drama)**

The continuation of English 330A. Reserved for special attention is Spenser's epic poem glorifying England and Elizabeth I - The Faerie Queene.

Prereq: 330A or consent of instructor

*Also offered at St. Jerome's College*

**Engl 339**

**Contemporary British Literature**

Not offered in 1979-80.

**Engl 343 F 0.5**

**American Literature**

The meaning of America - the myth, the dream, and the reality - as experienced through its major literary works. Sin, guilt, madness, mysticism, and grace: the search for fulfilment and peace by such writers as Poe, Thoreau, Whitman, Twain, and Crane.

*Also offered at St. Jerome's College*

**Engl 344 W 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.

Prereq: Engl 343

*Also offered at St. Jerome's College*

**Engl 345/346/347**

**Studies in American Literature**

(Usually only one or two courses from this series are offered each year.)

**Engl 346A W 0.5**

**American Fiction**

Special emphasis will be given to the works of two or three major American novelists such as Herman Melville and William Faulkner.

Prereq: Engl 343 or consent of instructor.
Engl 347A  W  0.5  
Contemporary American Literature  
A study of American Literature from World War 2 to the present.  
Prereq: Engl 343 or consent of instructor  
Also offered at St. Jerome's College

Engl 350  Y  1.0  
Seventeenth-Century Non-Dramatic Literature  
Special attention will be given to the poetry of Donne, Jonson, Herbert, Vaughan, and Marvell and to the prose works of Bacon, Burton, and Browne. Approximately half the course will be devoted to an intensive study of Milton's English poetry and a selection of his prose works.  
Also offered at St. Jerome's College.

Engl 355  Forms of Classical and Neo-Classical Satire  
Not offered in 1979-80.

Engl 356  Pastoral and Mythological Aspects of Classical and Neo-Classical Poetry  
Not offered in 1979-80.

Engl 362  F  0.5  
Shakespeare 1  
A study of the plays written prior to 1599-1600, excluding Julius Caesar.  
Also offered at St. Jerome's College

Engl 363  W  0.5  
Shakespeare 2  
A study of the plays written after 1599-1600, including Julius Caesar.  
Also offered at St. Jerome's College

Engl 365/366  1.0  
Selected Studies  
Designed to provide a study in depth of problems and/or authors selected by the instructor. Students interested in initiating such courses are encouraged to do so by bringing their ideas to the attention of individual instructors.  
Prereq: consent of instructor  
Also offered at St. Jerome's College

Engl 373  1.0  
An Introduction to the History of English  
The process of linguistic change as exemplified in the development of the English language from its origins in Indo-European and Germanic through modern dialects. Traditional, structural and generative approaches will be employed.

Engl 375  1.0  
Linguistics and English Grammar  
Linguistics and its application to the study of grammar and language. Included are 1) an introduction to descriptive and historical linguistics and the principles of linguistic analysis and 2) an evaluation of English grammars ranging from the traditional to the structural and transformational-generative.

Engl 376R  Our Changing Language: Syntax and Semantics 1  
Not offered in 1979-80.

Engl 377R  Our Changing Language: Syntax and Semantics 2  
Not offered in 1979-80.

Engl 385R  Y  3C  1.0  
Twentieth-Century Literature  
A survey of writing in the age of anxiety from the psychoanalytic novel to the theatre of the absurd. The concept of the anti-hero. Satirical, emotional and intellectual writing as studied in novels and plays by Graham Greene, Aldous Huxley, D. H. Lawrence, Evelyn Waugh and Harold Pinter.  
Note  
R courses are administered by Renison College.

Engl 400  1.0  
The Development of English Literature  
The course explores the origin, growth, and transformation of philosophical ideas and of literary themes, motifs, genres, forms, and movements from the beginning of English literature to the present.  
Also offered at St. Jerome's College

Engl 410  Y  1.0  
The Augustan Age  
A study of English literature from 1660 to 1798: the comedy of the Restoration; the satire of Dryden, Swift, and Pope; the probing of mores and manners by Pope and Johnson; the emergence of the novel with Richardson, Fielding, and Sterne; and the transformation from classicism to romanticism.  
Also offered at St. Jerome's College

Engl 410A  F  0.5  
Satire and Sense: The Restoration and Early Eighteenth 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.  
Also offered at St. Jerome's College
Environmental Studies

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 Man-Environment Studies, and School of Urban and Regional Planning. The courses are of general interest and are open to all students in the University. There is no Department of Environmental Studies.

The following persons have wide ranging interests and hence have been appointed to the Faculty of Environmental Studies rather than to a specific Department and/or School:

Professor
C. K. Knapper, BA Hons (Sheffield), PhD (Saskatchewan)
P. H. Nash, BA, MA (UCLA), CE (Grenoble), MCP, MPA, PhD (Harvard), MCIP

Associate Professor
D. Estrin, BA, LLB (Alberta) (part-time)
R. T. Newkirk, BA, MSc, PhD (W. Ont.)
D. H. Wood, BComm, LLB (Toronto) (part-time)

Adjunct Professor
M. M. R. Freeman, BSc (Reading), PhD (McGill)

Adjunct Lecturers
K. Elliott, Diploma Creative Arts
D. G. E. Wicken, Diploma AA

Faculty members cross and/or joint appointments as shown
1Environmental Studies and Psychology
2Environmental Studies and Planning
3Environmental Studies and Man-Environment Studies

Course Descriptions

Engl 410B W 0.5
Sense and Sensibility: The Middle and Later Eighteenth 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 classicism to romanticism.
Also offered at St. Jerome’s College

Engl 415 0.5
Major Canadian Writers
An intensive study of the work of two or three major Canadian authors. Writers who may be studied include Morley Callaghan, F. P. Grove, Robertson Davies, A. M. Klein, Thomas Haliburton, Irving Layton, Margaret Atwood, and Margaret Laurence.
Prereq: Consent of instructor

Engl 430 Y 1.0
The Romantic Movement
An historical and critical study of the principles and practice of the English Romantic authors from Blake to Keats, with primary emphasis on poetry.
Also offered at St. Jerome’s College

Engl 451 Y 1.0
Literature of the Victorian Age
An historical and critical study with emphasis on the major poets (Dowson, Tennyson, Arnold), novelists (Dickens, Thackeray, Eliot), and essayists (Newman, Ruskin, Mill, Huxley). Provision will be made for students who wish to study other writers such as Hopkins, Swinburne, Carroll, Morris, or Pater.
Also offered at St. Jerome’s College

Engl 460 Y 1.0
British Literature from Shaw to Eliot
A study of the major writers in British literature from 1890 to World War 2, with special emphasis on such writers as Shaw, Yeats, Eliot, Conrad, Joyce, and Lawrence.
Also offered at St. Jerome’s College

Engl 460A F 0.5
British Literature, 1885-1914
A study of works by such writers as Shaw, Conrad, and Yeats.
Also offered at St. Jerome’s College

Engl 460B W 0.5
British Literature, 1914-1945
A study of works by such writers as James Joyce, D. H. Lawrence, and T. S. Eliot.
Also offered at St. Jerome’s College

Engl 495 Supervision of Senior Honours Essay
Env St 195A  F  3C  0.5  
**Introduction to Environmental Studies**
Theories, methods and conceptual approaches that have become associated with the study of environment are introduced. This course attempts to develop an understanding of the relationship between people and their environment and an appreciation of how we do and how we could manage that relationship.

_Prereq:_ Environmental Studies Students only.

Env St 195B  F  2C,1L  0.5  
**Introduction to Environmental Problems**
A discussion of some major environmental problems and issues such as the population explosion, the impact of urbanization of man’s environment, environmental pollution, resource management, conservation, and environmental planning.

**Note**
This course is designed primarily for students outside of the Faculty of Environmental Studies.

Env St 200  F,W  2C,2L  0.75  
**Field Ecology**
To introduce the main concepts and principles of ecology as a basis for understanding 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; “designing with nature”.

Students may be charged a field trip fee not to exceed $5.00

_Prereq:_ 2nd, 3rd and 4th year students only

Env St 201  F,S  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 St 401 and Env St 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 St 252  F  3C  0.5  
**Media Tools for Environmental Studies**
Through actual experience, the student will learn photographic and darkroom techniques, audio recording and sound production. A small lab fee will be charged for materials. The student is expected to do much of the course work outside the classroom in field situations and to use initiative in project development.

_Prereq:_ Env St student only or consent of Instructors

Env St 253  W  3C  0.5  
**Media Tools for Environmental Studies - Advanced Level**
An expanded version of 252 in which the student will choose one or more of the following formats: sound, photography, film, slide-tape. The student will develop presentations around a central theme in consultation with the instructors. Much initiative is expected of the students. The student will be required to purchase materials.

_Prereq:_ Env St 252 or consent of Instructors

Env St 271  F,W  3C,1L  0.75  
**Introduction to Quantitative Research Methods**
An introduction to scientific method; descriptive and inferential statistics; sampling design. The course emphasizes the methodological and interpretative problems involved in using selected quantitative methods to investigate selected environmental topics.

_Prereq:_ only for students in Environmental Studies

Env St 272  W  3C  0.5  
**Computer Programming in Environmental Studies**
The course emphasizes programming skills and applications in the context of environmental problems.

_Prereq:_ Env St 271

Env St 333  W  0.5  
**Parkland Management**
Systems planning, master planning and site planning for Ontario’s non-urban parks. Design and management for linear open space, such as rivers, trails, and coasts. Environmental assessment as it relates to amenity resources. Evaluating the effectiveness of the public participation process.

_Prereq:_ Consent of instructor

Env St 358  F,W  3C  0.5  
**Environmental Pollution and its Control**
After some introductory material, guest lecturers, expert in their respective fields, discuss specific problem areas related to the environment. Representative topics include impact on groundwater of waste disposal, effect of air pollution on plant life, population problems, viruses in surface water, reutilization of waste materials.

_No prereq_

Env St 380/381  F,W  0.5  
**Environmental Studies Workshop**
An interdisciplinary workshop focusing upon environmental issues in a project or research format. 

_Prereq:_ 3rd and 4th year students in Environmental Studies; enrolment is by research team only with representatives from at least 3 units of the faculty (max. 7 people) and subject to selection of an advisor and a satisfactory project or research proposal.
Env St 400  S  0.5
Professional Development in Environmental Management
Those interested in qualifying for professional status and those from other related disciplines such as civil engineering, planning, architecture, and geography may find a discussion of professional environmental management strategies useful. Issues of technical principles, data assessment, ethics, and costs will be discussed.
Prereq: 4th year students or consent of instructor

Env St 401  F  3C, 1.5S  0.75
Environmental Law
An advanced, in-depth version of Env St 201, providing an opportunity for detailed analysis of institutional factors regulating the natural environment and resources development in Ontario and Canada. How satisfactory present statutes, court systems and boards are for improving environmental quality as well as alternatives to these legal-institutional approaches will be discussed.
Prereq: Env St 201

Env St 402  W  3C, 1.5S  0.75
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 boards, municipal councils, the Ontario Municipal Board, the Ministry of Housing, provincial Cabinet and the Niagara Escarpment Commission in the planning process will be discussed.
Prereq: Env St 201

Env St 411  F  3S  0.5
Alternative Future Environments 1
Analysis of “ideal” environments of the past, including “utopian” communities. Scrutiny of current “concepts” of future environments, including distillation of works of Bell, Clarke, Commoner, de Chardin, de Jouvenal, Dror, Doxiadis, Ehrlich, Forrester, Fuller, Kahn, Mead, Meadows, McHale, Michael, Polak, Theobald, Thompson, Toynbee, and Ward.
Prereq: 3rd or 4th year standing or consent of instructor

Env St 412  W  3S  0.5
Alternative Future Environments 2
Examination of “issues” in futuristics and their “methodological” problems, with particular attention to resources utilization. Socio-Cultural Change Theory and Policy Science. Science Fiction, Extrapolation, and Technology Forecasting. Societal Indicators, Quality of Life, and Technology Assessment. Probable and Possible Urban Futures.
Prereq: Env St 411 or consent of instructor

Env St 417  F  3S  0.5
Land Use History and Landscape Change 1
Literature, theory and method relating to man’s effects on landscapes and eco-systems. A human ecological approach. Case studies and field work.
Prereq: Consent of instructor

Env St 418  W  3S  0.5
Land Use History and Landscape Change 2
Research on literature, theory and method relating to man’s effects on landscapes and ecosystems.
Prereq: Env St 417 and consent of instructor

Env St 444 Land Evaluation and Resources Management
Not offered 1979-80
Fine Arts (Art)

Associate Professor, (Acting Chairman 1979-80)
N. L. Patterson, BA (Washington)

Professor
A. M. Urquhart, BFA (Buffalo)
(Sabbatical 1979-80)

Associate Professor
D. I. MacKay, BFA (Mt. Allison) MA (Cornell)

Assistant Professors
A. Green, BFA (Art Instit. of Chicago)
B. Ireland, BFA (Illinois), MFA (Massachusetts)
E. Kliiman, MA, PhD (Toronto)
J. Uhde, MA (Purkyne's University Brno,
Czechoslovakia), PhD (Waterloo)

Lecturers
C. Crockford, BEd (Alberta), MA (Br. Col.)
A. Roberts BA (Guelph)

Course Descriptions - Art

Fine 110  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 111  W  3C  0.5
Introduction to World 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 120  F  1C,1std  0.5
Fundamentals of Visual Art 1
An introduction to the fundamental principles and
concepts of visual art, through a series of experimental
studio problems in two and three dimensional materials
and media.
Lab fee.

Fine 121  W  3std  0.5
Fundamentals of Visual Art 2
A continuation of Fine 120 with emphasis on colour
Prereq: Fine 120

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 221  W  6std  0.5
**Fundamentals of Painting 2**
A continuation of the studio projects begun in Fine Arts 220 with a greater emphasis on the development of individual expression. Lab Fee. Prereq: Fine 220 or consent of instructor

Fine 222  F  3std  0.5
**Fundamentals of Sculpture 1**
An introduction to clay sculpture. Three-dimensional form will be explored with the emphasis on the handling of clay as an expressive medium enhanced by surface treatment. Primitive reduction and Raku firing methods will be used to understand basic clay and glaze reactions to heat. Prereq: Fine 120/121 lab fee

Fine 223  W  3std  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. Prereq: Fine 222, lab fee

Fine 223A  W  6std  0.5
**Clay Studies from the Human Form**
Three dimensional studies from the model. Hollow fired, terra-cotta portraiture and cement fondu casting of the human figure. Lab fee. Prereq: consent of instructor

Fine 224  F  4std  0.5
**Introduction to Drawing**
Half the time will be devoted to drawing from the model and the remainder to a series of drawing concepts. At least one field trip will be included: Art Gallery of Ontario or the Albright Knox in Buffalo. Lab fee. Prereq: Fine 120/121

Fine 225  W  4std  0.5
**General Drawing**
Analytical and expressive drawing in a variety of media. Lab fee. Prereq: Fine 120/121

Fine 226
**Printmaking**
Introduction to materials and methods of printmaking. Current offerings are given below.

Fine 226A  F  4std  0.5
**Printmaking (Intaglio)**
An introduction to basic intaglio techniques including etching and engraving through workshops, class demonstrations and field trips. Lab Fee. Prereq: Fine 120/121 or consent of instructor

Fine 226B  W  4std  0.5
**Printmaking (Relief)**
An introduction to relief printing including collograph, wood block, lino cut and type using press and non-press materials to make print images in a series of workshops, demonstrations and field trips. Lab fee. Prereq: Fine 226A or permission of instructor.

Fine 226C  W  6std  0.5
**Printmaking (Screen)**
An introduction to screen printing, with emphasis on exploration of ink properties and stencil techniques. Lab fee. Prereq: Fine 120/121 or consent of instructor.

Fine 227  W  3std  0.5
**Scientific Drawing**
Through studio experiences, students will learn techniques for making accurate scale drawings of biological subjects in line and value, using various media. Methods of preparing drawings for reproduction 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  **Expressive Textile Forms**
Not offered 1979-80

Fine 228B  **The Visual Arts and the Theatre**
Not offered 1979-80

Fine 234  F  C.std  0.5
**Introduction to Film and Photographic Techniques**
Basic introduction to the field of audio visual media including film and photographic techniques. Photo supplies, film stock and processing at students expense. Intended for Fine Arts majors; Admission by consent of instructor.

Fine 235  W  C.std  0.5
**Introduction to Film and Photographic Techniques 2**
Practical Introduction to film techniques. Theory, experiments and assignments in script writing, production planning, directing, editing and camera work. Further differentiation in film forms. Prereq: Fine 234 or consent of instructor.
Fine 244  F  D,C  0.5
History of Film 1
General history of world cinema in its silent era
(1885-1928), covering the work of outstanding directors,
important movements and the contribution to the film
medium as an independent art form. (Regular screening
of a variety of films.) Film fee.

Fine 245  W  D,C  0.5
History of Film 2  Sound Film
A continuation of Fine 244. The expression of film
history into the sound era (since 1929) including the
most recent period. (Regular screening of a variety of
films). Film fee.

Fine 246  S,F  2C,1S  0.5
Religion and Film 1 (Religious Studies 266R)
A theological approach to the study of film as a world
transforming phenomenon for man. An assessment
of film's special characteristics as an art form capable of
addressing man's quest for a significant existence.
Consideration of a wide range of films and directors,
with particular emphasis on Ingmar Bergman. Film fee
$5.00

Fine 247  S,F  2C,1S  0.5
Religion in Film 2 (Religious Studies 267R)
An exploration of selected themes - death, evil, guilt,
fate, alienation, love, redemption - in the films of several
of today's leading directors: Bunuel, Pasolini,
Kurosawa, Fellini, Antonioni, Polanski. Film fee $5.00

Fine 310  3C  0.5
Greek Art and Architecture (C Civ 351)
A survey of the art and architecture of the ancient Greek
world from the Minoan to the Hellenistic periods.
Consult Classics listings

Fine 311  3C  0.5
Roman Art and Architecture (C Civ 352)
A survey of the art and architecture of the Roman world
from Etruscan to Imperial times.
Consult Classics listing.

Fine 313  W  3C  0.5
Special Topics in 19th Century Art
An in-depth study with particular emphasis on the
character of Neoclassic, Romantic and Realist art.
Honours Arts History majors interested in 19th-century
are encouraged to use the course as preparation for
their 4th year Honours presentation.
Prereq: Fine 210 or consent of instructor.

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 317  W  3C  0.5
Canadian Art
An examination of Canadian Art extending through the
important styles of settlers, especially from Britain and
France, in the seventeenth, eighteenth and nineteenth
centuries, to the development of the nationalist styles of
early twentieth century, culminating in contemporary
Canadian art.

Fine 318  Canadian Ethnic and Traditional Arts
Not offered in 1979-80

Fine 319  F  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.
No prerequisite.

Fine 319A  Special Topics in 20th Century Art:
1900-1940
Not offered in 1979-80

Fine Arts 319B  W  3C  0.5
Special Topics in 20th Century Art: 1940-1970
A survey of the major movements during the thirty 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 320  F  6std  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. Lab fee.
Prereq: Fine 220/221 or consent of instructor.

Fine 320a  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.
Prereq: Fine 220 or consent of instructor.
Fine 321 W 6std 0.5  
**Advanced Painting 2**  
A continuation of Fine Arts 320 with a further emphasis on independent problems. Lab fee.  
*Prereq: Fine 320 or consent of Instructor.*

Fine 322 F 0.5  
**Advanced Sculpture 1**  
An exploration of sculpture problems in a variety of media as vehicles for serious creative expression. Wood, metal, glass and soapstone will be used for visual portrayal of spatial ideas.  
*Prereq: Fine 222/223 lab fee*

Fine 323 W 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, conceptualization, and structuralism.

Fine 324 F 6std 0.5  
**Advanced Drawing**  
A course in which drawing is investigated as a means of expression and communication. The human figure, objects, and the landscape will be studied as sources of artistic imagery. The student will be encouraged to experiment with imagery, to develop personal vision, and to devise individual formal means of expression.  
*Lab Fee. Prereq: Fine Arts 224 or consent of Instructor.*

Fine 325 W 6std 0.5  
**Advanced Drawing 2**  
Continuation of Fine 324.

Fine 326A F std 0.5  
**Advanced Printmaking (Intaglio)**  
A continuation of printmaking concepts developed in relief/intaglio printing with emphasis on projects/portfolios and individual experimentation.  
*Lab Fee. Prereq: Fine 226A and one of Fine 226B or Fine 226C or consent of Instructor.*

Fine 326C F std 0.5  
**Advanced Printmaking (Screen)**  
Advanced studio in screen printing, with emphasis on photographic stencil techniques.  
*Lab Fee, Prereq: Fine 226C and one of Fine 226A or Fine 226B or consent of Instructor.*

Fine 327A W std 0.5  
**Advanced Printmaking (Intaglio)**  
A senior printmaking studio in relief/intaglio printing with emphasis on projects and individual experimentation.  
*Lab Fee. Prereq: Fine 326A or consent of Instructor.*

Fine 327C W std 0.5  
**Advanced Printmaking (Screen)**  
A continuation of Fine 326C with emphasis on independent problems in large format printing.  
*Lab Fee. Prereq: Fine 326C or consent of Instructor.*

Fine 328 W 3std 0.5  
**Calligraphy**  
A study of the art of written forms, combining studio projects with slide lectures on the history of writing, illuminating, and lettering. Students will strive for mastery in various calligraphic forms including Roman, Uncial, Gothic, Italic and Fraktur.

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.  
*Prereq: Consent of Instructor.*

Fine 334 F 3std,C 0.5  
**Advanced Film Making 1**  
Further exploration in documentary film, Visual significance, motivation and other aspects of script writing.  
*Film stock and processing paid by students.*

Fine 335 **Advanced Film Making 2**  
Not offered 1979-80

Fine 344A F 3D,C 0.5  
**Topics In European Film History 1**  
This course will deal with the classical period of the French film (the 1940's and 50's) and will incorporate discussions of filmmakers such as Jean Renoir, Max Ophuls, Jean Cocteau, Marcel Carne, Rene Clement, Claude Autant-Lara, Jacques Becker, Jacques Tati, Robert Bresson.  
*Prereq: Another film course or consent of Instructor.*
Course Descriptions
Fine Arts
Art

Fine 345A W 3D,C 0.5
Topics in European Film History 2
This course will be concerned with the well known international phenomenon of "new wave". It will deal with the works of cineastes like Jean-Luc Godard, Eric Rohmer, Francois Truffaut, Claude Chabrol, Louis Malle, Alain Resnais, Claude Lelouch, Pierre Etaix, Jacques Rivette and Agnes Varda. It will also study the influence of the "new wave" movement on other filmmakers during the 1960's.
Prereq: Another film course or consent of Instructor.

Fine 346R/347R 0.5/0.5
Special Topics in Film
Special topics will be announced from year to year.

Fine 348R
The Films of Chaplin

Fine 349R
The Films of Fellini

Fine 370 Film Theory 1 (Anatomy of Film)
Not offered 1979-80

Fine 371 Film Theory 2 (Film Aesthetics and Criticism)
Not offered 1979-80.

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 F 3S 0.5
Methods in the History of Art
For students planning a Senior Honours Presentation in Art History as it is currently understood. Students will examine methods of formal and stylistic analysis, iconographical interpretation and the application of social and political history to understanding of works of art. Required of all art history majors who take Fine 490/491.
Prereq: 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 392 F R, std 0.5
Selected Subjects in Fine Arts
Studio and practice under the direction of individual instructors.
Admission by consent of Instructor.

Fine 393 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 394 W S, std 0.5
Senior Seminar in Graphics Concepts 1
Admission by consent of instructor.

Fine 395 W S, std 0.5
Senior Seminar in Graphics Concepts 2
Admission by consent of instructor.

Fine 420 F std, S 0.5
Senior Seminar in Graphics Techniques 1
Admission by consent of instructor.

Fine 421 W S, std 0.5
Senior Seminar in Graphics Techniques 2
Admission by consent of instructor.

Fine 434 Senior Seminar in Film Techniques 1
Not offered 1979-80

Fine 435 Senior Seminar in Film Techniques 2
Not offered 1979-80

Fine 470 F 0.5
Senior Seminar in Film Concepts 1
Admission by consent of instructor.

Fine 471 W 0.5
Senior Seminar in Film Concepts 2
Admission by consent of instructor.

Fine 472 std 0.5
Senior Seminar in Graphics Concepts 1
Admission by consent of instructor.

Fine 473 std 0.5
Senior Seminar in Graphics Concepts 2
Admission by consent of instructor.

Fine 490 S, std, R 0.5
Senior Honours Presentation 1
Each student will work under the direction of a Fine Arts faculty member on an advanced creative project. The result of this endeavor 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 S, std, R 0.5
Senior Honours Presentation 2
A continuation of Fine 490
Admission by permission only
Fine Arts (Music)

Associate Professor, Undergraduate Officer
W. R. Maust, BS (Eastern Mennonite), BM (Peabody Conservatory), MM, PhD (Indiana University)

Associate Professor
H. Martens, BA, MA (Minnesota), PhD (Columbia)

Lecturer
L. Enns, BSM (CMBC), BMus (Wat. Luth.), MMus (Northwestern)

Part-time Lecturers
K. Hull, BA (Waterloo), BMus (W. Ont)
M. Jarrett
A. Martin, BMus (Toronto), MMus (Eastman)

Course Descriptions - Music

Music 100G  F, W, S  3C  0.5
**The Basics of Music**
An introduction to music terminology, techniques and styles, through lectures and listening, with examples from all eras of music history but with an emphasis on twentieth century music, including computer music. *No prereq.*

**Note**
Credit is given for either Music 100G or Music 150G/151G, not for both.

Music 150G  F, J  3C  0.5
**Introduction to Music 1**
Examination by means of listening and analysis, of styles of music ranging from early Christian Chant to electronic and computer music. Compositions to be studied include major forms such as sonata, symphony, opera, mass, etc. as well as smaller forms.

Music 151G  W, A  3C  0.5
**Introduction to Music 2**
Continuation of 150G
Prereq: Music 150G or Consent of instructor.

Music 160G  F  2C, 2L  0.5
**Choral Literature 1**
Choral literature from the Renaissance period to the present will be introduced through singing reading sessions, discussion and performance.

Music 161G  W  2C, 2L  0.5
**Choral Literature 2**
Continuation of 160G
Prereq: Music 160G or consent of instructor.

Music 250G  F  3C, 1L  0.5
**Music Theory 1**
The study of music, past and present, to discover how tones and melodies are combined to create harmony and counterpoint, and how larger works are organized.
Prereq: Grade 2 Theory (Toronto Conservatory) or consent of the instructor.

Music 251G  W  3C, 1L  0.5
**Music Theory 2**
The study of music, past and present, to discover how tones and melodies are combined to create harmony and counterpoint, and how larger works are organized.
Prereq: Music 250G

Music 253G  F  3C  0.5
**Ancient, Medieval and Renaissance Music**
The study of music from pre-Christian times to approximately 1600.
Prereq: Music 150G/151G, or 100G

Music 254G  W  3C  0.5
**Bach to Beethoven**
Music from around 1700 to 1827, the Baroque and Classical Periods of Music. Major composers studied are Bach, Haydn, Mozart, and Beethoven. Listening to music is an integral part of the course.
Prereq: Music 150G/151G, or 100G

Music 2566  F  3C  0.5
**Ancient, Medieval and Renaissance Music**
The study of music from pre-Christian times to approximately 1600.
Prereq: Music 150G/151G, or consent of instructor

Music 263G  W  2C, 2L  0.5
**Instrumental Literature 2**
Continuation of 262G
Prereq: Music 262G or consent of instructor.

Music 266G  F, W std  0.5
**Music Studio**
Practical performance study with approved instructor and examination administered by Music Faculty. This course is normally available only to Music majors and minors.
Prereq: Audition with Music Faculty (see Undergraduate Officer).
Music 267G  F,W  std  0.5
Music Studio
See Music 266 for course description.
Prereq: Music 266G and consent of Music Faculty.

Music 273G  F,W,S  3C  0.5
Traditional Folk Music
Countries to be discussed: Great Britain, Canada, the United States and the Antipodes. A series of lectures and discussions supplemented by records, tapes, and field recordings. Delineation of characteristic motifs in folk music. Various folk instruments will be used by the lecturer throughout the course: guitar, auto harp, hammer dulcimer, appalachian dulcimer, and five string banjo.

Music 280G  F  3C  0.5
Canadian Music
An historical study of the development of music in Canada from colonial times to the present, with particular emphasis on the composers and music of the 20th century.
Prereq: Music 150G/151G or consent of instructor.

Music 352G  F  3C  0.5
Music of the Romantic Period (19th century)
Included among the many musical compositions studied are operas of Wagner, Verdi and Mussorgsky, the lied of Schubert, Schumann and Wolf, symphonic of Brahms, Mendelssohn, Tchaikowsky, and piano music by Chopin.
Prereq: Music 150G/151G

Music 353G  W  3C  0.5
Music of the Twentieth Century
A study of representative musical compositions of the twentieth century and their relationship to social, literary and political movements.
Prereq: Music 150G/151G or consent of instructor

Music 360G  F  2C,1D  0.5
Music of the Church
A study of the music, and the philosophies of music of the Christian church from the beginning to the present. Singing and/or listening to the music will be an integral part of the course.
Prereq: Music 150G/151G or consent of instructor
Course Descriptions

General Engineering

Instructor
J. Lowe, BSc (Carleton) Recipient of Distinguished Teacher Award

Department of Geography

Professor, Chairman of the Department
L. H. Russwurm\(^3\), BA, MA (W. Ont.), PhD (Illinois)

Associate Professor, Associate Chairman
C. Bryant, BA, PhD (London)

Professor, President of the University
B. C. Matthews\(^1\), BSc (Toronto), AM (Missouri), PhD (Cornell)

Professor, Dean of Environmental Studies
J. G. Nelson, BA (McMaster), MA (Colorado), PhD (Johns Hopkins)

Associate Professor, Associate Dean (Environmental Studies Undergraduate Affairs)
A. G. McLellan, BSc, PhD (Glasgow)

Associate Professor, Graduate Officer
D. F. Walker\(^3\), BSc (London), MA, PhD (Toronto)

Associate Professor, Undergraduate Officer
R. A. Bullock, BA, MA (Belfast), PhD (London)

Professors
J. H. Bater, BA, MA (Br. Col.), PhD (London)
J. C. Day, BA, MA (W. Ont.), PhD (Chicago)
A. Diem, BA (Wayne State), MA (Clark), PhD (Michigan)
D. K. Erb, BSc (W. Ont.), MA (Toronto), PhD (McGill)
R. M. Irving, BA, MA (Toronto), PhD (Minnesota)
C. K. Knapper\(^5\), BA Hons, (Sheffield), PhD (Sask)
R. R. Krueger\(^3\), BA, MA (W. Ont.), PhD (Indiana)
P. H. Nash\(^2\), BA, MA (California), CE (Grenoble), MCP, MPA, PhD (Harvard), AIP
R. E. Preston, BA (Central Washington), MA (Washington), PhD (Clark)

Associate Professors
J. S. Gardner, BSc (Alberta), MSc, PhD (McGill) (on Sabbatical Leave 1979-80)
L. T. Guelke, BSc (Cape Town), MA (York), PhD (Toronto)
B. Hyma\(^6\), BS, MS (Madras), MA (Sheffield), PhD (Pittsburgh)
A. B. Kesik, MA, PhD (UMCS-Lublin, Poland)
G. R. McBoyle, BSc, PhD (Aberdeen)
W. B. Mitchell, BA, MA (Br. Col.), PhD (Liverpool)
G. Wall, BA (Leeds), MA (Toronto), PhD (Hull)

Assistant Professors
T. E. Bunting, BA (York), MA (W. Ont.), PhD (Toronto)
E. F. LeDrew, BA (Toronto), MA, PhD (Colorado)
E. R. Officer, BA (Br. Col.), MA (Wisconsin)

Lecturer
D. Dudycha, BA (W. Luth.), MA (Waterloo)

Course Descriptions

General Engineering/Geography

Gen E 010 F, W 1S 0.0
Co-ordination Orientation
Given by the Department of Co-ordination for students in Year 1 Engineering. Its purpose is to introduce the students to the various features of the co-operative programme and engineering as a profession.

Gen E 061 F, W 3C 0.5
History and Philosophy of Science
The major conceptual transformations in evolution of science and technology: Greek, modern classical, contemporary periods. Scientific technology as a determining characteristic of global civilization and some critical questions it poses. Not open to Year 1 students.

Gen E 062 F 3C 0.5
Introduction to Human Communication 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 1 students.

Gen E 114 W, S 3C, 3L 0.25
Application of Mathematics to Engineering Problems
A laboratory and problems course giving practice in the mathematical formulation and solution of elementary engineering problems. Prereq: Math 110A and Math 114 or equivalent.

Gen E 115 F 2C, 4L 0.75
Engineering Concepts I
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 IV: examples of efficient numerical algorithms for basic scientific computations.

Gen E 122 W, S 3C, 2L, 1T 0.5
Electricity and Magnetism
Introduction to fundamentals of electromagnetics, circuits, wave motion and propagation.
Course Descriptions

Geog 101 F,W 2C,2L 0.75
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. The course is directed towards the man-land theme and the location analysis theme.

Geog 102 F,W 2C,2L 0.75
Introduction to Physical Geography
An ecosystem approach to physical geography which emphasizes that man's natural environment is an integrated system of which man is a part. Selected aspects of weather-climate, water, soils, biota, and landforms are studied and the flow of energy, water and matter and the resultant effects on the subsystems of the natural environment are emphasized.

Geog 110 F 2T 0.5
Tutorial in Geography
A tutorial for first year geography majors designed to promote close contact with a faculty member. Students will follow a personalized programme. Times and meetings will be arranged individually.
No prereq.

Env St 111 Introduction to the Study of the Future
See Env St course description, page 300.

Geog 125R Introduction to the Third World
Not offered 1979-80

Geog 126R F 3C 0.5
Development in the Third World
Case studies from selected countries of Africa, Asia and Latin America illustrate new approaches to spatial inequalities in development at local, regional and national levels. Themes include resources and regional development, education and health, agriculture and rural development, natural hazards and environment.

Geog 127 F 2C,2L 0.75
Regional Problems of Europe
An introduction to the Geography of Europe which examines agricultural, industrial and urban problems. Lectures, discussions and visual presentations based on field experience of instructors.

Env St 195A Introduction to Environmental Studies
See Env St course descriptions, page 301.

Env St 195B Introduction to Environmental Problems
See Env St course descriptions, page 301.

Env St 200 Field Ecology
See Env St course descriptions, page 301.

Env St 201 Introduction to Environmental and Planning Law
See Env St course descriptions, page 301.

Geog 201 F,W 2C,2L 0.75
Some Basic Topics of Physical Geography
Further studies of energy and matter flows in the atmosphere and on the land with particular reference to the development of the natural regions of Canada. Specific topics include the radiation, energy and circulation regimes of the earth-atmosphere system. The dynamics and morphology of earth structures, stream systems and glacial landform systems.
Prereq: Geog 102

Geog 202 F,W 3C 0.5
Some Basic Topics of Economic and Urban Geography
An analysis of the locational structure of economic activities. Basic concepts and tools are explained; these are used to analyse the location structure of primary, secondary and tertiary activities. Throughout, an attempt is made to evaluate the locational models under discussion by reference to case studies. The analysis is placed in the overall context of regional development.
Prereq: A first-year human geography course

Geog 203 W 2C,2L 0.75
Some Basic Topics of Cultural and Regional Geography
The approach of the regional geographer is illustrated by reference to one or more world regions. Political, social and historical processes are studied as they affect man's perceptions of his environment and the identification of culture regions.
Prereq: A first-year human geography course

Adjunct Lecturers
G. Brannon, CC
D. I. McKenzie, BES, MA (Waterloo)

Faculty members holding cross and/or joint appointments as shown
1Geography and Earth Sciences
2Environmental Studies
3Geography and Planning
4Geography and Renison College
5Environmental Studies and Psychology
Geog 204  F,S  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  0.75
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 220  Y  2C,2L  1.5
World Regional Geography
Study in depth of selected areas of the world's climatic regions, emphasizing characteristic problems as well as their physical, cultural and economic interrelationships. Utilization of natural resources, the effects of increasing population density, the occupation and utilization of urban and rural lands, and the effects of man's tools, techniques and institutions on the earth's surface.

Geog 225R Urbanization in the Third World
Not offered 1979-80

Geog 226R  W  3C  0.5
Food and Agriculture, and Integrated Rural Development in the Third World
Recent trends in population growth as related to the food resources situation in different areas of the Third World. Discussion of obstacles and possibilities to decelerating population growth, and accelerating food production and rural development in selected geographic regions.

Geog 232  F  3C  0.5
Geography of Population

Geog 251  W,S  2C,1L  0.5
Urban Areas in North America
An introduction to some basic concepts in urban studies emphasizing a systematic approach to processes and problems of urban development in North America, particularly in Canada.

Env St 252  Media Tools for Environmental Studies
See Env St course descriptions, page 301.

Env St 253  Media Tools for Environmental Studies - Advanced Level
See Env St course descriptions, page 301.

Course Descriptions
Geography

Geog 260  F,W  2C,2L  0.75
Introduction to Cartography and Map Analysis
Basic concepts involved in the analysis and use of existing types of cartographic products. Background theory of the production and reproduction of topographic and thematic maps, including historical development, collection of data and symbolization.

Env St 271  Introduction to Quantitative Research Methods
See Env St course descriptions, page 301.

Env St 272  Computer Programming in Environmental Studies
See Env St course descriptions, page 301.

Geog 275  F,W  2C,2L  0.75
Introductory Air Photo Analysis and Remote Sensing
Basic techniques of handling air photos, viewing them stereoscopically (in 3D), identifying and describing features, making measurements and in general, their use in the broad field of geographic and environmental studies. Introduction to specialized types of air photos, satellite imagery and remote sensing techniques. Lab fee $15. Prereq: Geog 102, or Sci 100, and a first year human geography course.

Geog 300  S  2C,4fldlab  0.75
Geomorphology and the Southern Ontario Environment
This course emphasizes field work and field trips in exploring the evolution of S. Ontario landforms. The identification of landforms, landform assemblages and their relationship. The meaning and utility of this information in terms of the contemporary and future environment will be stressed. There will be a $15 charge per student for field trip expenses. Prereq: Geog 201, or Earth 130 or consent of instructor

Geog 301  F,S  3C  0.5
Climatology

Geog 302  Geomorphic Processes
Not offered 1979-80

Geog 303  Physical Basis and the Geography of Water
Not offered 1979-80
Course Descriptions
Geography

Geog 307  F,W  2C,1D  0.5
Social Survey Techniques
Social research and the planning process; interview and self administered surveys; questionnaire design; profile data; sampling; data processing; non-survey data collection techniques; practical applications. Cross-listed as Plan 307
Prereq: Second or third year Geography students and Env St 271; other Env St students with consent of instructor.

Geog 311  F  3C  0.5
Regional Industrial Development
Manufacturing and transportation in the context of area economic development, both at regional and urban scales. This course aims at deepening conceptual insights as well as fostering an appreciation of their relevance to the understanding of particular areas. Empirical focus is on Canada and the United Kingdom. Prereq: Geog 202 or consent of instructor.

Geog 315  F  3C  0.5
Agricultural Geography
The study of agriculture as a system, and an analysis of the geographical dimensions of agricultural systems. Issues include the diffusion of innovations, regional evolution of agricultural structure and vertical integration. Structural problems in agriculture are emphasized through a comparative study of programmes of government intervention in agriculture in Canada and Europe. Some field trips. Prereq: Geog 202 or consent of instructor.

Geog 316  W  3S  0.75
Multivariate Statistics
The theory and application of multivariate statistics, with particular emphasis upon use of the computer. Same as Plan 316. Prereq: Env St 271 or consent of instructor.

Geog 317  F  3C  0.5
Nonparametric Statistics
The theory and application of nonparametric statistics, with particular emphasis upon social science problems. Same as Plan 317. Prereq: Env St 271 or consent of instructor.

Geog 318  Spatial Analysis
Not offered 1979-80

Geog 319  F  3S  0.5
Regional Planning Techniques
Discussion, appraisal and application at the regional level of selected economic techniques - specifically, cost-benefit analysis, planning-programming-budgeting systems and input-output analysis. This course is the same as Plan 319. Prereq: Econ 101 or consent of instructor.

Geog 321  W,S  3C  0.5
Geographical Perspectives on Contemporary Problems of American Society.
Focus on three critical problem areas of contemporary life in America: natural resources and environmental quality, regional economic disparities, management of large metropolitan systems. Student participation by means of collective project seminar work. Liberal use of audio visual materials to generate interest, to spark discussion and to serve as a substitute for the field experience. Prereq: Any half course in human geography or consent of instructor.

Geog 322  F,S  3C  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. Prereq: Consent of instructor.

Geog 323  Comparative Regional Problems
Not offered 1979-80

Geog 325R  W  3C  0.5
Special Topics in Development of the Third World
Emphasis on research methods and approaches to the study of geographic aspects of selected social and economic development problems. Regions of concentration will be mainly tropical Africa, South and South-East Asia, Caribbean and tropical Latin America. Among topics selected are population, agriculture and food, rural development, urbanization, resource development and regional planning. Prereq: First or second year courses related to Third World studies or consent of instructor.

Geog 330  Cultural Geography
Not offered 1979-80

Geog 331  W  3C  0.5
Special Topics in Cultural Geography
A detailed investigation of selected issues in man's relations with the natural environment. Given as a seminar. Issues will be partially selected on the basis of the interests of participants. Prereq: Geog 330 or consent of instructor.

Geog 332  W  3C  0.5
Special Topics in the Geography of Population
Detailed study of selected topics of population geography. Prereq: 2nd year students or higher

Env St 333  Parkland Management
See Env St course descriptions, page 301
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 342  W  2C,1S  0.5  
**Historical Geography of Canada 2**
The changing geographies of settlement and resource use in the nineteenth and early twentieth centuries.  
*Prereq: A second year geography course or consent of instructor*

Geog 345  Political Geography  
Not offered 1979-80

Geog 349  F,S  3C  0.5  
**The City as a System 1**
An examination of theories, models, and research procedures appropriate to the study of internal urban structure. The course focuses on the analysis of city-wide processes. Topics include urban land use, spatial economic processes, transportation and interaction, urban systems, individual spatial behaviour, decision-making (public and private), urban growth, and the processes of development and redevelopment.  
*Prereq: Geog 202 or Geog 251 or consent of instructor*

Geog 350  W,S  3C  0.5  
**Regional Urban Systems 1**
An examination of theories, models, and research procedures appropriate to the study of the external structure and function of urban centres and their role in the spatial economy. Focuses on the growth and support of urban centres and city systems, on relationships between aspects of urbanization and regional development, on the outward growth of cities, and on analytical techniques useful in studying such topics.  
*Prereq: Geog 202 or Geog 251 or consent of instructor*

Geog 352  W  3C  0.5  
**The Rural-Urban Fringe of Canadian Cities**
Study of the processes underlying the natural, economic and cultural environments of the rural-urban fringe zone surrounding our cities. Particular emphasis will be placed on the use, ownership, development and management of land and the interrelationships between the resource base and urban demands on it.  
*Prereq: Geog 202*

Geog 355  F,S  3C  0.5  
**Resources Management**
Reviews selected theories, methods, and terminology related to economic, behavioural, institutional, and decision-making aspects of resources and environmental problems.  
*Lab fee $10.*
Geog 357 is a companion course.  
*Prereq: Env St 271, Geog 275, Geog 260 or consent of instructor*

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. The course is the same as Plan 357 and M Env 357.  
*Lab fee $12.*  
*Prereq: Env St 200*

Env St 358  **Environmental Pollution and its Control**  
*See Env St course descriptions, page 301.*

Geog 358  W  3C,1L  0.75  
**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.  
*Lab fee $12.*  
*Prereq: Geog 356 and 357 or consent of instructor*

Geog 360  W  1C,2L  0.5  
**Preparation of Maps and Illustrations**
Basic equipment, materials and techniques involved in the practical construction of maps and other forms of cartographic illustrations, including conventional drafting and plotting procedures, symbolization of data, and map editing consideration for reproduction.  
*Prereq: Geog 200*

Geog 375  W,S  2C,2L  0.75  
**Air Photo Interpretation and Remote Sensing 1**
The principles of air photo interpretation via in depth analysis of elements of the air photo including rock types, landforms, drainage patterns, erosion characteristics, tonal variations, boundary characteristics, vegetation characteristics and patterns, and man-made features. Examples drawn from geology, geography and vegetation mapping.  
*Lab fee $12.*  
*Prereq: Geog 275 and Geog 201 or Earth 130 or Sci 100*

Env St 380/381  **Environmental Studies Workshop**  
*See Env St course descriptions, page 301.*

Geog 381  F,W  2S  0.5  
**The Nature of Geography**
*Course material fee $9.*  
*Prereq: Any three Geog credits or consent of instructor*
Course Descriptions
Geography

Geog 390  W,S  0.5
Senior Honours Essay Research Proposal
Participants are responsible for developing a research proposal under the supervision of an appropriate faculty member. Normally taken in the Winter term of the third year.
Prereq: Honours Geography students only

Geog 391  F  2S  0.5
Field Research
One week field camp session during which a specific area will be analysed from a geographic point of view. Students will be expected to undertake individual or group analysis of specific problems and must present the results in a written report.
Prereq: Third Year Hon Geog students
Estimated cost to student: Between $80-$100

Env St 400  Professional Development in Environmental Management
See Env St course descriptions, page 302.

Env St 402  Planning Law
See Env St course descriptions, page 302.

Geog 400  Climatic and Periglacial Morphology
Not offered 1979-80

Geog 401  Glacial Geomorphology and some Contemporary Applications
Not offered 1979-80

Geog 403  F  1C,3L  0.75
Advanced Cartography 1
Advanced study of numerical map analysis and computer mapping techniques.
Prereq: Geog 260, or Env St 271

Geog 404  F,W  3C  0.5
Advanced Cartography 2
Advanced study of basic techniques of map production and the theory of cartographic communication and map design. Technical aspects include photo mechanics, scribing, process photography, typography, proofing and printing processes. Theoretical topics include the map as a communications system, advanced map design and principles of information selection and generalization.
Lab fee, $15.
Prereq: Geog 360

Geog 406  W  0.5
Tropical Geomorphology
Basic geomorphological concepts and their application in a tropical environment. Special emphasis on morphology and processes as related to the geological foundation.
Prereq: One of Geog 302, Earth Sci 342, or consent of instructor

Geog 407  F,S  1C,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. There will be a $15 charge per student for field trip expenses.
Prereq: Geog 300, Geog 302, Earth Sci 342 or consent of instructor

Geog 408  W,S  0.5
Special Topics in Climatology and Natural Hazards
Special studies in economic aspects of climate; atmospheric pollution potential, perception of urban climate and air pollution; weather modification, the atmosphere as a natural resource system. Studies of natural hazards.
Prereq: Geog 301

Geog 409  S  2C,1L  0.5
Energy Balance Climatology
This will be a field and lecture course including the radiation and energy balances of various surfaces, the principles of turbulent energy exchange, and the biotic response to the energy environment. These concepts will be illustrated through the collection and examination of field data.
Prereq: Geog 101, 201 and 301

Geog 410  F  3C  0.5
Recreation Geography
The environmental implications of existing and potential recreational demands. Recreational travel, site capability, economic and ecological impact models will be considered as well as the behavioural aspects of amenity resources.
Prereq: Geog 356

Env St 411  Alternative Future Environments 1
See Env St course descriptions, page 302.

Geog 411  Resource Studies
Not offered 1979-80

Env St 412  Alternative Future Environments 2
See Env St course descriptions, page 302.

Geog 412  S  3C  0.5
Geography of Manufacturing Firms and Industries
A companion course to Geog 311. Emphasis will be placed on decision-making, multinational corporations, technological change, and analyses of the locational patterns of specific industries.
Prereq: Geog 311
Course Descriptions
Geography

Geog 413 W 2C 0.5
Behavioural Studies
Studies of the behaviour of individuals, groups and organizations in interaction with their environment. Emphasis will be placed on environmental perception and decision-making.
Prereq: One of Geog 311, 356, or 357

Geog 414 W.S 2S 0.5
Resources Management Workshop
Application of theory, methodology and techniques to research projects which focus upon natural resource management problems. Emphasizing social and economic considerations, research project will utilize individual and group approaches.
Prereq: Geog 356 and consent of instructor

Env St 417 Land Use History and Landscape Change 1
See Env St course descriptions, page 302.

Env St 418 Land Use History and Landscape Change 2
See Env St course descriptions, page 302.

Geog 421 Y 2C.2L 1.5
Europe and the Mediterranean
Detailed study of physical, cultural, economic and political geography of Europe, including the development of cities, problems of agriculture, changing industrial patterns, distribution of trade, regional disparities, and planning on the city, regional and national levels. Inter-relationships of problems among the European countries, communist or non-communist.

Geog 422 W.S 2S 0.5
Canada
Seminar on the geographical analysis of selected Canadian development problems. Emphasis on topics of continuing Canadian concern.
Prereq: Geog 322 or Plan 222

Geog 423 Central and Eastern Europe
Not offered 1979-80

Geog 424 S 3C 0.5
Soviet Union
Advanced study of selected aspects of the geography of the Soviet Union. A degree of flexibility in the course allows some emphasis on topics of particular interest to the students registered in it.
Prereq: Geog 204

Geog 425 W 3C 0.5
Africa
Examination of selected aspects of the geography of a major region in Africa with particular reference to problems of development. The region will normally be East Africa; a degree of flexibility will facilitate the selection of topics related to the interests of participants.
Prereq: Geog 205

Geog 430 S .5/1.0/1.5
Field Research in Regional Geography
430A (.5 course credit)
430B (1.0 course credits)
430C (1.5 course credits)
A detailed analysis of a selected region with major emphasis upon a field examination of the region (2-3 weeks duration) in spring.
Prereq: Fourth year honours geography students or consent of instructor

Env St 444 Land Evaluation and Resources Management
See Env St course descriptions, page 302.

Geog 448 W 2S 0.5
Urban Historical Geography
An examination of the process of city growth during the nineteenth and early twentieth centuries. The course will focus on internal urban structure and will cover both the European and North American city. Emphasis on student projects.
Prereq: Geog 349 or consent of instructor
Hist 204C recommended

Geog 449 W 3C 0.5
The City as a System 2
A continuation of Geog 349 with an emphasis on specific types of urban sub-systems, e.g. commercial, industrial, residential, institutional and recreational. Consideration is given to applied problems such as commercial blight, residential change, urban quality dimensions and the changing role of the public sector. Special attention is placed on individual student projects.
Prereq: Geog 349 or consent of instructor

Geog 450 W 3C 0.5
Regional Urban Systems 2
A continuation of Geog 350 with an emphasis on student projects.
Prereq: Geog 350

Geog 451 F 1C.3L 0.75
Soils Geography
An analysis of the factors affecting soil development and classification. Techniques of soil survey and land classification.
Prereq: Env St 200 and Geog 315
Geog 452 W 3C 0.5
Problems of Rural Land Use
The nature of rural land use problems, and a critical evaluation of the methods of rural land use planning. Emphasis placed on two types of geographical areas: metropolitan areas and problems of land use competition, and open space planning; and underdeveloped or depressed rural regions and problems of alternative employment opportunities. Methods of analysis and decision making.
Prereq: Geog 315 and/or Geog 352

Geog 461 S 3C 0.5
Land Dereliction & Rehabilitation 1
Examination of the reasons for land dereliction, its processes, and effects. Analysis of rehabilitation techniques, includes principles of landscape architecture and optimizing ecological considerations and use of post operation areas.
Prereq: 4th year students or consent of instructor.

Geog 462 F wkshp 0.5
Land Dereliction & Rehabilitation 2
Students who have previously taken Geog 461 will examine an area or topic and prepare an objective and acceptable proposal for improvements in the form of a report of existing methods of operation and post operation rehabilitation. Small charge for field trip expenses of $15 to $20.
Prereq: Geog 461

Geog 470 W 2C,1L 0.5
Air Photo Interpretation and Remote Sensing 2
Not offered 1979-80

Geog 471 W 2S 0.5
Air Photo Interpretation and Remote Sensing 3
Data gathering from air photos by interpretation and measurement with emphasis on agricultural and urban geography. Recent advances in remote sensing (satellite photography, thermal infra-red and radar imagery, multiband imagery). Spectral analysis, image quality, image processing.
Prereq: Geog 375 or consent of instructor

Geog 475 F,W 2S 0.5
Special Reading and Seminar on Selected Topics
A brief outline is to be filed with the Chairman or UG officer.
Prereq: Hon Geog students and consent of instructor

Geog 476 Y 2S 1.0
Special Readings and Seminar on Selected Topics
A brief outline is to be filed with the Chairman or UG officer.
Prereq: 3 full credits in Geog and consent of instructor
Department of Germanic and Slavic Languages and Literatures

Professor, Chairman of the Department
J.W. Dyck, AB (Bethel), MA (Missouri), PhD (Michigan)

Associate Professor, Associate Chairman Graduate Studies
J. Whiton, BA, MA, PhD (Minnesota)

Assistant Professor, Associate Chairman Undergraduate Studies
R. Karpik, BA, MA (Manitoba), PhD (Ottawa)

Professors
E. Heier, BA, MA (Br. Col.), PhD (Michigan)
S. Hoefert, BA, MA, PhD (Toronto)

Associate Professors
G. Brude-Firnau, Staatsexamen (Berlin), PhD (Yale)
M. Kuxdorf, BA, MA (Waterloo), PhD (Alberta)
H. W. Panthel, BA (Waterloo), MA (Cincinnati), PhD (Waterloo)
M. Richter, Staatsexamen (Berlin and Bonn), MA, PhD (Toronto)
W. Shelest, MA (Ottawa), Dr. phil. (München UFU)
A. Zweers, Doctorandus (Amsterdam), litt. Dr. (Groningen)

Assistant Professors
F. Jakobsh, BA, MA (Manitoba), PhD (Waterloo)
D. G. John, BA, MA, PhD (Toronto)
B. Kejna-Sharratt, MA (Warsaw), BA (London), MA (McMaster), PhD (Toronto)
T. Sommer, BA, MA (Waterloo)

Visiting Assistant Professor
F. Futterknecht, Dr. phil. (Mannheim)

Lecturers
S. Dyck, BA (London), MPhil (Waterloo)
H. Marsden, BA (Randolph-Macon), MA (Waterloo)
I. Tschimmel, MA (McGill), Dr. phil. (Trier)

Course Descriptions

German

Ger 101 F, W, J 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. One section, Ger 101A, offers more intensive oral practice with an additional language lab hour per week.

Note
Not open to students with Ontario High School Grade 13 German or equivalent, nor to students who have credit for Ger 105 or 111.

Ger 105 F 3C 0.5
German for Reading Knowledge
The elements of German grammar with practice in pronunciation. Selected readings from the humanities and social sciences. This course prepares the student to read German independently with the aid of a dictionary. It can be used as a prerequisite for Ger 201 only with special permission.

Ger 106 W 3C 0.5
German for Reading Knowledge
As Ger 105
Prereq: Ger 105

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.

Note
Not open to students with Ontario High School Grade 13 German or equivalent, nor to students who have credit for Ger 101 or 105.

Ger 112 F, W, S 3C 0.5
First Year Scientific German
As Ger 111
Prereq: Ger 111

Ger 121 F 3C 0.5
Studies in German Literature with Language Practice
An introduction to German literature designed to accomplish the transition from language studies to reading and discussing literary texts. Grammar review, conversation practice, and the reading of selected works.
Prereq: At least 2 years of High School German, or equivalent
Ger 122 W 3C 0.5
Studies in German Literature with Language Practice
As Ger 121
Prereq: Ger 121

Ger 151 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: West and East Germany, Austria, and Switzerland. Comprehensive grammar review, vocabulary building, written practice. Language lab is recommended.
Prereq: At least 2 years of High School German, or equivalent.

Ger 152 W 3C 0.5
German Conversation and Grammar Review
As Ger 151
Prereq: Ger 151

Ger 201 F 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

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 106, 112 or equivalent.

Ger 212 W 3C 0.5
Intermediate Scientific German
As Ger 211
Prereq: Ger 211

Ger 231 F 3C 0.5
German Through Contemporary Literature
Reading of selected contemporary texts with the goal of vocabulary building and the improvement of reading and comprehension. This course is mainly for students with only one year of German.
Prereq: Ger 102

Ger 232 W 3C 0.5
German Through Contemporary Literature
As Ger 231
Prereq: Ger 231

Ger 251 F 3C 0.5
German Conversation and Composition
This course offers extensive practice in both the spoken and written language. It provides vocabulary building, grammar review, and exercises in pronunciation and comprehension. Optional Language Lab.
Prereq: Ger 122, 152 or equivalent.

Ger 252 W 3C 0.5
German Conversation and Composition
As Ger 251
Prereq: Ger 251

Ger 271 F 3C 0.5
German Thought and Culture
A survey of cultural currents to the time of Enlightenment. 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 272 W 3C 0.5
German Thought and Culture
A survey of cultural events from Goethe 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 275 F 3C 0.5
German Culture in the 20th Century
German cultural trends are discussed in the light of social and political events up to 1945. Emphasis is placed on literary and artistic movements, especially Expressionism. Readings include selections from Mann, Hesse, Kafka and Brecht. Documentary films and slides are introduced.
Taught in English.

Ger 276 W 3C 0.5
German Culture in the 20th Century
As Ger 275.

Ger 281 F 3C 0.5
Post-War Literature
Reading and interpretation of major works since 1945 in prose, drama and poetry. Main authors: Brecht, Borchert, Böll, Frisch, Dürenmatt, Grass, Eich.
Prereq: Ger 122, 152 or equivalent. Students with Ger 231 are ineligible.
Course Descriptions
German

Ger 292 W 3C 0.5
Post-War Literature
As Ger 281
Prereq: Ger 122, 152 or equivalent.

Ger 291 F 3C 0.5
Survey of German Literature
Introduction to the major periods of German literature. Readings and interpretation of representative texts.
Prereq: Ger 122, 152, 202 or equivalent.

Ger 292 W 3C 0.5
Survey of German Literature
As Ger 291
Prereq: Ger 122, 152 or equivalent.

Ger 341 F 3C 0.5
The Age of Goethe (Storm and Stress, Classicism)
Reading, interpretation, and critical analysis of representative works (Goethe, Schiller, Hölderlin, etc.).
Prereq: Ger 122, 152 or equivalent.

Ger 342 W 3C 0.5
The Age of Goethe (Romanticism)
Reading, interpretation, and critical analysis of representative works (Novalis, Tieck, Brentano, etc.).
Prereq: Ger 122, 152 or equivalent.

Ger 343 F 3C 0.5
Intermediate Conversation and Composition
This course is a continuation of Ger 202. It offers conversation and composition on contemporary topics, vocabulary building, and exercises in grammar and stylistics on the intermediate level.
Prereq: Ger 202 or consent of instructor
Not open to students with Ger 252 or 352 nor students in Honours German.

Ger 344 W 3C 0.5
Intermediate Conversation and Composition
As Ger 343
Prereq: Ger 343

Ger 351 F 3C 0.5
Intermediate Conversation and Composition
Conversation on modern topics. Exercises in advanced grammar, stylistics, and composition.
Prereq: Ger 202, 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 Dürrenmatt. Taught in English.
Prereq: Open to students from all departments: not normally to first year students.
This course is complemented in the Winter term by Russ 356.

Ger 361 F 3C 0.5
Young Germany and Biedermeier
Reading, interpretation, and critical analysis of prescribed prose, drama and poetry (Grillparzer, Mörke, Stifter, Gotthelf, etc.).
Prereq: Ger 122, 152 or equivalent

Ger 362 W 3C 0.5
Poetic Realism
Reading, interpretation, and critical analysis of prescribed prose, drama and poetry (Storm, Keller, Ludwig, Hebbel, Raabe, Fontane, etc.).
Prereq: Ger 122, 152 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, 152 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, 152 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 Danton’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.
Course Descriptions
Dutch/Russian

Ger 395Z  F  2.5
Waterloo in Germany Programme
See page 98 for description.

Ger 396Z  W  2.5
Waterloo in Germany Programme
As 395Z.

Ger 451  F  3C  0.5
Advanced Conversation, Grammar and Composition
This course is conducted in German and 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, Grammar and Composition
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, 152 or equivalent.
Offered in alternate years

Ger 462  W  3C  0.5
Middle High German Literature
Reading and interpretation of samples from the major
works of the MHG period, with emphasis on writers of
the first "Blütezeit" in German literature (1170 to 1250):
Early Minnesang, Walther von der Vogelweide,
Nibelungenlied, Hartmann von Aue, Wolfram von
Eschenbach, etc.
Prereq: Ger 122, 152 or equivalent.
Offered in alternate years

Ger 471  F  3C  0.5
German Poetry
A study of the main thoughts, themes, forms, and
schools in German poetry from the beginnings to
Goethe.
Prereq: Ger 122, 152 or equivalent.

Ger 472  W  3C  0.5
German Poetry
A study of the main thoughts, themes, forms, and
schools in German poetry from German Romanticism to
the present.
Prereq: Ger 471 or equivalent.

Ger 481  F  3C  0.5
Humanism/Reformation
Reading, interpretation, and critical analysis of
prescribed texts (Erasmus, Luther, Sachs, Bidermann,
etc.).
Prereq: Ger 122, 152 or equivalent.
Offered in alternate years

Ger 482  W  3C  0.5
Baroque and Enlightenment
Reading, interpretation, and critical analysis of
prescribed texts (Opitz, Gryphius, Grimmelshausen,
Hofmannswaldau, Angelus Silesius, Haller, Klopstock,
Lessing, Wieland, etc.).
Prereq: Ger 122, 152 or equivalent.
Offered in alternate years

Dutch

Dutch 101  F  3C  0.5
First Year Dutch
The basic elements of Dutch grammar with emphasis
on oral practice and pronunciation. Optional reading of
appropriate texts from Dutch literature and cultural
history.
Open to all students

Dutch 102  W  3C  0.5
First Year Dutch
As Dutch 101
Prereq: Dutch 101 or equivalent

Russian

Russian Workshop
"Total Immersion" Russian Language Workshop. The
programme consists of 2 sessions (12 days each) at the
Russian Language Seminar in Dyuny (near Leningrad).
Instruction is given daily for four hours by Russian
professors on different levels according to the
proficiency of the students.

Credits: 1 and 1/2 (for students who completed:
a) first year Russian: 193, 194, 195;
b) second year Russian: 293, 294, 295;
c) third year Russian: 393, 394, 395;
d) fourth year Russian: 493, 494, 495.

Students can receive up to three half credits prior to
graduation.
Prereq: Russ 102 or equivalent

Russ 10  Y  3C  1.0
Reading and Translation
This course is designed to assist graduate students in
acquiring a reading knowledge of Russian. Usage and
structure of Russian scientific writings. Translation in
fields of specialization.
Open to graduate students of all departments
Course Descriptions

Russian

Russ 101 F 3C,1L 0.5
First Year Russian
(Arts Oriented) For students with little or no knowledge of Russian. The elements of Russian grammar and composition; with emphasis on oral practice and pronunciation. Language Laboratory and Visual aids. Selected readings of major Russian authors.
Open to all university students, except those who have credit for Russ 111/112.

Russ 102 W 3C,1L 0.5
First Year Russian
As Russ 101
Prereq: Russ 101 or equivalent

Russ 111 F,S,W 3C 0.5
First Year Russian
(Science Oriented) For students with little or no knowledge of Russian. Essential grammar, sentence structure. Reading and translation of scientific literature according to the students' fields of interest.
Open to all university students, except those who have credit for Russ 101/102.

Russ 112 W,F 3C 0.5
First Year Russian
As Russ 111
Prereq: Russ 111, Russ 101 or equivalent

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
The course is conducted largely in Russian and provides intensive practice in spoken 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 261 F 3C 0.5
Introduction to Russian Literary Movements
Reading of representative works from Russian Classicism, Romanticism, 19th Century Realism, and various periods of 20th century Russian literature.
Prereq: Russ 102 or equivalent

Russ 262 W 3C 0.5
Introduction to Russian Literary Movements
As 261.
Prereq: Russ 261 or equivalent.

Russ 271 F 3C 0.5
Russian Thought and Culture
A survey of cultural history from 862 to 1905. Lectures will focus on major developments in literature, religion, 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.
This course is 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.
This course is taught in English.
Open to all students.

Note
Arts students can take Russ 271 and 272 in their second or subsequent years; students for other faculties, in any year (Chapter 8 for course requirements in the Faculty of Arts).

Russ 275 F,W 3C 0.5
Literature and Cinema in the USSR
A survey of selected Soviet films that are adaptations of significant literary works or illustrate important cultural events or movements. Among the films studied will be: War and Peace (Bondarchuk), The Quiet Don (Gerasimov), Uncle Vanya (Konchalovsky), My Universities (Donskoj).
This course is taught in English.
Open to all students.
This course carries Aiiii credit, not Aii credit.

Russ 281 F 3C 0.5
Russian Short Story
A study of the form and a detailed examination of Russian short stories by major representative writers. Conducted in English. Extra work in Russian required of Russian majors only. Open to all students.
Russ 282 W 3C 0.5
Russian Short Story
As Russ 281.
Conducted in English. Extra work in Russian required of Russian majors only. Open to all students.

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.
Conducted in English. Extra work in Russian required of Russian majors only. Open to all students.

Russ 342 W 3C 0.5
Russian Drama
As Russ 341
Conducted in English. Extra work in Russian required of Russian majors only. Open to all students.

Russ 351 F 3C 0.5
Intermediate Conversation and Composition
Written reports on prescribed themes and topics. Oral drill and translation.
Prereq: Russ 252 or equivalent

Russ 352 W 3C 0.5
Intermediate Conversation and Composition
As Russ 351.
Prereq: Russ 351 or equivalent.

Russ 356 W 3C 0.5
The Stage as Forum: Russian Drama in Translation
Major Russian dramas will be studied from various points of view, including historical importance, themes, and technique. The course includes theory and selected dramas of such playwrights as Gogol, Chekhov, Tolstoy, Gorky, Mayakovksy, and Pogodin.
The course is conducted entirely in English.
Fall term: See Ger 355.
Open to students from all departments. Not normally open to first year students.

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 Russian 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 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 Pushkin, Lermontov, Gogol, Turgenev, and Tolstoy. Lectures on social and intellectual background. Conducted 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 Dostoevsky, Gorky, Pastenak, Solzhenyn, and Zamiatun. Lectures on social and intellectual background. Conducted 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.
Conducted in English. Open to all students.

Russ 442 3C 0.5
Russian Epic Tradition
As Russ 441.
Conducted 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

**Twentieth Century Russian Literature**

Reading, interpretation, and critical analysis of selected fiction and drama (Andreev, Bunin, Gorky, Kataev, Sholokhov, A. N. Tolstoy). Conducted 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). Conducted 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, Nerkrasov, Fet, Tiuchev, etc.).

**Prereq:** Russ 102 or equivalent.

Russ 482  W  3C  0.5

**Russian Poetry**

A study of themes and forms of representative authors from Symbolism to the present (Blok, Esenin, Mayakovsky, 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. Conducted 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. Conducted in English. Extra work in Russian required of Russian majors only. Open to all students.

Russ 496-498  F, W, S  0.5

**Reading Courses in Approved Topics**

Open to fourth year students only.

---

**Course Descriptions**

**Russian/Polish**

---

**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. The instruction is in English. Open to all university students.

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

**Taught in alternate years**

Polish 202  W  3C  0.5

**Intermediate Polish**

As Polish 201

**Prereq:** Polish 201 or equivalent

**Taught in alternate years**

---
Ukrainian

Ukr 101 F 3C,1L 0.5
Beginners Ukrainian
For students with 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.

Ukr 102 W 3C,1L 0.5
As Ukr 101
Prereq: Ukr 101 or equivalent

Ukr 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: Ukr 102 or equivalent. Taught in alternate years.

Ukr 202 W 3C,1L 0.5
Intermediate Ukrainian
As Ukr 201.
Prereq: Ukr 201 or equivalent. Taught in alternate years.

Ukr 301 F 3C 0.5
Introduction to Ukrainian Literature
Reading and critical interpretation of texts chosen from the works of Skovoroda, Kotliarevsky, Shevchenko, Franko, L. Ukrainka and others. This course is taught in English. Open to all students.

Ukr 302 W 3C 0.5
A Critical Survey of Literary Movements in 20th Century Ukrainian Literature
With special attention to the rise of the new angry generation of poets of the Sixties (V. Symonenko, L. Kostenko, V. Korotych, and others). This course is taught in English. Open to all students.

Department of Health Studies

Associate Professor, Chairman of Department of Health Studies
J. A. Best, BA (Queen’s), PhD (Waterloo)

Professor, Dean of the Faculty of Human Kinetics and Leisure Studies
G. S. Kenyon, BPE (Br. Col.), MS (Indiana), PhD (NYU)

Assistant Professor, Undergraduate Officer
H. W. Gruchow, BSc, MSc, PhD (Wisconsin)

Assistant Professor
R. P. Schlegel, BA (W. Ont.), MSc (Illinois), PhD (Ohio State)

Assistant Professors
S. McColl, BSc (McGill), PhD (Purdue)
B. Flay, D. Phil (Warkato)
M. T. Sharratt, BA, MA (W. Ont.), PhD (Wisc)

Research Associate
C. H. Pierce, BA (Grinnell), MA (DePauw), PhD (Kansas)

Faculty Members Holding Cross Appointments as shown:

Course Descriptions

Health 140 F 3C,1T 0.5
Introduction to Health Sciences 1
An exploration of the biological bases of health and disease, strategies for prevention and treatment of disease, and the moral, social, and psychological impact of innovations in health care on Canadian society. Topics include human reproduction, conception, pregnancy and childbirth, sexual development and expression, human heredity (chromosomal disorders, genetic diseases, birth defects), and acute disease states (infectious diseases, cancer, immune deficiencies).

Health 141 W 3C,1T 0.5
Introduction to Health Sciences 2
An exploration of the biological bases of health and disease, strategies for prevention and treatment of disease, and the moral, social, and psychological impact of innovations in health care on Canadian society. Topics include the human nervous system (neurological disorders, mental illness, brain dysfunctions, drug abuse), lifestyles and health (heart disease, obesity, exercise, smoking), and health care systems (environmental health, medical abuses, aging, and dying).
Health 241  W  3C  0.5
Epidemiology
An introduction to the study of factors governing the occurrence of diseases in human populations, using selected diseases to illustrate methods of transmission and identification of risk factors.
Prereq: Health 140-141

Health 245  W,S  3C  0.5
Community Health
This course examines health care delivery systems by considering organizational principles, manpower issues, health resources and economics, service utilization and alternatives to the institutional model. 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

Health 302  F  2C  0.5
Introduction to Biomathematics 1 (MTHEL 302a)
Biometry is a biological discipline requiring both a knowledge of mathematics and some basic understanding of specific biological phenomena. The course material has been selected from genetics and gerontology to provide examples of where both mathematics and biology have contributed to the advancement of knowledge in interdisciplinary areas.
Prereq: Kin 116 or first year Chemistry or consent of instructor

Health 303  W  2C  0.5
Introduction to Biomathematics 2 (MTHEL 302b)
A continuation of Biomathematics 1. Topics considered are first order reaction kinetics in biological systems, including a discussion of radioisotope and C14 dating, higher order kinetics including statistical considerations in enzyme kinetics, models for and the measurement of evolution from a knowledge of genetics and protein structure and assessing the relative importance of environmental factors as evolutionary determinants.
Prereq: Health 302

Health 340  F  3C  0.5
Environmental Health
A study of human biological variation in relation to various physical, biological, and social environmental influences, with emphasis on the relevance of these factors to health and disease.

Health 344  W  3C  0.5
Programme Evaluation
A comprehensive and systematic introduction to the key concepts, methodologies, and issues related to programme evaluation in general and their application to health programmes 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 programmes will be discussed.
Prereq/Coreq: Kin 222 and Kin 300 or equivalent basic knowledge in statistics and research design/methodology.

Health 346  W,S  3C  0.5
Nutrition (Kin 346)
An elementary course in nutrition with special emphasis on diet for sport and certain physiological conditions.
Prereq: Kin 317 or equivalent

Health 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: Health 349

Health 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: Health 140, Psych 101 or consent of instructor.

Health 410  W  3C  0.5
Growth, Development and Aging (Kin 410)
The changing capacities and interests of man are studied as he grows and develops. The contribution of physical activity to growth, and physical, psychological and sociological development is examined.
Prereq: Kin 200 and Biol 203

Health 431  F,W,S  0.5
Research Project
An independent research project on an approved topic, supervised by a faculty member. Includes an approved design and completion of the first three chapters of the paper.
Prereq: Approval of supervisor
Health 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 Health 431  

Health 440  F  3C  0.5  
Marriage and Family  
An exploration of sociocultural and psychological phenomena related to human sexuality, marriage, and family through the study of sex-role socialization, family structure, mate selection, marital roles, marital conflict and its resolution, family planning and alternatives to marriage and family.  
Prereq: Social 101 and Psych 101 or consent of instructor  

Health 442  F  3C  0.5  
Epidemiology of Chronic Diseases  
An investigation of the epidemiology of selected "non-infectious" diseases. Specific disease emphasized will vary from year to year (e.g., cardiovascular diseases, malignant neoplasms at various sites; chronic diseases of respiratory and digestive systems). The course emphasizes identification of risk factors and methodology.  
Prereq: Health 241 or consent of instructor  

Health 443  W  3C  0.5  
Behavioural Strategies for the Prevention of Chronic Diseases  
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.  

Health 445  W  3C  0.5  
Seminar in Health Behaviour  
A study of current issues pertaining to health and health behaviour. Topics include pertinent research in the field of health which have significant values to the individual, family and community, as well as a study of the problem areas in health behaviour.  
Prereq: Health Studies students only, or permission of instructor  

Health 447  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.  
Prereq: Consult with Department.
Assistant Professors
R. W. Guisso, BA (Toronto), DPhil (Oxford)
D. J. Horton, BA (Wat. Luth.), MA (Waterloo),
PhD (McGill)
S. K. Johannesen, BA (Evangel College),
MA, PhD (Missouri)
K. M. McLaughlin, BA (Waterloo), MA (Dalhousie),
PhD (Toronto) J
W. O. Packull, BA (Guelph), MA (Waterloo)
PhD (Queen’s) R
R. Sawatsky, BChEd (CMBC), BA (Bethal College),
MA (Minnesota) MA (Princeton), PhD (Princeton) G
D. E. Wright, BA (Cambridge), MA, PhD (McMaster)

Faculty member holds cross-appointment as shown

1Classics
2Sociology

Bachelor of Arts

a) General Programme
Students majoring in history should consult the General Programme requirements described in Chapter 7. They will normally choose one course from the Introductory and one course from the Level 2 Programme course listed below. In their third year they may also choose one history course from the Level 3 listings (or History 349, or from the Senior Seminar listings, if permitted by the instructor). Two additional history courses must be chosen from an approved Departmental list. The exact programme for each student will be worked out in consultation with a department advisor.

b) Honours Programme
Students taking the Honours programme in History should consult the Honours Programme requirements in Chapter 7. The exact programme for each student will be worked out in consultation with a departmental advisor.

Undergraduate Courses

Note 1
The Department offers two categories of courses, Programme and Non-Programme. The Programme courses are divided into four basic categories to allow for sequential development. The four categories are as follows:

Level 1: Introductory Programme courses (For General and Honours credit)
Level 2: Programme courses (For General and Honours credit)
Level 3: Programme courses (For General and Honours credit)
Level 4: Senior seminars (For Honours credit)

Other, non-programme courses are offered at first and second year levels primarily as a service to other faculties and other disciplines.

Note 2
General students are reminded that they must take at least one 300 Level course or Hist 349 – or a Senior Seminar, if granted permission – in order to complete their major. A student cannot take both a Non-Programme and a corresponding Honours course or second year course for credit.

Note 3
In Hist 123, 265, 295, and other courses as listed, students should use these numbers when registering for the full year. If registering for a half course only, use the alternative numbers: for example, 265A (Fall), 265B (Winter) etc.

Note 4
The G, P, R, J, suffixes indicate administered by one of the Colleges: Conrad Grebel (G), St. Paul’s (P), Renison (R), St. Jerome’s (J)

Note 5
In both undergraduate and graduate courses an instructor may grant a grade of Incomplete for a certain time in special cases, such as illness. If all the required work is not completed in the specific period, a grade is allotted. Unless a major portion of this work has been submitted this grade is normally an F. All incomplete grades are automatically turned into Fs after a lapse of seven months for full undergraduate courses, four months for graduate courses.
1 Non-Programme Courses

These are courses designed especially for students in other faculties and other disciplines in Arts. Only within stated limits can they be used for credit towards a History major (cf. General and Honours programmes, pp. 98). No prerequisites. Not normally for Honours History credit.

Hist 105  W  0.5
The Meaning of Civilization
A survey of western civilization based on lectures, Kenneth Clark's film series, "Civilization", and on the reading of selected great books, including works by Marx, Freud and Mill. The focus of discussion will be on the nature, movement and costs of civilization itself.
Instructor: Johannesen

Hist 120  Y  1.0
An Introduction to Western Intellectual History
This is a course designed especially for students who want to be challenged intellectually by a foray into history which will explore some of the seminal visions of the human predicament and some of the solutions posed by thinkers of the Western world over the past 2,500 years. Readings will range from Job to Jean Paul Sartre; from Plato through Marx to Lenin; from Sir Thomas More to Marcuse and from St. Augustine through Freud and Fromm.
Instructor: New

Hist 130  W,S  0.5
The Modern World in Historical Perspective
This course will introduce students, through the interrelationships and interaction of selected themes, to the contemporary history of Europe, North America, and the Far East. Its format includes two interpretive lectures per week plus major films on twentieth century crises and optional discussion groups.
Instructor: Wynne

Hist 201  Expansion of Europe from the 15th to the 18th Century
Not offered 1979-80

Hist 202  Expansion of Europe in the 19th and 20th Centuries
Not offered 1979-80

Hist 204A-204L Themes of History
History through thematic perspectives.

Hist 204A  Aborigines and Empires
Not offered 1979-80

Hist 204B  W  0.5
Empires and Missionaries
A survey of missionaries as an aspect of imperialism since 1500. Native responses to evangelization will be studied. Some comparisons will be made with indigenous response to Christianity in pre-modern times.
Instructor: Patterson
Offered at St. Jerome's College

Hist 204C  F  0.5
Canadian Urban History
An historical examination of the urbanization process, the social, political and economic factors that shaped the Canadian city, and the relationship between selected metropolitan and hinterland areas.
Instructor: Staff

Hist 204E  War and Society in the Twentieth Century
Not offered 1979-80

Hist 204F  The History of Education in Ontario, Part 1
Not offered 1979-80

Hist 204G  The History of Education in Ontario, Part 2
Not offered 1979-80

Hist 204H  F  0.5
The Individual and the Family in History
A survey of the changes in the quality and structure of life with special emphasis on love, marriage and the family in the West since the sixteenth century.
Instructor: Johannesen
Offered at St. Jerome's College

Hist 204K  W  0.5
Canada: The Problem of Quebec
The course will discuss the problem of Quebec in contemporary Canada by analyzing the historical background of key issues like separatism, the survival of the French language, French-Canadian nationalism and the Quiet Revolution.
Instructor: Horton

Hist 204L  W  0.5
Renaissance Italy
A study, against a social and political background, of creative achievements in the age of Machiavelli, Leonardo da Vinci, the Borgias.
Instructor: Cherniavsky

Hist 204M  F  0.5
Women in History
A historical and biographical study of women who have helped to shape the modern world.
Instructor: Guisso
Course Descriptions
History

Hist 204N  W   0.5  
Technology in the Evolution of Modern Western Society  
A selective historical analysis of major changes in the evolution of modern Western European and North-American societies in response to technological change. 
Instructors: Davis, Ostrander

Hist 204P  W   0.5  
Modern Western Popular Culture  
This course examines historically the formation of a distinct modern western popular culture, looking primarily at Britain, France, Canada and the United States from around 1850 to the present, and emphasizing such aspects as: industrialism and leisure, the family and sexual attitudes, religion and popular belief, education and literacy, drinking habits, organized sport and mass entertainment. 
Instructors: Harrigan, Wright

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, cultural and social as well as political and institutional development will be examined. 
Instructor: Cherniavsky

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. 
Instructor: Wright

Hist 214A  F   0.5  
Irish History, Part 1  
Political, social, and religious history of Ireland from the supremacy of the Gaelic social order to the Act of Union, 1485 to 1800. 
Instructor: MacGillivray

Hist 214B  W   0.5  
Irish History, Part 2  
Political, social, and religious history of Ireland emphasizing social changes, the struggle for Home Rule, and the Republic, 1800 to present. 
Instructor: MacGillivray

Hist 215  F   0.5  
Critical Issues in Contemporary European History  
A survey of major developments in East and West Europe since 1945, with emphasis on the effects of the Second World War, the emergence of blocs, economic growth and institutions, political life in the major states, and international policies and problems. 
Instructor: Baker

Hist 225  Canadian Culture and Society  
Not offered 1979-80

Hist 225A  Canadian Culture and Society 1  
Not offered 1979-80

Hist 225B  Canadian Culture and Society 2  
Not offered 1979-80

Hist 227  F   0.5  
The History of Selected Racial and Regional Minorities in North America, Part 1  
An examination of the formative years of the Afro-Canadian, Afro-American and Native Indian communities and of the emergence of minority assertiveness and the position of minorities in modern Canadian society.  
Instructor: Patterson

Hist 228  W   0.5  
The History of Selected Racial and Regional Minorities in North America, Part 2  
An examination of the formative years of the Afro-Canadian, Afro-American and Native Indian communities and of the emergence of minority assertiveness and the position of minorities in modern Canadian society. 
Instructor: Patterson

Hist 235G (R S 227G)  F  2C,1D  0.5  
History of Christianity 1  
The development of Western and Eastern Christianity to the end of the medieval period. 
Instructor: Klaassen

Hist 236G (R S 228G)  W  2C,1D  0.5  
History of Christianity 2  
Roman Catholicism, Eastern Orthodoxy and Protestantism from the Reformation to the present. 
Instructor: Klaassen

2 Programme Courses

These courses are designed primarily for General and Honours History majors and other students in the Faculty of Arts, but are open also to all students (in some cases, a prerequisite or permission of the instructor is required).
Level 1

Hist 101  Y  1.0
Crisis and Change in Western Civilization
Through lectures and small tutorials, this course will examine the major transformations experienced by the western world and introduce students to historical controversy and methodology. It is recommended for future honours history students as well as for students in other areas seeking an overview of the dynamics of Western Civilization.
Instructors: MacKinnon, Davis, Harrigan, Davies

Hist 101B  W  0.5
Crisis and Change in Western Civilization, 2
(Second half of 101).

Hist 101R  F  3C  0.5
Major Themes of Western Civilization 1
An introduction to the historical development of European civilization from Graeco-Roman and Judaeo-Christian origins to the emergence of sovereign states.
Instructor: Packull

Hist 102  W  3C  0.5
Major Themes of Western Civilization 2
An introduction to the historical development of Western history from the Reformation to the present. The course will survey the economic, social and intellectual trends during the period.
Instructor: Packull

Hist 121  Y  1.0
An Introduction to Western Intellectual History
This course explores some of the questions and answers to the human predicament posed by thinkers of the Western world over the past 2,500 years.
Instructor: New
(This is the Honours section of Hist 120. Students may not take both Hist 120 and Hist 121 for credit.)

Hist 123  Y  1.0
Canada: Unity in Diversity
An historical approach to the nature of the societies, economics and public affairs of Canada in its world setting. This is a foundation course for students concerned about Canadian questions.
Instructors: Cornell, English, Horton, McLaughlin
Also offered at St. Jerome's College

Hist 123A  F  0.5
Canada: Unity in Diversity 1
(The first half of 123)
Also offered at St. Jerome's College

Hist 123B  W  0.5
Canada: Unity in Diversity 2
(The second half of 123)
Also offered at St. Jerome's College

Level 2

Hist 125A  F  0.5
The Ancient World
This course will survey various aspects of ancient western civilization. The foundations of political life, social organization, and intellectual development will be considered, including the development of the Greek city-state and the Roman Empire.
Instructor: Lavigne
Offered at St. Jerome's College

Hist 125B  W  0.5
The Medieval World
A survey of selected topics designed to illustrate the development of medieval Europe. The end of the Roman political system and the formation of new political groupings in the West, the origins of feudalism, the crusades, and the Renaissance of the 12th century will be among the subjects considered.
Instructor: Lavigne
Offered at St. Jerome's College

Hist 125C  F  0.5
Early Modern Europe
This course will survey the chief features of early modern European society. Topics will include the Renaissance and Reformation, the expansion of Europe, Old Regime society, the scientific revolution and the Enlightenment.
Instructor: Smith
Offered at St. Jerome's College

Hist 125D  W  0.5
Modern Europe
A survey of selected topics to illustrate the chief features of modern European history. Topics will include the French Revolution, the Industrial Revolution, liberalism, nationalism, and socialism, industrial society and the New Imperialism, the World Wars and their aftermaths.
Instructor: Smith
Offered at St. Jerome's College

Course Descriptions

History 331
Hist 251A, B, C, D

Special Topics
Courses to be mounted for one year only.

Hist 252 Y 1.0
Twentieth Century America: Change and Conflict
This course will consist of an analysis of six or seven key issues in 20th-century American History, drawn in connected fashion from domestic and foreign politics. The emphasis will be on the ideas and the politics of change in modern America. 
Instructor: Eagles
Offered at St. Jerome's College

Hist 252A F 0.5
Twentieth Century America 1
(The first half of 252)
Offered at St. Jerome's College

Hist 252B W 0.5
Twentieth Century America 2
(The second half of 252)
Offered at St. Jerome's College

Hist 255 Ancient Civilization
Not offered 1979-80

Hist 258 History of Medieval Europe
Not offered 1979-80

Hist 258A History of Medieval Europe 1
Not offered 1979-80

Hist 258B History of Medieval Europe 2
Not offered 1979-80

Hist 260 Y 1.0
Europe in Renaissance and Revolution
This course will focus on Europe in transition (1300-1600) and emphasize those political, intellectual, social and economic changes most significant to the emergence of modern Europe.
Instructor: Harrigan

Hist 263 F 0.5
Europe in the Nineteenth Century
A study of Europe from the French Revolution to approximately 1900 with particular emphasis on the social forces that affect European society and the historical role of institutions in European society.
Instructor: Harrigan

Hist 264 W 0.5
Europe in the Twentieth Century
The course will stress a close examination of those issues, both domestic and international, which constitute the distinctive features and trends of twentieth century Europe. It will cover the period from the 1880's to 1945.
Instructor: Wynne

Hist 265 Y 1.0
Canadian History
History 265 is a survey of Canadian history, and in particular the social and political development of the nation and people. Special attention will be given to the evolution of a distinctive Canadian society in the face of American and British influences.
Instructor: McLaughlin
Offered at St. Jerome’s College

Hist 265A F 0.5
Canadian History 1
(The first half of 265)
Offered at St. Jerome’s College

Hist 265B W 0.5
Canadian History 2
(The second half of 265)
Offered at St. Jerome’s College

Hist 266 Y 1.0
The History of Selected Racial and Regional Minorities in North America
An examination of the formative years of the Afro-Canadian, Afro-American and Native Indian communities and of the emergence of minority assertiveness and the position of minorities in modern Canadian society.
Instructor: Patterson
(This is the Honours section of Hist 227/228. Students may not take both Hist 227/228 and Hist 266 for credit.)

Hist 267A F 2C.1D 0.5
Canadian Minorities 1
A comparative study of minorities, whose development in Canada was conditioned by political conflict, especially in time of war. Included are Doukhobors, Germans, Japanese, Hutterites, Mennonites, Quakers, and Jehovah's Witnesses.
Instructor: Epp
Offered at Conrad Grebel College
Hist 267B  W  2C,1D  0.5
**Canadian Minorities 2**
A comparative study of immigrant minorities, whose Canadian experience involved cultural conflicts: discrimination in education, distorted imagery in the mass media, linguistic coercion, etc. Groups include: Arabs, Chinese, Italians, Jews, Poles, Portuguese, Ukrainians, etc.
*Instructor: Epp*
*Offered at Conrad Grebel College*

Hist 268A  F  2C,1D  0.5
**Mennonite History 1 (1525-1920)**
Origins and development in Switzerland, Germany, and the Netherlands. Migrations to, and settlements in Prussia, Russia, and North America. Topics include church-state relations, community formation, separation and assimilation, and conflicts in the Great War.
*Instructor: Epp*
*Offered at Conrad Grebel College*

Hist 268B  W  2C,1D  0.5
**Mennonite History 2 (1920-1975)**
The world-wide Mennonite struggle for survival and meaningful identity in such settings as Communist Russia and Nazi Germany. Other topics: migrations to Latin America, assimilation in North America, new communities in Africa and Asia.
*Instructor: Epp*
*Offered at Conrad Grebel College*

Hist 269R  Y  3C  1.0
**History of Modern Revolutions**
A comparative study of the French Revolution, the Russian Revolution, the World War 1 German Revolution, Fascism and Nazism, the Chinese Communist Revolution. Special attention will be given to revolutionary theories and the social changes which accompany revolutions.
*Instructor: Packull*
*Offered at Renison College*

Hist 273  Y  1.0
**History of French Canada**
The course will examine socio-economic, cultural and ideological themes in Pre and Post-Industrial French-Canadian history.
*Instructor: Horton*

Hist 273A  F  0.5
**History of French Canada, Part 1**
The course will examine socio-economic, cultural and ideological themes in Pre-Industrial French Canada.

Hist 273B  W  0.5
**History of French Canada, Part 2**
The course will treat Quebec in the Industrial Era.

Hist 275  Y  1.0
**Twentieth Century Canada**
The course will examine the economic, social, and political foundations of modern Canada. The approach will be chronological and will focus on such topics as urbanization, American influences, regionalism, the welfare state, and nationalism.
*Instructor: English*

Hist 275  F  0.5
**Twentieth Century Canada, Part 1**

Hist 275  W  0.5
**Twentieth Century Canada, Part 2**

Hist 277  British Empire and Commonwealth History
*Not offered 1979-80*

Hist 282  Y  1.0
**East Asian History**
Chinese history from the Shang dynasty to the Opium War emphasizing the formation of a distinctive value system in the Chou; the creation of a unified and durable policy in the Han, the evolution of Confucianism, Taoism and Buddhism in their social context; the family system, the position of women, science and technology, poetry and the visual arts.
*Instructor: Guisso*

Hist 284  F  0.5
**Latin America, Colonial Period**
Study of the transfer of Iberian civilization from the Old World to the New emphasizing social history. Topics will include the destruction of native cultures, forced labour and slavery, colonial institutions, race mixture, 18th-century mercantilism, and the achievement of independence by the colonies.
*Instructor: Smith*
*Offered at St. Jerome's College*

Hist 285  W  0.5
**Latin America, National Period**
The central themes of the course are the persistence of colonialism in the economy, political system and societal makeup, and gradual fragmentation of the region as nationalism and industrialization begin to break down colonial forms. The period covered is independence (ca. 1825) to the present.
*Instructor: Smith*
*Offered at St. Jerome's College*

Hist 291  Colonial and Independent Africa
*Not offered 1979-80*
Hist 295  Y  1.0  
**History of the United States**
A survey of American society, politics and thought, and of the relations of the United States with the outside world from 1776 to the present. 
*Instructors: Ostrander, Johannesen*

Hist 295A  F  0.5  
**History of the United States, 1776-1865**  
(Part 1 of 295)

Hist 295B  W  0.5  
**History of the United States, since 1865**  
(Part 2 of 295).

**Level 3**

3 hours. Lectures and seminars. The following courses are open to all students above the first year level. In every case the prerequisite is an Introductory or Level 2 course appropriate to the subject, or the permission of the instructor. These courses grant Honours credit.

C Civ 365, 366  **Greek History**  
See Classics Dept. for description. This course is acceptable for History credit.

Hist 340  **Roman History to 337 A.D.**  
*Not offered 1979-80*

Hist 343G  **Mystical and Utopian Movements from the 12th to the 17th Century 1**  
*Not offered in 1979-80*

Hist 344G  **Mystical and Utopian Movements from the 12th to the 17th Century 2**  
*Not offered 1979-80*

Hist 347G  F  0.5  
**Radical Reformation 1**  (also R S 321G)  
A study of spokesmen for radical reform of the church, including Andreas Carlstadt, Thomas Munzter, Caspar Schwenckfeld, Sebastian Franck and Michael Servetus.  
*Alternates with History 343G*  
*Instructor: Klaassen*

Hist 348G  W  0.5  
**Radical Reformation 2**  (also R S 322G)  
A study of Anabaptism and its place in the history of the Christian church and of the Reformation period.  
*Alternates with History 344G*  
*Instructor: Klaassen*

Hist 349  **History as an Avocation**  
*Not offered 1979-80*

Hist 351A, B, C, D  
**Special Subjects**  
Seminars and lectures in special fields. (See current department brochure for future information.)

Hist 351A  **Black History from Slavery to Revolution**  
*Not offered 1979-80*

Hist 351B  **A study in depth of selected themes in modern Irish history**  
*Not offered 1979-80*

Hist 352  **The United States in World Affairs**  
*Not offered 1979-80*

Hist 353  **Medieval Church History from 312-1449**  
*Not offered 1979-80*

Hist 354  Y  1.0  
**Africa and East Asia from World War 2 to the Present**  
A course designed to examine the response of two culturally diverse regions to the realities of the post-war world. The African section will focus upon the various forms taken by nationalist aspirations and independence movements in selected areas, while the East Asian section will contrast the communist and capitalist alternatives as developmental models in China and Japan.  
*Instructors: Beachey, Guisso*

Hist 354A  F  0.5  
**Part 1, East Asia**  
(The first half of 354)  
*Instructor: Guisso*

Hist 354B  W  0.5  
**Part 2, Africa**  
(The second half of 354)  
*Instructor: Beachey*

Hist 355  F  0.5  
**Russian History 1613-1625**  
The course will focus on selected themes in the development of the Russian state and society from the beginning of Romanov rule to the middle of the nineteenth century.  
*Instructor: Davies*

Hist 356  W  0.5  
**Russian History Since 1825**  
The course will focus on selected themes in Russia’s development in the nineteenth and twentieth centuries, including the Soviet Period.  
*Instructor: Davies*

Hist 357  F  0.5  
**German History 1815-1918**  
Hopes, failures, success and collapse. The various stages of the German peoples’ attempts to create a national state and the political, social and economic factors involved.  
*Instructor: Wynne*

*Offered at St. Jerome’s College*
Hist 358 W 0.5
Germany 1918-1939
The course will investigate the political, social and economic factors of the Weimar Republic and the rise of Hitler.
Instructor: Wynne
Offered at St. Jerome's College

Hist 359 France in Revolution 1780-1914
Not offered 1979-80

Hist 360 French History Since 1914
Not offered 1979-80

Hist 361 Y 1.0
English History 1485-1660
A study of achievements and crises in the Tudor and early Stuart periods.
Instructor: New

Hist 362 Y 1.0
British History Since 1760
A study of society, politics and thought in the world's first industrialized state.
Instructor: Wright

Hist 363 Medieval English History
Not offered 1979-80

Hist 364R F 3C 0.5
The Enlightenment, 1: Europe in Ferment
An examination of the 17th century background for the enlightenment era, especially the economic, political, social and intellectual ferment of the period. The study will focus on continental Europe.
Instructor: Packull

Hist 365R W 3C 0.5
The Enlightenment, 2: Europe in the 18th Century
The term will focus on the Enlightenment itself, its religious and political implications, and the practice of Enlightened Despotism in France, Prussia, Austria, and Russia.
Instructor: Packull

Hist 366A F 0.5
Western European Cultural History 1815-1890
Evolution of the idea of consciousness as seen in the major works and manifestoes of artists, writers, musicians, architects, and thinkers of the period, with particular emphasis on the roles assigned to "artists" (broadly defined) in the shaping of consciousness and society.
Instructor: Baker

Hist 366B W 0.5
Western European Cultural History, 1890-1939
Evolution of the idea of consciousness as seen in the major works and manifestoes of artists, writers, musicians, architects, and thinkers of the period, with particular emphasis on the roles assigned to "artists" (broadly defined) in the shaping of consciousness and society.
Instructor: Baker

Hist 368 International History Since 1870
Not offered 1979-80

Hist 368B International History Since 1870
Not offered 1979-80

Hist 369 Y 1.0
Britain Since 1851
An inquiry led by two instructors into the nature of the British experience from 1851 to the present. Emphasis will be given to Britain's pioneering role as the world's first mature industrial urban society and to the British response to rapid changes in the overseas world.
Instructors: Stubbs, Wright
This course will be offered in years when neither History 368 or History 362 is offered. It is not open to students who have already taken either History 368 or History 362.

Hist 370 West Indian History
Not offered 1979-80

Hist 372 East Africa History
Not offered 1979-80

Hist 374G F 0.5
The Middle East Conflict
A survey of regional, religious and imperial rivalries from ancient to modern times, with emphasis on the 20th century and the Arab-Israeli conflict.
Instructor: Epp
Offered at Conrad Grebel College

Hist 381A Studies in Canadian Regionalism 1 (before 1867)
Not offered 1979-80

Hist 381B Studies in Canadian Regionalism 2 (since 1867)
Not offered 1979-80

Hist 382 Canadian Intellectual History
Not offered 1979-80
Course Descriptions

History

Hist 386 F 0.5
Ontario History to Confederation
The course will examine the growth of Ontario from a pioneer settlement, with particular emphasis on economic, social, political and cultural aspects of change. An emphasis will be placed on the sources and methods of local historical research.
Instructor: MacGillivray

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 be placed on the sources and methods of local historical research.
Instructor: Cornell

Hist 388 Y 1.0
History of Canadian American Relations
An examination of the history of relations between the two countries. Topics of a political, economic, social and cultural nature will be studied.
Instructor: English

Hist 389 Canada in World Affairs: The Twentieth Century
Not offered 1979-80

Hist 390 Y 1.0
History of Canadian Indians
An examination of the main themes in the history of the Indians of Canada since 1600. Some attention will also be given to the Indians of the United States comparing their history with that of the Canadian Indians.
Instructor: Patterson

Hist 392 The Foundations of American Civilization
Not offered 1979-80

Hist 393 History of American Nationalism 1790-1920
Not offered 1979-80

Hist 394 Twentieth Century Latin America
Not offered 1979-80

Hist 394A Twentieth-Century Latin America 1
Not offered 1979-80

Hist 394B Twentieth-Century Latin America 2
Not offered 1979-80

Hist 395 Law in Ancient World
Not offered 1979-80

Hist 397 The Origins of the Common Law
Not offered 1979-80

Hist 399 Y 1.0
Directed Studies in Special Topics
Study in a limited field under tutorial guidance. A high standard of written work will be expected.
Also offered at St. Jerome’s College

Hist 399A 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.
Also offered at St. Jerome’s College

Hist 399B 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.
Also offered at St. Jerome’s College.

Level 4: Senior Seminars

3 hours. Seminars and consultations. These seminars are designed for fourth year students who have taken relevant Level 2 or Level 3 courses, their equivalent elsewhere, or related courses in other disciplines. In all cases the instructor’s permission is required.

Hist 400 Roman History: Keresztes
Hist 401 Medieval History: MacKinnon
Hist 406 The Intellectual History of the Renaissance and Reformation: Davis
Hist 410 Early Modern English History: New
Hist 411 English History from the 17th to the 19th Century: MacGillivray
Hist 412 19th and 20th Century British History: Wright
Hist 413 Modern French History: Harrigan
Hist 414 Modern European Social and Cultural History: Baker, Harrigan
Hist 415 Modern German History: Wynne
Hist 418 Russian History since 1861: Davies
Hist 420 Canada in the 19th Century: McLaughlin
Offered at St. Jerome’s College
Hist 421 Ontario History: Cornell
Hist 423 Modern Quebec: Horton
Hist 425 20th Century Canadian History: English
Hist 426 Colonial American History: Johannesen
Hist 427 19th Century United States History: Ostrander
Hist 428 Modern American History: Eagles
Hist 429 Modern Latin American History: Smith
Offered at St. Jerome’s College
Hist 430 British Imperial and Colonial History: Craton
<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hist 432</td>
<td>African History: Beachey</td>
</tr>
<tr>
<td>Hist 435</td>
<td>The History of Native Response to Colonial Rule: Patterson</td>
</tr>
<tr>
<td></td>
<td><em>By permission of instructor only</em></td>
</tr>
<tr>
<td>Hist 436</td>
<td>Black History In North America: Walker</td>
</tr>
<tr>
<td>Hist 440</td>
<td>Far East: Guisso</td>
</tr>
<tr>
<td>Hist 450</td>
<td>Marxism and Canadian History: Johnson</td>
</tr>
<tr>
<td>Hist 453</td>
<td>20th Century International History: Stubbs</td>
</tr>
</tbody>
</table>

**Other Senior Courses**

*These courses are limited to senior Honours students*

- **Hist 465** Y 1.0
  - **The History and Theory of Historical Writing**
  - The emphasis will be on discussions of general questions about the nature and purpose of historical study, and of the answers that have been given by some important historians and philosophers.
  - *Instructor: Cherniavsky*

- **Hist 491** Y 1.0
  - **Directed Studies in Special Topics**
  - *Senior students only*
  - *Also offered at St. Jerome’s College*

*Not counted as Senior Seminars*

---

**Department of Kinesiology**

**Professor, Chairman of Department**

N. J. Ashton, BSc (McGill), MS (Michigan)

**Professor, Dean of the Faculty of Human Kinetics and Leisure Studies**

G. S. Kenyon, BPE (Br. Col.), MS (Indiana), PhD (NYU)

**Assistant Professor, Associate Dean of Undergraduate Affairs of the Faculty of Human Kinetics and Leisure Studies**

W. N. Widmeyer, BA (W. Ont.), BPE (McMaster), MA (California), PhD (Illinois)

**Associate Professor, Associate Dean of Graduate Affairs of the Faculty of Human Kinetics and Leisure Studies**

B. D. McPherson, BA, MA (W. Ont.), PhD (Wisconsin)

**Associate Professor, Associate Chairman Undergraduate Affairs**

P. J. Bishop, BSc, BPE (Waterloo), MSc (Western Illinois), PhD (Minnesota)

**Associate Professor, Associate Chairman Graduate Affairs**

K. C. Hayes, Dip, PE (St. Lukes College), MSc, PhD (Massachusetts)

**Professors**

D. A. Winter, BSc, MSc (Queen’s), PhD (Dalhousie)

**Associate Professors**

H. J. Green, BA, BPHE (Queen’s), MA (Alberta), PhD (Wisconsin)

M. E. Houston, BSc (Toronto), PhD (Waterloo)

R. G. Marteniuk, BPE, MA (Alberta), EdD (Berkeley)

R. W. Norman, BS, BPE (McMaster), MSc (Alberta), PhD (Penn State)

D. A. Ranney, BA (Toronto), MD (Toronto), FRCS (England)

**Assistant Professors**

F. Allard, BA, BPE, PhD (Waterloo)

R. Hughson, BSc (W. Ont.), MSc (Br. Col.)

E. Roy, BSc (Waterloo), MPE (Br. Col.), PhD (Waterloo)

M. T. Sharratt, BA, MA (W. Ont.), 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)

I. D. Williams, MS, PhD (Illinois)

**Adjunct Associate Professors**

E. English, MFA (UCLA), MD (Toronto), FRCS (Canada)

J. A. Israel, MD (Toronto), FRCS (Canada)

D. R. McTavish, MD (W. Ont.) FRCS

G. H. Mann, MB, BS (London), DRCOG (London)
Adjunct Assistant Professor
D. Rainham, MS, BSc, BCh (Wales)

Faculty members holding cross appointments as shown
1Sociology
2Psychology
3Systems Design

Course Descriptions
Kinesiology

Kin 102  F  3C,1T  0.5
Biophysical Basis of Kinesiology
Human physical movement is discussed from mechanical, anatomical and physiological viewpoints. The course provides a general orientation to the study of Kinesiology.

Kin 103  F  3C,1T  0.5
Psycho-Social Basis of Kinesiology
An introduction to the study of human physical activity from psychological, sociological, anthropological and historical perspectives.

Kin 116  W  3C  0.5
General and Organic Chemistry
An introduction to the chemical concepts of importance in kinesiology and health studies.

Kin 171  History of Sport and Physical Activity
Not offered 1979-80

Kin 200  F  3C,2L  0.5
Human Anatomy of the Limbs and Trunk
A functionally-oriented study of the limbs and trunk by regions using pres dissected cadavers. A brief introduction to Neuroanatomy is included.
Prereq: Kinesiology, Health Studies and Dance students or permission of instructor. Lab 5 is for Dance students only. No Year 1 students 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.

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.
Prereq: Kin students only

Kin 252  W,S  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: Kin 103 and Soc 101

Kin 255  W  3C,2L  0.5
Introduction to Psychomotor Behaviour
An information processing approach is used to introduce the principles of learning and performing fine and gross motor skills. In addition, social psychological variables are studied as they relate to the facilitation or decrement in learning and performance.
Prereq: Kin 103 and Psych 101

Kin 280  Administration
Not offered 1979-80

Kin 300  F  3C,2L  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 151, 152

Kin 317  F  3C  0.5
Human Biochemistry
An elementary course in human biochemistry including the metabolism and function of proteins, carbohydrates, lipids, and hormones. Emphasis is placed on the application of biochemical principles to human movement.
Prereq: Kin 116 or equivalent

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 biostatics and biodynamics of linked segment 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: Kinesiology students only
Kin 335  W,S  3C,2L  0.5  
**Evaluation of Human Motor Performance**
The nature and methodology of assessment is reviewed from theoretical and empirical perspectives. Taxonomies of motor performance are examined and principles developed for the measurement of specific construction in field and laboratory situations.  
*Prereq: Kin 222*

Kin 340  F,W  3C,2L  0.5  
**An 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, 3rd and 4th year students only*

Kin 341  W  3C,2L  0.5  
**Selected Topics in Sports Medicine**
A course for those students wishing additional study in the area of sport 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 201.*

Kin 346  W,S  3C  0.5  
**Nutrition (Health Studies 346)**
An elementary course in nutrition with special emphasis on diet for sport and certain physiological conditions.  
*Prereq: Kin 317 or equivalent*

Kin 352  F  3C  0.5  
**Aging, the Aged and Leisure: A Sociological and Social Psychological Perspective (Sociology 373)**
Employing a sociological and psychological frame of reference, the process and problems of aging are analysed. Special emphasis is given to the problem of leisure time in the later years of life.  
*Prereq: Soc 101 and one other Soc course. Offered even years only*

Kin 354  W,S  2C,1T  0.5  
**Social Psychology and Physical Activity**
An examination of the social influences and group processes which occur within sport teams. Topics include conformity, the influence of onlookers and co-actors, leadership, group structure, and cohesion.  
*Prereq: 2 term courses in Psych, or consent of instructor*

Kin 356  F  2C,1T  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  2C,1T  0.5  
**Motor Learning**
A course focused on the bases and applications of theories of motor learning. Included are selected psychological and neurophysiological processes as they relate to these theories.  
*Prereq: Kin 222, 255*

Kin 401  W,S  3C,2L  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 muscle and the neuro endocrine mechanisms involved.  
*Prereq: Kin 300 and 317*

Kin 402  F,S  3C  0.5  
**Hydrospace, Altitude and Aerospace Physiology**
An examination of man’s cardiorespiratory responses at rest and during work to selected stresses of hyperbaric and hypobaric environments.  
*Prereq: Kin 300*

Kin 405  W  3C,2L  0.5  
**Exercise Management**
An examination of the rationale and procedures used in the development of exercise programmes for normally healthy individuals.  
*Prereq: Kin 300 and 321*

Kin 407  F  3C  0.5  
**The Physiology of Coronary Heart Disease**
An examination of the pathology, risk factors and rehabilitation programmes related to coronary heart disease. Major emphasis is placed on the cardio-respiratory implications of exercise in the rehabilitation process.  
*Prereq: Kin 300 or equiv.*
Kin 410 F,S 3C 0.5
Growth, Development and Aging
(Health Studies 410)
The physiology of growth, development and aging is examined with special reference to the influence of physical activity, diet and other environmental factors on the normal processes.
Prereq: Kin 200 and Biol 151

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 and Psych 261 or permission of instructor

Kin 420 F 3C 0.5
Kinesiological Considerations in Equipment Evaluation
The principles of evaluation and design of equipment for human use are studied from a Kinesiological perspective.
Prereq: Kin 321 and 340

Kin 425 F 3C,2L 0.5
Biomechanics of Human Movement
The quantitative analysis of human movement from a biomechanical perspective, including some neural control processes. Static, kinematic and kinetic analyses of single and multi-segment models of a variety of human movement forms are conducted.
Prereq: Kin 321

Kin 426 W 3C,2L 0.5
Biophysical Signal Processing and Control Systems
Basic electricity and electronics for the student with a biophysical background. Application of signal processing techniques to biophysical signals encountered by kinesiology students. Modelling of biophysical systems, control systems associated with human movement and performance.
Prereq: Kin 321, Kin 300, Kin 357 or permission of instructor.

Kin 431/432 F,W,S 0.5 each
Research Project
An independent research project on an approved topic, supervised by a faculty member. Required of all students enrolled in the Honours programme in Kinesiology. Kin.431 includes an approved design and the completion of the first segment of the paper.
Prereq: Depending upon the topic selected, the student is required to achieve at least 60% in appropriate courses. Details are available in the Departmental office.
Kin 432 includes the completion of the project begun in Kin 431.
Prereq: Kin 431

Kin 442 W 2C,2L 0.5
Adapted Physical Activity
The study of individual problems and their implications for the kinesiologist. Body mechan problems orthopaedic disabilities, neurological disabilities, heart disturbances and respiratory problems are discussed.
Prereq: Kin 300

Kin 452 W,S 3C 0.5
Sport in Society (Recreation 303 Sociology 374)
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 Soc course

Kin 453 F,S 3C 0.5
The Psychology of Sport and Physical Activity
The course focuses on the effects of participating in physical activity programmes upon the socio-psychological adjustment of the individual. Emphasis is given to the uniqueness of the individual personality and how a person reacts to different situations.
Prereq: Kin 354

Kin 456 F,S 3C 0.5
Cognitive Dysfunction and Motor Skill
An examination of issues related to understanding of the cerebral organization of motor skill. Discussion of how certain movement disorders are a reflection of disturbances at different stages in the sequence of information processing.
Prereq: One of Psych 206, 207, or Kin 356
Cross-listed as Psych 307

Kin 470 F,W,S 3C 0.5
Seminar in Kinesiology
An examination of current major issues and trends in Kinesiology. Students select areas of major interest from a series of faculty introduced topics.
Prereq: fourth year Kinesiology students.

Kin 472 F,W,S 0.5
Directed Study in Special Topics
For the student who desires to pursue a particular topic in depth through guided independent research and/or reading. A faculty member must approve a student’s project prior to registration. May be repeated in subsequent terms.
Prereq: Consent of department
Coaching Foundations
A study of basic principles and philosophies of coaching today. Emphasis is placed upon the application of kinesiological principles of performance as well as social, organizational and resource problems pertinent to each of several sport sections.

The specific sections offered are:
Kin 481T - Volleyball, Kin 482T - Basketball, Kin 483T - Gymnastics, Kin 484T - Racquets, Kin 485T - Football, Kin 486T - Ice Hockey, Kin 487T - Field Hockey, Kin 488T - Aquatics, Kin 489T - Track and Field. Students must complete a minimum of three (3) sport sections before credit is given.

Physical Activities Courses
All physical activity courses are elective and non-credit and available only to students enrolled in Kinesiology. Students should consult with a faculty advisor concerning the applicability of these courses for entry into careers such as teaching. The following activity courses are offered if there are sufficient requests:

Kin 180  Elem. Basketball, W, S
Kin 183  Elem. Gymnastics, F, W
Kin 187  Beginner Swimming, F
Kin 188  Elem. Aquatics, F, W
Kin 281  Elem. Volleyball, F
Kin 282  Elem. Lacrosse, W
Kin 283  Int. Gymnastics (M), W
Kin 284  Int. Gymnastics (W), W
Kin 285  Elem. Football, F, S
Kin 286  Elem. Badminton, W
Kin 287  Elem. Soccer, F (even years)
Kin 288  Elem. Wrestling, W
Kin 289  Elem. Rugger, F (even years)
Kin 381  Elem. Tennis, F, S
Kin 382  Elem. Squash, W, F
Kin 383  Elem. Golf, F, S
Kin 384  Elem. Handball/Paddleball, W
Kin 385  Elem. Field Hockey, F, S
Kin 386  Elem. Ice Hockey, W
Kin 387  Elem. Curling, W
Kin 388  Int. Aquatics, W
Kin 389  Elem. Track & Field, F, S
Kin 389A Outdoor Skills Camp, F
Kin 481  Adv. Volleyball, W
Kin 482  Adv. Basketball, F, S
Kin 483  Adv. Gymnastics, W
Kin 484  Adv. Racquets, W
Kin 485  Adv. Football, W, S
Kin 486  Adv. Ice Hockey, W
Kin 487  Adv. Field Hockey, F, S
Kin 488  Adv. Aquatics, W
Kin 489  Adv. Track & Field, F, S
Kin 489A Ski School, W
M Env 131 W 3C 0.5
Environmental Issues 2
Continuation of M Env 130
Prereq: Honours Man-Environment Studies

M Env 150 F 3C 0.5
Environmental Methods and Techniques 1
Series of concurrent six week workshops to introduce methods and techniques appropriate for investigating different environmental problems. Students to select any two from a series of workshops such as field studies, laboratory analyses, questionnaire design, survey research, small group dynamics and participant observation of social interactions.
Prereq: Honours Man-Environment Studies

M Env 151 W 3C 0.5
Environmental Methods and Techniques 2
Continuation of M Env 150
Prereq: Honours Man-Environment Studies

M Env 190 F 4S,1wkshp 0.5
Seminar-Workshop
Faculty supervised individual or small group investigation of selected environmental issues to help develop skills for defining and resolving problem situations.
Prereq: Honours Man-Environment Studies

M Env 191 W 4S,1wkshp 0.5
Seminar-Workshop
Continuation of M Env 190
Prereq: Honours Man-Environment Studies

Env St 195A Introduction to Environmental Studies
See Env St course descriptions, page 301.

Env St 195B Introduction to Environmental Problems
See Env St course descriptions, page 301.

Env St 200 Field Ecology
See Env St course descriptions, page 301.

Env St 201 Introduction to Environmental and Planning Law
See Env St course descriptions, page 301.

M Env 241 W 3C 0.5
Social Change
An analysis of major theories of social change, the sources and patterns of change processes with emphasis on the environmental context. Provide an opportunity to explore aspects of change which are of special interest to the student.
No prereq

M Env 247 F 3C 0.5
Urban Anthropology
Approaches to the study of urban centres as undertaken by anthropologists. Selected topics such as urban social networks, the urbanization of non-western societies, and the culture of poverty will be pursued.
Prereq: Anth 102 or permission of instructor

M Env 250 F,W 3C 0.5
Environmental Methods & Techniques
Series of concurrent six week workshops to continue the methods and techniques offerings of M Env 150/151. Students to select any two from a series of workshops such as field studies, laboratory analyses, questionnaire design, survey research, small group dynamics and participant observation of social interactions.
Prereq: Honours Man-Environment Studies or consent of instructor.

Env St 252 Media Tools for Environmental Studies
See Env St course descriptions, page 301.

Env St 253 Media Tools for Environmental Studies - Advanced Level
See Env St course descriptions, page 301.

M Env 260 W 3C 0.5
Visual Perception and Communication
An exploration of the nature of perception and its relationship to communication with special reference to visual phenomena.
Prereq: Consent of Instructor

Env St 271 Introduction to Quantitative Research Methods
See Env St course descriptions, page 301.

Env St 272 Computer Programming in Environmental Studies
See Env St course descriptions, page 301.

M Env 275 F,W 2R 0.5
Special Readings
May be used by students who transfer into Man-Environment Studies at second year level. Background reading and study in consultation with faculty.
Prereq: Consent of instructor
Course Descriptions
Man-Environment Studies

M Env 290 Y 6S-wkshp 1.0
Seminar-Workshop
The course begins with an examination of the design and conduct of research including elements of philosophy of science, goal-setting, research techniques, design and analysis. With this background students will prepare a project proposal to be conducted throughout the balance of the year in consultation with selected faculty advisors.
Prereq: Second year Honours Man-Environment Studies

M Env 295 Y 2C,1S 1.0
Perspectives on Science & Technology
Through the use of Ascent of Man film series and a number of texts, this course will provide an historical perspective on the development of science and technology in a socio-cultural context.
Prereq: Honours Man-Environment, year 2 or consent of instructor.

M Env 310 F 4C 0.5
Psychological Man
The psychological correlates of the different environments in which man develops and continues in adult life. The emphasis will be on individual differences assessed by empirical techniques and objective criteria derived from the physical and cultural environment.
No prereq

M Env 320 W 3C 0.5
Environmental Economics
Principal economic concepts and their environmental implications. Examination of the economic approach to environmental quality. Introduction to social benefit-cost analysis as applied to environmental problems.
Prereq: Honours Man-Environment Studies or Introductory Economics course or consent of instructor
Cross-listed as Econ 355

M Env 330 Psycho-Social Aspects of Environmental Design
Not offered 1979-80.

M Env 331 W 2C 0.5
Environmental Issues in a Global Perspective
No prereq

Env St 333 Parkland Management
See Env St course descriptions, page 301.

M Env 335 W 2C 0.5
Anthropology of Education
A seminar on selected theories of socialization, acculturation and enculturation. These theories will be related to what in the west is usually categorized as "education". There will also be some emphasis on understanding how field work should be done in educational settings. Students should be prepared to do some field work themselves.
Prereq: Anth 102A or consent of instructor

M Env 340 F,W 3C 0.5
Special Topics in Environmental Science
Application of the natural or life science disciplines to selected problems of environmental importance. Emphasis is placed on the scientific principles and concepts used for analyzing problems in detail. Dependent on student demand and faculty availability.
Prereq: Honours Man-Environment Studies

M Env 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 take part in one group project to experience the process at first hand.
No prereq

M Env 351 W 3S 0.5
Organizations and Environmental Management
Analyses of inter-jurisdictional and inter-organizational arrangements governing major environmental-resource complexes in Canada. Policy and other issues relating to the development of coherent, effective planning and management systems for such complexes. The course will focus on one particular environmental-resource complex each year to serve as an on-going case study. Examples may include the Great Lakes system, agricultural lands in Canada, development north of 60°, off-shore resources to the 200 mile limits.

M Env 356 W 3C 0.5
Canadian Non-Renewable Resources
An introduction to mineral resources and the state of reserves on selected minerals. Geological factors affecting the occurrence of economic minerals and rocks, concentrating upon energy minerals. Political and social implications are discussed.
Prereq: Honours Man-Environment Studies or consent of instructor
Cross-listed as Sci 350.

Env St 358 Environmental Pollution and its Control
See Env St course descriptions, page 301.
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

M Env 361 Contemporary Media of Communication and Human Environments
Not offered 1979-80.

M Env 375 F, W 2R 0.5 Special Readings or Seminars on Selected Topics
Prereq: Consent of instructor

M Env 375E/475E Local Energy Self-Reliance
M Env 3/5/4/5F Environments of Work: Health, Safety and Satisfaction in the Workplace
M Env 375H/475H Man-Made Environmental Health Hazards
M Env 375J/475J Issues in Resource Law
M Env 3/5M/4/5M Urban Systems Dynamics
M Env 375N/475N Environmental Nutrition: Man and His Food
M Env 375P/475P Environmental Education
M Env 375S/475S Social Impact Assessment: Theory and Technique

Env St 380/381 Environmental Studies Workshop
See Env St course descriptions, page 301.

M Env 385 F 3C, 1S 0.5 Technology/Lifestyles for a Conserver Society
Based upon a Conserver Society approach, the course will focus upon energy as a central and symbolic issue. Energy alternatives will be discussed with emphasis on the technologies of alternate energy systems and on the social, political and economic implications.
Prereq: Second year or above

Env St 390 Y 4.8S, wkshp 1.0/2.0 Seminar-Workshop
390A (1 course credit)
390B (2 course credits)
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. Extra credit only by consent of faculty.
Prereq: Honours Man-Environment Studies.

Env St 400 Professional Development in Environmental Management
See Env St course descriptions, page 302.

Env St 401 Environmental Law
See Env St course descriptions, page 302.

Env St 402 Planning Law
See Env St course descriptions, page 302.

M Env 410 Y 3S 1.0 Honours Seminar: Environmental Management
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 programmes.
Prereq: Hon. Man-Environment Studies or instructor consent.

Env St 411 Alternative Future Environments 1
See Env St course descriptions, page 302.

Env St 412 Alternative Future Environments 2
See Env St course descriptions, page 302.

Env St 417 Land Use History and Landscape Change 1
See Env St course descriptions, page 302.

Env St 418 Land Use History and Landscape Change 2
See Env St course descriptions, page 302.

Env St 444 Land Evaluation and Resources Management
See Env St course descriptions, page 302.

M Env 445 Y 3C 1.0 Technology Assessment and Policy Analysis
The focus of this course is upon technology assessment processes and systems with particular attention to actors, information, decisions, strategies, issues and policy analysis. In the context of technological developments, policy statements and policy-making structures and processes will be examined.
Prereq: Honours Man-Environment Studies fourth year or consent of instructor.

M Env 450 Honours Seminars: Environmental Design
Not offered 1979-80.
### Course Descriptions

**Management Sciences**

**M Env 470 Y 3C 1.0**

**Environmental Teaching and Learning**

Examination of physical and social environments which induce particular kinds of learning. Practical training and experience in project development and co-ordination, leadership and group facilitation processes.

*Prereq:* Third and fourth year Honours Man-Environment Studies and consent of instructor

**M Env 475 F,W 2R 0.5**

**Special Readings or Seminar on Selected Topics**

See M Env 375 for selected topics which were offered in 1978-79 and will likely be offered in 1979-80.

*Prereq:* Consent of instructor

**M Env 476 Y 2R 1.0**

**Special Readings or Seminar on Selected Topics**

*Prereq:* Consent of instructor

**M Env 480 Y 3S 1.0**

**Honours Seminar: Special Topics**

Topics will be selected from areas of special interest and experience of individual faculty members, reflecting current research or other academically related activities. Topics will change from year to year. Dependent on student demand and faculty availability.

*Prereq:* Honours Man-Environment Studies

**M Env 490 Y 4,8,12C 1.0/2.0/3.0**

**Senior Honours Assignment**

490A (1 course credit)
490B (2 course credits)
490C (3 course credits)

A project of sufficient scope to demonstrate mastery of problem solving and communication skills on a selected problem or issue concerning man-environment interrelationships. Variable credit only by consent of faculty.

*Prereq:* Honours Man-Environment Studies

---

### Department of Management Sciences

**Professor, Chairman of the Department**

D. W. Conrath, BA (Stanford), MS (Carnegie Tech)
MA, PhD (UC, Berkeley)

**Professor, Associate Chairman**

E. A. Silver, BEng (McGill), ScD (MIT), PEng

**Professors**

D. J. Clough, BASc, MBA (Toronto), PEng
P. M. Reilly¹, BASc (Toronto), DIC PhD (London), FSS, PEng
S. D. Saleh, BA (Cairo), MA, PhD (Case Western Reserve)

**Associate Professors**

I. Bernhardt, BA (NYU) PhD (UC, Berkeley)
F. E. Burke, BA (London), PEng
M. J. Magazine, BS (CCNY), MS (NYU), MEng, PhD (Florida)
J. B. Moore, BASc (Toronto), MMath, PhD (Waterloo), PEng
R. G. Vickson, BSc (Br. Col.), PhD (MIT)

**Assistant Professors**

J. T. Janz, BA (Winnipeg), PhD (Minnesota)
B. S. Jung, BS (Seoul), MASc (Waterloo), MBA, PhD (Toronto)

**Adjunct Professor**

M. Saltsman, MP

*Faculty Member holding cross appointment as shown: ¹Department of Chemical Engineering*

---

### Course Descriptions

**M Sci 21 F,W 3C 0.5**

**Probability and Statistics 1**


**M Sci 23 F,S 2C,1T 0.5**

**Managerial and Engineering Economics 1**

This course is designed to satisfy Engineering Economics requirements of the Canadian Accreditation Board. Price and output decisions. Choosing among alternative inputs and production processes. Evaluating make-or-buy decisions, equipment service life, and new products.
M Sci 31  F,W  2C,1T  0.5
\textit{Probability and Statistics 2}
Linear statistical models. General regression theory and
applications. Design of orthogonal experiments and
industrial applications. Correlation coefficient analysis.
Elementary time series analysis.
\textit{Prereq: M Sci 21 or equivalent}

M Sci 43  W  2C,1T  0.5
\textit{Managerial and Engineering Economics 2}
Applications of models of household and enterprise
beaviour. Seller strategy in consumer and industrial
markets. Valuation of nonmarket goods. Examples
include use of buyer behaviour data to determine
market segments, and evaluation of a public
investment.
\textit{Prereq: M Sci 23 or equivalent}

M Sci 44  F,S  3C  0.5
\textit{Organizational Behaviour 1}
Considerations of perception, cognition, motivation, job
attitudes, and job satisfaction. Discussion of the
measurements of performance and procedures for
selection to match worker and job. A review of
psychological and physiological costs and benefits of
work.

M Sci 46  F,W,S  3C  0.5
\textit{Operations Research 1}
The Operations Research approach to problem solving.
Deterministic mathematical programming including
linear programming, transportation method,
assignment problem, network methods, and dynamic
programming. Elements of deterministic inventory
models.

M Sci 47  F,W,S  3C  0.5
\textit{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.
\textit{Prereq: M Sci 21 or equivalent, and M Sci 46.}

M Sci 48  W  3C,1T  0.5
\textit{Introduction to Production Management}
Introduction to a number of problem areas in the
management of production/industrial engineering.
Topics chosen from production planning and inventory
control, planning/control of large projects, quality
control, reliability/maintenance, facilities layout, job
design, production standards and work measurement.
Faculty of Mathematics

Dean of the Faculty of Mathematics
W. F. Forbes, BSc, PhD, DSc (London), DIC, ARCS

Associate Deans, Undergraduate Studies
K. D. Fryer, BA (W. Ont.), PhD (Toronto)
P. J. Ponzo, MA (Toronto), PhD (Illinois)

Associate Dean, Graduate Studies
J. Paldus, RNDr. (Charles University, Prague), CSc (Czecho- slovak Academy of Sciences, Prague)

Director of Undergraduate Affairs
P. C. Brillinger, BA (McMaster), MA (Waterloo)

Director, Mathematics Computing Facility
W. M. Gentleman, BSc (McGill), PhD (Princeton)

Director of Computer Communications Network Group
E. G. Manning, MSc (Waterloo), PhD (Illinois)

Director, Statistical Consulting Service
G. W. Bennett, BSc, BA, PhD (Adelaide)

Director, Mathematics/Commerce Group
C. F. A. Beaumont, BA (McMaster), MA (Toronto)

Associate Director, Mathematics/Commerce Group
R. G. Dunkley, BA (W. Ont.)

Lecturers
R. J. Beach, MMath (Waterloo)
Z. Dvoracek, MS, RNDr. (Charles University, Prague), PhD (Czecho- slovak Academy of Sciences, Prague)
R. G. Scoins, MMath (Waterloo)
C. Struthers, MMath (Waterloo)

Adjunct Lecturer
R. G. R. Lawrence, QC

Department of Applied Mathematics

Associate Professor and Chairman of the Department
C. F. A. Beaumont, BA (McMaster), MA (Toronto)

Professor and Associate Chairman of the Department
I. J. McGee, BASc (Toronto), MSc (Waterloo), PhD (Yale)

Professors
J. Cizek, RNDr. (Charles University, Prague), CSc (Czecho- slovak Academy of Sciences, Prague)
H. F. Davis, PhD (MIT)
S. G. Davison, PhD (Manchester)
B. Forte, PhD (Pisa), Habil DSc (Rome)
J. A. George, MSc (Alberta), PhD (Stanford)
F. O. Goodman, BSc (London), PhD (London), DSc (London), FInstP, FA/P (Leave of Absence)
M. A. McKiernan, MA (Loyola), PhD (UIT)
J. Paldus, RNDr. (Charles University, Prague), CSc (Czecho- slovak Academy of Sciences, Prague)
M. M. Pintar, BSc, MSc, PhD (Ljubljana)
P. J. Ponzo, MA (Toronto), PhD (Illinois)
D. G. Wertheim, BA (McMaster), PhD (Toronto)

Associate Professors
C. B. Collins, BSc (London), PhD (Cambridge)
J. Froese, BA (Manitoba), MA (Queen’s), PhD (Br. Col.)
G. W. Horndeski, BSc (Washington University), PhD (Waterloo)
W. H. Hui, BSc (Peking), PhD (Southampton)
G. J. Lastman, MA (Br. Col.), PhD (Texas)
F. R. McCourt, BSc, MSc, PhD (Br. Col.)
C. Rogers, BA Hons (Oxford), MSc, PhD (Nottingham)
J. Wainwright, BSc (Natal), PhD (South Africa)
R. A. Wentzell, BSc (Acadia), PhD (W. Ont.)

Assistant Professors
S. P. Lipshitz, BSc Hons (Natal), MSc (South Africa), PhD (Witwatersrand)
R. G. McLennan, MSc (Queen’s), PhD (Cantab)
M. E. Snyder, BSc (W. Ont.), MSc (Waterloo)

Lecturer
B. J. Marshman, PhD (Waterloo)

Postdoctoral Fellows
J. A. Isenberg, PhD (Princeton)
R. J. McKellar, PhD (Arizona)

Adjunct Professors
Y. C. Cheng, PhD (Br. Col.)
M. L. Glasser, PhD (Carnegie-Mellon)
D. J. Henderson, BS (Br. Col.), PhD (Utah), FInstP
M. S. Klamkin, BChE (Cooper Union), MS (Brooklyn)
D. Lovelock, PhD, DSc (Natal)
H. Rund, PhD (Cape Town), Habilitation (Freiburg)
R. E. Woolsey, PhD (Texas)
Faculty Members holding cross-appointments as shown
1Applied Mathematics and Chemistry
2Applied Mathematics/Statistics/Computer
Science/Pure Mathematics
3Computer Science and Applied Mathematics
4Pure Mathematics and Applied Mathematics
5Physics and Applied Mathematics

Department of Computer Science

Professor and Chairman of the Department
J. A. Brzozowski, MASc (Toronto), PhD (Princeton)

Professor and Associate Chairman for Undergraduate Studies
J. W. Graham, MA (Toronto)
Recipient of Distinguished Teacher Award

Associate Professor and Associate Chairman for Graduate Studies
J. Li. Morris, BSc (Leicester), PhD (St. Andrews)

Professors
D. D. Cowan, BASc (Toronto), PhD (Waterloo)
K. Culik, MSc, RNDr (Prague), PhD (Czechoslovak Acad Sci)
B. Forte, PhD (Pisa), Habil DSc (Rome)
W. M. Gentleman, BSc (McGill), PhD (Princeton)
J. A. George, MSc (Alberta), PhD (Stanford)
Sabbatical Leave 1979-1980
J. D. Lawson, BASc (Toronto), PhD (Waterloo), FIMA
E. G. Manning, MSc (Waterloo), PhD (Illinois)
T. Pietrzykowski, MA (Warsaw), PhD (Polish Acad Sci)

Associate Professors
E. A. Ashcroft, BA (Cantab), PhD (Imperial College)
K. O. Geddes, BA (Sask), MSc, PhD (Toronto)
J. F. Gentleman*, MS (Chicago), PhD (Waterloo)
J. Majithia, BSc (London), MEng, PhD (McMaster)
M. A. Malcolm, BSc, MEng (Denver), MS, PhD (Stanford)
D. E. Morgan, BSc (Rose Polytechnic Inst), MS (Michigan), PhD (Waterloo)
J. I. Munro, BA (New Br.), MSc (Br. Col.), PhD (Toronto)
R. B. Simpson, MASc (Toronto), PhD (Maryland)

Department of Combinatorics and Optimization

Professor and Chairman of the Department
D. H. Younger, PhD (Columbia)

Professor and Associate Chairman of the Department
R. C. Mullin, BA (W. Ont.), PhD (Waterloo)
Associate Professor and Associate Chairman of the Department
C. E. Haf, BS (Stanford), PhD (Waterloo)

Course Descriptions
Computer Science/
Combinatorics and Optimization

Distinguished Professor
W. T. Tutte, PhD (Cantab), FRSC

Professors
G. Berman, MA, PhD (Toronto)
J. Edmonds, BA (Geo Washington), MS (Maryland)
K. D. Fryer, BA (W. Ont.), PhD (Toronto)
P. L. Hammer, PhD Math (Bucharest) Sabbatical Leave
R. C. Read, MA (Cantab), PhD (London)
E. R. Swart, BScEng (Witwatersrand), MSc (UNISA), DSc ( Pretoria)

Associate Professors
M. Best, MMath (Waterloo), PhD (UC Berkeley) Sabbatical Leave
J. A. Bondy, DPhil (Oxon)
R. N. Burns, BSc (Toronto), PhD (Waterloo)
A. R. Conn, BSc (Imperial College) MSc (Manitoba), PhD (Waterloo)
L. J. Cummings, PhD (Br. Col.)
R. A. Honsberger, BA (Toronto), MA (Waterloo)
D. M. Jackson, PhD (Cantab)
U. S. R. Murty, MA (Osmania), PhD (Indian Stat. Inst.)

Assistant Professors
F. R. Allaire, MMath (Waterloo), PhD (Manitoba)
M. W. Carter, PhD (Waterloo)
L. B. Richmond, MSc (Manitoba), PhD (Alberta)
P. Schellenberg, PhD (Waterloo)
S. A. Vanstone, PhD (Waterloo)

Lecturers
E. Anderson, BA (McMaster)
R. G. Dunkley, BA (W. Ont.)
G. B. Faulkner, BSc (Toronto), PhD (Waterloo)

Adjunct Professors
P. Erdos, PhD (Budapest), DSc (Manchester)
E. L. Johnson, BS (Georgia Tech), PhD (UC Berkeley)
C. St. J. A. Nash-Williams, PhD (Cantab), FRSE
K. Ritter, DHab (Karlsruhe)

Adjunct Lecturer
J. W. Dodd, BASc (Toronto), MSc (Waterloo)

Faculty Member holding cross-appointment as shown
1Pure Mathematics and Combinatorics and Optimization

Faculty Member holding joint appointment as shown
2St. Jerome’s and Combinatorics and Optimization
Course Descriptions

Combinatorics and Optimization/
Pure Mathematics

Assistant Professors
J. C. Beatty, AB (Math) (Princeton), PhD (UC Berkeley)
K. S. Booth, BS (Calif Inst Tech), PhD (UC Berkeley)
P. C. Brilling, BA (McMaster), MA (Waterloo)
V. A. Dyck, MMath (Waterloo)
M. van Emde Boas, MEngMath (Technische Hogeschool,
Delft, The Netherlands), PhD (Amsterdam)
G. H. Gonnet, PhD (Waterloo)
T. E. Maibaum, BSc (Toronto), PhD (London)
D. Rotem, BSc (Hebrew Univ Jerusalem),
PhD (Witwatersrand)
G. R. Sager, PhD (Washington)
J. A. Smith, PhD (Waterloo), PEng
J. D. Taylor, BSc (Sask), MMath, PhD (Waterloo)
F. W. Tompa, BSc (Brown), PhD (Toronto)
J. H. Velimera, BA (W. Ont.), MA (Waterloo) (part-time)
J. W. Welch, BSc (McGill), PhD (Waterloo) (part-time)
J. W. N. Wong, PhD (UC Los Angeles)

Departments and Pure Mathematics

Lecturers
R. J. Beach, BMath, MMath (Waterloo) (part-time)
R. L. Newkirk, BSc, MSc (W. Ont.) (part-time)

Adjunct Professors
P. H. Dirkansen, MA (Waterloo)
S. C. Johnson, BA (Haverford College, Pa.),
PhD (Columbia)
J. G. Linders, MASc (Toronto), PhD (Imperial College)

Adjunct Assistant Professor
E. J. H. Chang, BSc (Manitoba), MD (Br Col.),
MMath (Waterloo)

Faculty Members holding cross-appointments as shown
1Applied Mathematics/Statistics/Computer Science/Pure Mathematics
2Computer Science and Applied Mathematics
3Computer Science and Statistics
4Statistics and Computer Science
5Electrical Engineering and Computer Science
6Computer Science and Dean’s Office

Department of Pure Mathematics

Professor and Chairman of the Department
G. E. Cross, MA (Dalhousie), PhD (Br.Col.)

Distinguished Professor
J. Aczel, PhD (Budapest), Habilitation (Hungarian Acad Sci), FRSC

Professors
G. E. Cross, PhD (Oklahoma)
D. Z. Djokovic, PhD (Belgrad)
B. Forte, PhD (Pisa), Habilitation (Rome)
H. Haruki, PhD (Osaka)
P. Hoffman, BA (Toronto), PhD (Manchester)
J. G. Linders, BA (Cantab), PhD (Imperial College)
D. A. Higgs, BScHons (Witwatersrand), MA (Cantab),
PhD (McMaster)
A. Kerr-Lawson, BA (Toronto), MA (Chicago),
PhD (McMaster)
E. Moskal, BA (Toronto), PhD (Illinois)
D. Mowat, PhD (Waterloo)
C. T. Ng, BSc (Chinese Univ.), PhD (Waterloo)
F. C. Y. Tang, BSc (Hong Kong), MS (South Carolina),
PhD (Illinois)
D. de Witte, MSc Theor. Phys (Ghent), MScMath,
PhD (Brussels) Leave of Absence

Assistant Professors
A. A. Adamson, MMath (Waterloo), PhD (Berkeley)
K. R. Davidson, BMath (Waterloo), PhD (Berkeley)
L. J. Dickey, MA (Arizona), PhD (Wisconsin)
J. W. Lawrence, MSc (McGill), PhD (Carleton)
C. L. Stewart, BSc (Br. Col.), MSc (McGill),
PhD (Cantab)
F. Zorzitto, BSc (Windsor), PhD (Queen’s)

Postdoctoral Fellows
H. S. Tam, PhD (Hong Kong)

Adjunct Professor
H. H. Crapo, AB (Michigan), PhD (MIT)
Adjunct Lecturer
J. Lester, BSc (Memorial), PhD (Waterloo)

Faculty Members holding cross-appointments as shown
1. Applied Mathematics/Statistics/Computer Science/Pure Mathematics
2. Pure Mathematics and Applied Mathematics
3. Pure Mathematics and Philosophy
4. Pure Mathematics and Combinatorics and Optimization
5. St. Jerome's and Pure Mathematics

Department of Statistics

Associate Professor and Chairman of the Department
J. F. Lawless, BSc, MSc, PhD (Waterloo)

Professor and Associate Chairman of the Department
K. R. Shah, BA, MA (Bombay), PhD (Indian Stat. Inst.)

Professors
H. M. Atrubin, BA (Manitoba), FSA, FCFA
G. A. Barnard, MA (Cambridge), DSc (London), FIMA, HonARCS
W. F. Forbes, BSc, PhD, DSc (London), DIC, ARCS
B. Forte\(^1\), PhD (Pisa), HabilitDSc (Rome)
J. Gani, BSc, DIC (London), PhD (ANU), DSc (London), FAA
W. M. Gentleman\(^2\), BSc (McGill), PhD (Princeton)
V. P. Godambe, MSc (Bombay), PhD (London)
J. G. Kalbfleisch, BSc (Toronto), MA, PhD (Waterloo)
Sabbatical Leave
P. M. Reilly\(^3\), UE, BASc (Toronto), DIC, PhD (London), PEng
D. A. Sprott\(^4\), BA, MA, PhD (Toronto), FRSC, FRPS
M. D. Vogel-Sprott\(^5\), BA (McMaster), MA, PhD (Toronto)

Associate Professors
W. H. Atkens, BA (Toronto), BSc, MA, MSc (Adelaide)
G. W. Bennett, BSc, BA, PhD (Adelaide)
M. A. Bennett, BA (Nottingham), FSA, FCA
W. H. Cherry, BSc, MSc, PhD (Melbourne)
J. F. Gentleman\(^6\), BA, MS (Chicago), PhD (Waterloo)
J. D. Kalbfleisch, BSc, MMath, PhD (Waterloo)
F. G. Reynolds, BSc, MSc (Manitoba), FSA, FCA
W. S. Rickert, BSc, PhD (Waterloo)
J. C. Robinson, BASc, MSc, PhD (Waterloo)
M. E. Thompson, BSc (Toronto), MSc, PhD (Illinois)
R. V. Thyse\(^3\), BSc (Montana), MA, PhD (Iowa)
J. B. Whitney, BA, MA (W. Ont.), PhD (Toronto)
J. C. Young, BASc (Toronto), MSc (Waterloo), PhD (Edinburgh)

Assistant Professors
B. Abraham, BSc (Kerala), MSc (Guelph), PhD (Wisconsin)
A. Brender, BSc (McGill), MA, PhD (UC Berkeley), ASA
K. S. Brown, B Math, PhD (Waterloo)
R. L. Brown, B Math (Waterloo), FSA, FCIA
R. J. MacKay, BSc (Waterloo), MSc, PhD (Toronto)
D. E. Matthews, BA, MA (W. Ont.), PhD (London), DIC
C. Minder, Dipl Math (Basel), M Math, PhD (Waterloo)

Lecturer
C. Springer, BSc, MSc (McGill)

Adjunct Professors
I. P. Fellegi, BSc (Budapest), MSc, PhD (Carleton)
A. Finch, BSc, ARCS, PhD, DSc (London), DIC
L. P. Lefkovitch, BSc (London)

Adjunct Lecturer
J. A. Jackson, BS, BChir, MB, MA (Cambridge)

Faculty Members holding cross-appointments as shown
1. Applied Mathematics/Statistics/Computer Science/Pure Mathematics
2. Computer Science and Statistics
3. Chemical Engineering and Statistics
4. Statistics and Psychology
5. Psychology and Statistics
6. Statistics and Computer Science

Strategy Board Members

University of Waterloo Faculty of Mathematics

R. S. Aberg
Vice President
Oil Sands Administration
Shell Canada Limited

M. W. Bainbridge
Director
Post-Secondary Recruitment Programme
Public Service Canada

Dr. D. C. Baxter
Director General
Data Processing Branch
Department of Supply & Services

E. G. Burton
President
Simpsons Limited

R. G. Clifford
Vice President
Central Region
IBM Canada Limited

G. Corlett
Deputy Comptroller
Noranda Mines Limited
Course Descriptions
Strategy Board Members/Mathematics

Mathematics Course Descriptions

Math 101a Number Systems and Functions (For Arts Students)  
Not Offered 1979-80  
(Students are encouraged to take Math 103 instead.)

Math 101b Geometry and Calculus (For Arts Students)  
Not offered in 1979-80  
(Students are encouraged to take Math 104 instead.)

Math 103 F 3C,1T 0.5  
Introductory Algebra (For students in Arts/Social Sciences)  
Topics chosen from set theory, permutations and combinations, binomial theorem, probability theory, systems of linear equations, vectors and matrices, mathematical induction.  
N.B.: Not open to students in the Faculty of Mathematics.

Math 104 W 3C,1T 0.5  
Introductory Calculus (For students in Arts/Social Sciences)  
N.B.: Not open to students in the Faculty of Mathematics.

Note
Math 103/104 are specially designed courses for students enrolled in Arts programmes and are normally not available to students with Year 5 Mathematics or equivalent. Year 4 Mathematics is recommended.

Math 105 W 3C 0.5  
Mathematics (For Environmental Studies Students)  
Prereq: None  
N.B.: Not open to students in the Faculty of Mathematics.
Math 106  F  3C  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.
N.B.: Not open to students in the Faculty of
Mathematics. This course is open to Kinesiology
students who have not taken Grade 13 Calculus.

Math 107  F  3C  0.5
Mathematics (For Kinesiology Students)
Content similar to that of Math 106 except that it will be
assumed that students have completed Grade 13
Calculus. Accordingly, there will be broader
consideration of applications.
N.B.: Not open to students in the Faculty of
Mathematics.

Math 110a  F  3C,2T  0.625
Calculus 1a (For Engineering Students)
Functions and their inverses, limits, continuity and
derivatives. The trigonometric functions, their inverses
and derivatives. Applications to rate, max./min., curve
sketching problems. Sequences, the definite integral,
the fundamental theorem of calculus. Applications to
area and volume problems.
Prereq: Year 5 Calculus
N.B.: Not open to students in the Faculty of
Mathematics.

Math 110b  W,S  3C,2T  0.5
Calculus 1b (For Engineering Students)
The logarithmic and exponential functions and their
derivatives and applications. Elementary differential
equations. Integration techniques. Improper integrals.
Indeterminate forms. Arc length, average values, work,
centroids and centres of mass, fluid force. Parametric
and polar equations. Series of constants and tests for
Operations on power series.
Prereq: Math 110a
N.B.: Not open to students in the Faculty of
Mathematics.

Math 111a  F  3C  0.5
Algebra and Solid Geometry (For Science Students)
The real and complex number systems, mathematical
induction, the Binomial Theorem, monotone sequences
and the Cauchy criteria, polynomial functions, theory of
equations.
Prereq: Year 5 Algebra recommended but not required.
N.B.: Not open to students in the Faculty of
Mathematics.

Math 111b  W,S  3C  0.5
Algebra and Solid Geometry (For Science Students)
Determinants, vector and matrix notation, elementary
solid geometry, linear transformations, eigenvalues and
eigenvectors.
Prereq: Year 5 Algebra recommended but not required.
N.B.: Not open to students in the Faculty of
Mathematics.

Math 113  Y  3C,2T  1.0
Calculus (For Arts and Science Students)
The derivative, differentiation of algebraic and
transcendental functions. Applications of the derivative.
The integral, applications of integration, techniques of
integration. Power series. Polar co-ordinates. Some
elementary differential equations.
Prereq: Year 5 Calculus
N.B.: Not open to students in the Faculty of
Mathematics.

Math 114  F  3C,2L,1T  0.625
Algebra and Vector Geometry (For Engineering
Students)
Matrix algebra. Systems of linear equations.
Determinants. Vectors in Euclidean space, lines, planes,
spheres. Eigenvalues. Introduction to vector spaces.
Prereq: Year 5 Algebra
N.B.: Not open to students in the Faculty of
Mathematics.

Note
Certain core Mathematics courses are offered at three
different levels. The advanced level courses are
intended for exceptionally gifted students in an
Honours programme. A student pursuing an Honours
degree may substitute the Advanced level equivalent
course(s) for any required Honours level course(s).
Similarly, a student pursuing a Pass or General
degree may substitute the Honours level equivalent
course(s) for any required General level course(s),
unless the student has been required by the Standings
& Promotions Committee to switch from an Honours
programme to General or Pass. In this case, the student
must enrol in General level courses. The following table
sets out these equivalences.
Advanced Honours General

Math 140a/b Math 130a/b Math 120a/b
Math 144a/b Math 134a/b Math 124a/b
Math 240a/b Math 230a/b Math 220a/b
Math 241a/b Math 231a/b Math 221a/b
P Math 341a/b Math 331a/b Math 321a/b
P Math 351a Math 332a Math 322a
P Math 352a Math 332b Math 322b
- Stat 230/231 Stat 220/221

Prerequisites involving these core courses in the course descriptions which follow will be given in terms of the lowest level acceptable (e.g. Prereq: Math 130b implies that Math 140b is also acceptable but Math 120b is not).

Math 120a 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: Year 5 Calculus
N.B.: Math 120a is not open to Honours Mathematics students.

Math 124a F,W 3C,1T 0.5
Deductive Geometry
Euclidean geometry with emphasis on deductive reasoning and problem solving, number systems.
Prereq: Year 5 Algebra
N.B.: Math 124a is not open to Honours Mathematics students.

Math 140b 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: Year 5 Calculus and a Year 5 Math Average of at least 85% (or permission of instructor)
N.B.: Credit will only be granted for one of Math 120a, 130a, 140a.
Also offered at St. Jerome's College.

Math 130a F 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: Year 5 Calculus
N.B.: Credit will only be granted for one of Math 120a, 130a, 140a.
Also offered at St. Jerome's College.

Math 130b 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 or 80% in Math 120a
N.B.: Credit will only be granted for one of Math 120b, 130b, 140b.
Also offered at St. Jerome's College.

Math 134a F 3C,1T 0.5
Algebra
Basic set theory, cardinality, elementary number theory, number systems, polynomials.
Prereq: Year 5 Algebra
N.B.: Credit will only be granted for one of Math 124a, 134a, 144a.
Also offered at St. Jerome's College.

Math 134b W,S 3C,1T 0.5
Linear Algebra 1
Systems of equations, vector spaces, matrices, determinants, geometric applications.
Prereq: Year 5 Algebra (Math 134a or 80% in Math 124a, is recommended, but not required)
N.B.: Credit will only be granted for one of Math 124b, 134b, 144b.
Also offered at St. Jerome's College.

Math 140a F 3C 0.5
Calculus
Math 140a is an advanced level, enriched version of Math130a.
Prereq: Year 5 Calculus and a Year 5 Math Average of at least 85% (or permission of instructor)
N.B.: Credit will only be granted for one of Math 120a, 130a, 140a.

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)
N.B.: Credit will only be granted for one of Math 120b, 130b, 140b.
Math 144a  F  3C  0.5  
**Algebra**  
Math 144a is an advanced-level, enriched version of Math 134a.  
*Prereq: Year 5 Algebra and a Year 5 Math Average of at least 85% (or permission of instructor)*  
*N.B.: Credit will only be granted for one of Math 124a, 134a, 144a.*

Math 144b  W,S  3C  0.5  
**Linear Algebra 1**  
Math 144b is an advanced-level, enriched version of Math 134b.  
*Prereq: Math 134a*  
*N.B.: Credit will only be granted for one of Math 124b, 134b, 144b.*

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 110a/b*  
*N.B.: Not open to students in the Faculty of Mathematics.*

Math 211  F,W  2C,2T  0.5  
**Calculus 2 (For Electrical Engineers)**  
Differential calculus of functions of several variables. Differential equations. Multiple integrals.  
*Prereq: Math 110a/b*  
*N.B.: Not open to students in the Faculty of Mathematics.*

Math 212  F,S  2C,2T  0.5  
**Advanced Calculus (For Electrical Engineers)**  
*Prereq: Math 211*  
*N.B.: Not open to students in the Faculty of Mathematics.*

Math 213  Y  3C  1.0  
**Calculus (For Science Students)**  
*Prereq: Math 113*  
*N.B.: Not open to students in the Faculty of Mathematics.*

Math 215  F,W  3C  0.5  
**Differential Equations (For Chemistry Students)**  
*Prereq: Math 113*  
*N.B.: Not open to students in the Faculty of Mathematics.*

Math 216  F,S  3C  0.5  
**Differential Equations (For Physics or Chemical Engineering Students)**  
*Prereq: Math 113 or 110a/b*  
*N.B.: Not open to students in the Faculty of Mathematics.*

Math 220a  F,W,S  3C,1T  0.5  
**Advanced Calculus**  
Differential calculus for functions of several variables.  
*Prereq: Math 120b*  
*N.B.: Math 220a is not open to Honours Mathematics students.*

Math 220b  F,W,S  3C,1T  0.5  
**Advanced Calculus**  
*Prereq: Math 220a*  
*N.B.: Math 220b is not open to Honours Mathematics students.*

Math 221a  F,W,S  3C  0.5  
**Linear Algebra**  
A selection of topics from: vector spaces, linear maps, matrix theory, inner products, bilinear and quadratic forms, and applications.  
*Prereq: Math 124a/b*  
*N.B.: Math 221a is not open to Honours Mathematics students.*

Math 221b  F,W,S  3C  0.5  
**Linear Algebra**  
A continuation of Math 221a.  
*Prereq: Math 221a*  
*N.B.: Math 221b is not open to Honours Mathematics students.*
Math 226 Y 2C 1.0
**Elementary Differential Equations (For Science Students)**


**Prereq:** Math 113
**N.B.:** Not open to students in the Faculty of Mathematics.

Math 230a F,W 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. Integral calculus of functions of several variables: multiple integrals, iterated integrals, change of variables, applications to area and volume calculations.

**Prereq:** Math 130b or 80% in Math 120a/b
**N.B.:** Credit will only be granted for one of Math 220a, 230a, 240a.

Also offered at St. Jerome's College.

Math 230b F,W,S 3C,1T 0.5
**Advanced Calculus**


**Prereq:** Math 230a
**N.B.:** Credit will only be granted for one of Math 220a, 230b, 240b.

Also offered at St. Jerome's College.

Math 231a F,W 3C 0.5
**Linear Algebra**

A selection of topics from: vector spaces, systems of linear equations, transformations, matrices, inner products, determinants, invariant subspaces, canonical forms, bilinear forms, quadratic forms, and applications.

**Prereq:** Math 134a/b or 80% in Math 124a/b
**N.B.:** Credit will only be granted for one of Math 221a, 231a, 241a.

Also offered at St. Jerome's College.

Math 231b F,W,S 3C 0.5
**Linear Algebra**

A continuation of Math 231a.

**Prereq:** Math 231a

**N.B.:** Credit will only be granted for one of Math 221b, 231b, 241b.

Also offered at St. Jerome's College

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)
**N.B.:** Credit will only be granted for one of Math 220a, 230a, 240a.

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)

**N.B.:** Credit will only be granted for one of Math 220b, 230b, 240b.

Math 241a F,W 3C 0.5
**Linear Algebra**

Math 241a is an advanced-level, enriched version of Math 231a.

**Prereq:** Math 144b (or permission of instructor)

**N.B.:** Credit will only be granted for one of Math 221a, 231a, 241a.

Math 241b F,W,S 3C 0.5
**Linear Algebra**

Math 241b is an advanced-level, enriched version of Math 231b.

**Prereq:** Math 241a (or permission of instructor)

**N.B.:** Credit will only be granted for one of Math 221b, 231b, 241b.

Math 321a F,W,S 2C,1T 0.5
**Modern Algebra**

Groups, monoids and Boolean algebras with selected applications.

**Prereq:** Math 124a/b (Math 221a desirable)

**N.B.:** Math 321a is not open to Honours Mathematics students.

Math 321b F,W 2C,1T 0.5
**Modern Algebra**

Rings and fields with selected applications.

**Prereq:** Math 321a

**N.B.:** Math 321b is not open to Honours Mathematics students.

Math 322a F,W,S 3C 0.5
**Introduction to Real Analysis**

Elementary properties of the real number system including the completeness property and its relation to the concepts of limit, continuity and differentiability; mean value theorem; Riemann integration and the integrability of continuous and monotonic functions; uniform convergence, uniform continuity and their relation to the above. The emphasis will be on applications.

**Prereq:** Math 220a (Math 220b desirable)

**N.B.:** Math 322a is not open to Honours Mathematics students.
Math 322b  F,W  3C  0.5
An Introduction to Complex Variable Theory
Complex numbers; continuity, differentiability, 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
N.B.: Math 322b is not open to Honours Mathematics students.

Math 331a  F,W,S  2C,1T  0.5
Modern Algebra
Groups, monoids and Boolean algebras with selected applications.
Prereq: Math 134a/b or 80% in Math 124a/b (Math 231a desirable)
N.B.: Credit will only be granted for one of Math 321a, 331a.

Math 331b  F,W  2C,1T  0.5
Modern Algebra
Rings and fields with selected applications.
Prereq: Math 331a
N.B.: Credit will only be granted for one of Math 321b, 331b.

Math 332a  F,W,S  3C  0.5
Real Variables
Prereq: Math 230a (Math 230b desirable)
N.B.: Credit will only be granted for one of Math 322a, 332a.

Math 332b  F,W  3C  0.5
An Introduction to Complex Variable Theory
Complex numbers; continuity, differentiability, 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 230b
N.B.: Credit will only be granted for one of Math 322b, 332b.

Math 380a  F  2C,1T  0.5
Introduction to Information Theory with Applications

Math 380b  W  2C,1T  0.5
Information Theory with Applications
Measures of expected conditional information. Maximizing expected conditional information. Applications to communication theory and programming. Basics in questionnaire theory.

Department of Applied Mathematics
Course Descriptions

AM 101  F  3C,1T  0.5
Applications of Mathematics 1 (For Biology Students)
Models using difference equations will be formulated for examples drawn from biology, economics and psychology.
Prereq: None
N.B.: Not open to students in the Faculty of Mathematics

AM 111  W  3C,1T  0.5
Applications of Mathematics 2 (For Biology Students)
Sets of difference equations, probability and matrix theory will be used to describe models from biology, ecology, economics, psychology and physiology.
Prereq: AM 101, or consent of instructor
N.B.: Not open to students in the Faculty of Mathematics

AM 230, 240, 330, 340, 430, 440 is a sequence of courses designed to illustrate the representation of a real situation by a mathematical model. The mathematical techniques necessary to formulate the model and to discuss its behaviour are developed as required. Examples will be taken from diverse fields since one of the aims of each course is to formulate models to describe unfamiliar situations.

AM 230  F  2C,1T  0.5
Applications of Mathematics
Ordinary differential equations will be applied to models drawn from biology, economics, physiology and physics.
Prereq: Math 120 a/b
N.B.: Credit will be given for only one of AM 230, 260.

AM 240  W  2C,1T  0.5
Applications of Mathematics
Other examples from biology, ecology, economics, physiology and physics will be discussed using sets of differential equations.
Prereq: AM 230 or Math 220b
N.B.: Credit will be given for only one of AM 240, 270.
**Course Descriptions**

**Applied Mathematics**

**AM 260 F,W 2C 0.5**

**Mathematical Modelling**
Mathematical models for problems in the physical and biological sciences. Typical problems chosen from ecology, special relativity, spread of epidemics, rumours and tumors. Solutions to problems will be obtained primarily by differential equations.

*Prereq:* Math 130a/b

*N.B.: Credit will be given for only one of AM 230, 260.*

**AM 270 F,W 2C 0.5**

**Mathematical Modelling**
Further mathematical models from various disciplines. An introduction to Newtonian mechanics will also be included in the course.

*Prereq:* AM 260 or consent of instructor

*N.B.: Credit will be given for only one of AM 240, 270.*

**AM 340 W 2C 0.5**

**Applications of Mathematics**
Partial differential equations applied to diffusion problems, blood flow, wave phenomena; mathematical models in ecology, physiology, economics and other fields.

*Prereq:* Math 220a/b or consent of instructor

**AM 362/P Math 365 F 2C,1T 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.

*Prereq:* Math 230a/b, or consent of instructor

**AM 369 F 0.5**

**Reading Course**

**AM 391 W 2C,1T 0.5**

**Ordinary Differential Equations 1**
Existence and uniqueness theorems, second and higher order equations, series solutions and Special Functions, Laplace transforms. Application to Mathematical Physics.

*Prereq:* Math 230a/b

**AM 395 W 2C,1T 0.5**

**Mechanics**

*Prereq:* Math 230a/b, or consent of instructor

**AM 389 F 0.5**

**Reading Course**

**AM 405 Y 2C 1.0**

**Applied Analysis** (For Science Students)

*Prereq:* Consent of instructor

*N.B.: Not open to students in the Faculty of Mathematics*  

**AM 430 F 2C 0.5**

**Applications of Mathematics**
Integral equations and integral transforms will be applied to systems with memory.

*Prereq:* Consent of instructor
APPLICATIONS OF MATHEMATICS

As a project, students will develop a mathematical model and interpret its behaviour.

Prereq: Consent of instructor

NON-LINEAR DIFFERENTIAL EQUATIONS

Non-linear mechanics, stability, quasi-linear and strongly non-linear systems, linear periodic systems, non-linear integral equations.

Prereq: AM 381/391, or consent of instructor

MEASURE AND INTEGRATION

The theory of measure and the Lebesgue integral.

Prereq: Math 332a or P Math 351a

INTRODUCTION TO DIFFERENTIABLE MANIFOLDS

Differentiable manifolds, vector fields, linear connections, tensor fields, differential forms, and the Cartan structure equations.

Prereq: AM 362 or consent of instructor

QUANTUM MECHANICS


Prereq: Math 231a/b, AM 371 or consent of instructor

FLUID MECHANICS

Fundamental equations of inviscid fluids, compressibility, vorticity; two and three-dimensional irrotational, incompressible flow, Blasius’ theorem, Joukowski hypothesis.

Prereq: AM 365

TOPICS IN APPLIED MATHEMATICS

A selection of special topics given by members of the Applied Mathematics Department.

Prereq: Consent of instructor

LINEAR OPERATORS

Linear operators in Hilbert spaces. Compact operators. Introduction to functional analysis.

Prereq: AM 462 or consent of instructor

SELECTED TOPICS IN APPLIED DIFFERENTIAL GEOMETRY


Prereq: AM 362 or consent of instructor

FLUID DYNAMICS

Shock wave theory, supersonic flow around a corner, Prandtl-Meyer flow. Dynamics of real fluids. Navier-Stokes equations, exact solutions, Stokes and Oseen flow; introduction to boundary layer theory.

Prereq: AM 466

TOPICS IN APPLIED MATHEMATICS

Same as in AM 468.

Prereq: Consent of instructor

PARTIAL DIFFERENTIAL EQUATIONS OF APPLIED MATHEMATICS 2

Second-order partial differential equations and characteristics; d’Alemberts’ solution of the wave equation, concepts of distributions, construction of Green’s functions. Fourier integral theorem, integral transforms, integral equations, variational properties of eigenvalues and eigenfunctions, special functions, asymptotic series. All these methods are applied to physical problems.

Prereq: AM 371, 381, 391, or consent of instructor

CALCULUS OF VARIATIONS


Prereq: Math 230a/b, or consent of instructor

ELECTROMAGNETISM

Applications of Maxwell’s equations. Introduction to wave guides and antennae.

Prereq: Phys 253 or consent of instructor

STATISTICAL MECHANICS

Applications of probability theory to theoretical Physics.

Prereq: Consent of instructor
Course Descriptions
Combinatorics and Optimization

AM 488 F 2C 0.5
Control Theory
Prereq: Consent of instructor

AM 489 F 0.5
Reading Course

AM 495 W 2C,1T 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

Department of Combinatorics and Optimization
Course Descriptions

Note
Course descriptions are given under the new course numbers introduced in 1978. The old numbers appear in brackets.

C & O 280 W 3C 0.5 (C & O 249b)
Introduction to Combinatorics and Optimization
An introductory study of selected topics of fundamental importance in both combinatorics and optimization. The numerous applications of linear algebra principles make this course complementary to a formal course in linear algebra.
Coreq: Math 231a/b
N.B.: Credit will be granted for at most two of C & O 280, 282, 283.

C & O 282 F 2C,2T 0.5 (C & O 239a)
An Introduction to Combinatorics
Recommended for students wishing an introduction to discrete mathematics.
Prereq: Math 124a/b
N.B.: Credit will be granted for at most two of C & O 280, 282, 283. Also offered at St. Jerome's College in Winter Term.

C & O 283 W,S 2C,2T 0.5 (C & O 239b)
An Introduction to Optimization
Prereq: Math 124a/b
N.B.: Credit will be granted for at most two of C & O 280, 282, 283. Also offered at St. Jerome's College in Winter Term.

C & O 331a F,W,S 3C 0.5 (C & O 352a)
Linear Programming
Basic linear programming theory; review of relevant linear algebra, systems of linear inequalities, the simplex method, revised simplex method, pivot rules. Theory and applications of duality and complementary slackness. Sensitivity analysis.
Prereq: Math 221a/b

C & O 331b F,W 3C 0.5 (C & O 352b)
Introduction to Combinatorial Optimization
Network programming, optimal paths, trees, transportation problems, k-th best policies. Applications to PERT, CPM, dynamic programming, equipment replacement, knapsack problems, optimal man-job assignments, warehousing problems.
Prereq: C & O 331a

C & O 332 F,S 3C 0.5 (C & O 451a)
Fundamentals of Continuous Optimization
Linear least squares. Properties of quadratic forms 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/b

C & O 340 F,W,S 3C 0.5 (C & O 353a)
Modelling and Optimization 1
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: Math 221a/b
Coreq: C & O 331a

C & O 341 F,W 3C 0.5 (C & O 353b)
Modelling and Optimization 2
An applications oriented course complementary to C & O 340.
Prereq: C & O 340
Combinatorial Analysis
Basic enumeration principles, emphasizing the combinatorial significance of generating functions. Topics to include the principle of inclusion-exclusion, Polya theory, the Lagrange theorem, and vector spaces over finite fields. Applications to a variety of combinatorial problems.
Prereq: Math 231a/b

Introduction to Combinatorial Design
Topics covered include orthogonal Latin squares, finite projective planes, balanced incomplete block designs, Hadamard matrices and Room squares.
Prereq: Math 231a/b

Introduction to Graph Theory 1
Basic definitions; trees, connectivity; Euler tours; matchings; edge colourings. The emphasis will be on proof techniques and problem solving.
Prereq: Math 221a/b

Introduction to Graph Theory 2
Independent sets and cliques; vertex colourings; planar graphs, face colourings and Hamilton cycles; directed graphs.
Prereq: C & O 370a

Graph Theory with Applications 1
Not offered 1979-80

Graph Theory with Applications 2
Not offered 1979-80

Mathematical Discovery and Invention 1
A study of about 100 challenging problems taken from many areas of elementary mathematics - number theory, combinatorics, geometry, probability, logic.
Prereq: None

Mathematical Discovery and Invention 2
A study of about 100 challenging problems taken from many areas of elementary mathematics - number theory, combinatorics, geometry, probability, logic.
Prereq: None

Combinatorial Geometry 1
Combinatorial aspects of the plane, such as, the number of regions into which the plane is divided by n lines; the number of two point lines formed from a set of n non-collinear points, etc. Properties of convex sets in the plane.
Prereq: Math 221a
N.B.: Offered at St. Jerome’s College

Combinatorial Geometry 2
This course introduces the idea of a finite geometry and partial geometry. It shows the connection between Latin squares, orthogonal arrays, finite geometries and block designs.
Prereq: C & O 386a
N.B.: Offered at St. Jerome’s College

Network Flow Theory
Prereq: C & O 331a

Continuous Optimization
Variable metric and conjugate gradient methods for unconstrained optimization problems. Constrained optimization methods including convex programming and Rosen’s gradient projection algorithms. Non-feasible direction methods including penalty function techniques. Emphasis is on algorithms rather than abstract theory.
Prereq: C & O 332

Topics in Linear Programming
Prereq: C & O 331a
Combinatorics and Optimization

Course Descriptions

C & O 433b  W  2C  0.5  (C & O 452b)
Numerical Linear Programming
Prereq: C & O 433a

C & O 436 (C & O 457a)  Integer Programming
Not offered 1979-80

C & O 442a  F,S  2C  0.5  (C & O 454a)
Game Theory 1
A mathematically-oriented course on the basics of game theory, with applications to economics, bargaining and strategy. Classification of games; solution of matrix games and their relationship to linear programming; infinite zero-sum games; utility theory; bimatrix games and the bargaining problem.
Prereq: C & O 331a and Stat 220

C & O 442b (C & O 454b)  Game Theory 2
Not offered 1979-80

C & O 443a (C & O 450a)  Linear and Quadratic Programming 1
Not offered 1979-80

C & O 443b (C & O 450b)  Linear and Quadratic Programming 2
Not offered 1979-80

C & O 444  F,S  2C  0.5  (C & O 453a)
Queueing Theory
Queueing models are analyzed, including, single channel queues of infinite and finite capacity; infinite and finite customer populations. Multi-server queues in series or parallel with homogeneous and heterogeneous servers. Models incorporating customer behaviour including balking, reneging and jockeying.
Prereq: Stat 220

C & O 446  F,S  2C  0.5  (C & O 457b)
Boolean Methods
Prereq: Math 321a/b

C & O 447a  F,W,S  2C,1T  0.5  (C & O 456a)
Scheduling 1
Algorithms for functions of completion or due times. Applications to quality control, organization of data files, machine shops. Precedence relations, parallel machines, implicit enumeration algorithms, generalized travelling salesman problem.
Prereq: C & O 331a or C & O 340

C & O 447b (C & O 456b)  Scheduling 2
Not offered 1979-80

C & O 448 (C & O 455a)  Dynamic Programming
Not offered 1979-80

C & O 449 (C & O 455b)  Topics in Optimization
Not offered 1979-80

C & O 460  W  2C  0.5  (C & O 460a)
Enumerative Mathematics
Enumerative mathematics, combinatorial identities, generating functions, counting of labelled and unlabelled objects, theorems of Pólya, Redfield-Read, and de Bruijn, permanents, combinatorial decompositions.
Prereq: C & O 360

C & O 462  W  2C  0.5  (C & O 460b)
Combinatorial Design
This is a continuation of C & O 362. Topics covered include error correcting codes, resolvable designs, affine designs, weighing matrices, and their interaction.
Prereq: C & O 362 or consent of instructor

C & O 464a  F,S  3C  0.5  (C & O 438a)
Combinatorial Applications of Computer 1
General topics: methods of data storage for combinatorial problems, representation of sets, etc. Algorithms for permutations, combinations, partitions, etc. The use of generating functions, and methods of handling them on a computer. Enumeration problems: Pólya's theorem and variations. Applications.
Prereq: Math 321a/b and two of CS 140, 180, 240, 250

C & O 464b  W  3C  0.5  (C & O 438b)
Combinatorial Applications of Computer 2
Prereq: C & O 464a
CS 112  F,W  2C.2T  0.5  Introduction to Business Problem Solving by Computer
Emphasis on the solution of mathematical problems in business. Concept and properties of an algorithm. Language and notation for describing algorithms. Analysis of problems, development of models and algorithms; implementation in a procedure-oriented language (usually FORTRAN IV); execution of these programs using several systems.
Prereq: none
N.B.: Credit will only be granted for one of CS 112, CS 115, CS 118 or CS 140. CS 112 cannot be counted for credit toward a BMath degree.

CS 115  W  2C,2L  0.5  Introduction to Commercial Problem Solving by Computer
Introduction to file processing techniques such as file maintenance, sorting and report generation. Language and notation for describing such algorithms. Analysis of problems dealing with files, and development of algorithms for their solution. Introduction to procedure-oriented languages (usually COBOL) for solving such problems.
Prereq: CS 112 or the equivalent
N.B.: Credit will only be granted for one of CS 115 or CS 180. CS 115 cannot be counted for credit toward a BMath degree.

CS 116  F  2C,1T  0.5  Introduction to Computing
This course provides students in programmes of study which do not emphasize mathematics with an appreciation of the capabilities and limitations of machine computing and a reasonable capability for programming in one or more programming languages. Topics will include: concept of an algorithm, presentation of information, programming in a higher level language, concept of a compiler.
Prereq: none
N.B.: Credit will only be granted for one of CS 112, CS 116, CS 118 or CS 140. CS 116 cannot be counted for credit toward a BMath General or Honours degree.

CS 118  F,W  3C,2L  0.5  Introduction to Scientific Problem Solving by Computer
An introduction to the analysis of scientific problems, development of mathematical models and algorithms for their solution; implementation in a procedure-oriented language (normally FORTRAN IV). Topics discussed are: solution of equations, computation of integrals, graph plotting, and simulation.
Prereq: Year 5 mathematics is recommended.
N.B.: Credit will only be granted for one of CS 112, CS 116, CS 118 or CS 140.

C & O 470a  F  2C  0.5  (C & O 458a)
Graph Theory 1
Topics in graph theory. These may include symmetry in graphs, planarity, bipartite graphs, minimax theorems, directed graphs, enumeration, algorithms, colouring problems, matrices and graphs.
Prereq: C & O 370a/b or consent of instructor

C & O 470b  W  2C  0.5  (C & O 458b)
Graph Theory 2
Continuation of topics covered in C & O 470a.
Prereq: C & O 470a

C & O 472a (C & O 459a)  Algebraic Graph Theory 1
Not offered 1979-80

C & O 472b (C & O 459b)  Algebraic Graph Theory 2
Not offered 1979-80

C & O 487  F  2C  0.5  (C & O 466a)
History of Mathematics 1
A study of selected topics from Greek geometry. Some related work of post-renaissance scholars is included. Topics include: famous construction problems, pythagorean arithmetic, regular solids, four discoveries of Archimedes, the problem of Apollonius; selected works of Archimedes, Euclid, Apollonius, Euler, Steiner.
Prereq: None

C & O 488  W  2C  0.5  (C & O 466b)
History of Mathematics 2
A study of selected topics from post-renaissance mathematics. Topics include material on prime numbers, Fermat's Last Theorem, the Gaussian Integers, the Fibonacci Sequence, other topics from elementary number theory, a collection of outstanding problems in geometry (Fagnano, Steiner-Lehmus, Morley).
Prereq: None

C & O 499  F,W,S  2R  0.5  (C & O 499)
Reading in Combinatorics and Optimization
Prereq: Consent of department

Department of Computer Science
Course Descriptions

Note
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 112, CS 115, CS 116, CS 118, CS 316
Course Descriptions

Computer Science

CS 140 F,W,S 3C,2L 0.5
Introduction to Mathematical Problem Solving by Computer
An introduction to the analysis of mathematical problems, development of mathematical models and algorithms for their solution; implementation in a procedure-oriented language (normally FORTRAN IV). Topics discussed are: solution of equations, computation of integrals, graph plotting, and simulation.
Prereq: Year 5 mathematics is recommended.
N.B.: Credit will only be granted for one of CS 112, CS 116, CS 118 or CS 140.

CS 180 F,W 2C,2L 0.5
Introduction to File Processing
Introduction to the use of computers. Concept of an algorithm. Language and notation for describing algorithms. Analysis and solution of problems dealing with files. Introduction to a procedure-oriented language (usually COBOL). The preparation and debugging of programs in such a language. Topics include: file processing and maintenance, sorting, report generation, and file design.
Prereq: Year 5 mathematics is recommended.
N.B.: Credit will only be granted for one of CS 115 or CS 180.

CS 210 F 3C 0.5
Introduction to Numerical Computing
A survey of numerical procedures with emphasis upon computer implementation using the FORTRAN IV programming language. Topics include: interpolation, curve fitting, solution of non-linear equations, numerical integration, numerical solution of ordinary and partial differential equations, matrix algebra, and solution of systems of linear equations.
Prereq: at least one course in calculus, algebra, and computer science.
N.B.: CS 210 cannot be counted for credit toward a BMath Honours degree.
Credit will only be granted for either CS 210 or for courses in the CS 370/371 sequence.

CS 240 F,W,S 2C,2T 0.5
Programming Principles, Languages, and Techniques
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.
Prereq: CS 140 or CS 180 or the equivalent. CS 250 is recommended.

CS 250 F,W,S 2C,2T 0.5
Characteristics of Computers and Computer Systems
Introduction to machine and assembly language programming and basic machine architecture. Addressing modes, indexing, and indirectness. Subroutine linkage and macro instructions. Characteristics of peripheral devices. A survey of software which assists user programs: assemblers, compilers, loaders, input/output routines, operating systems.
Prereq: CS 116 or CS 118 or CS 140 or CS 180.

CS 316 W 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.
N.B.: CS 316 cannot be counted for credit toward a BMath degree.

CS 330 F,W,S 2C 0.5
Computer Applications in Business: Introduction
A discussion of algorithms for the storage and retrieval of information using storage media such as disks and tapes. The techniques developed are applied to a number of general business applications such as billing, inventory control, and general ledger accounting. Good systems design and programming practices will be stressed throughout the course.
Prereq: CS 180.
N.B.: Credit will only be granted for either CS 340 or for courses in the CS 330/331 sequence.

CS 331 F,W 2C 0.5
Computer Applications in Business: Data Bases and Data Communications
A continuation of the topics presented in CS 330.
Prereq: CS 330.
N.B.: Credit will only be granted for either CS 340 or for courses in the CS 330/331 sequence.

CS 340 F,W,S 3C 0.5
Data Structures
The study of data structures in a language independent setting. Levels of data description and their role in design of structures. The effects of secondary store. Introduction to the analysis of algorithms. Topics include: primitive data types; sequences; designing representation-independent data structures; tuples; arrays and tables; trees and forests; sets.
Prereq: CS 240.
N.B.: Credit will only be granted for either CS 340 or for courses in the CS 330/331 sequence.
Course Descriptions
Computer Science

CS 350  F.W.S  3C  0.5
Machine Structures
The intent is to give a basic understanding of what goes on inside a computer, of machine architecture, and of some fundamental operating system services. Topics include: introduction to an actual computer; representation of data; memory; central processor; addressing schemes; input/output; linking and loading.  Prereq: CS 250

CS 360  F,W,S  3C  0.5
Introduction to the Theory of Computing
Models of computers including finite automata and Turing machines. Basics of formal languages. Relations between machine models and formal languages with applications to syntax of programming languages. Unsolvable problems and their relevance to the semantics of programming. Concepts of computational complexity including algorithm optimality.  Prereq: CS 240

CS 369  F,W,S  3C  0.5
Digital Networks

CS 370  F,W,S  2C,2T  0.5
Introduction to Scientific Computation: Numerical Algebra
Pitfalls in computation; solution of linear algebraic equations; finding zeros of a single nonlinear equation and systems of nonlinear equations; the algebraic eigenvalue problem. The emphasis is on exposure to modern computer techniques for solving mathematical problems. Heavy use of mathematical subroutine libraries is anticipated.  Prereq: Knowledge of a high level programming language, preferably FORTRAN; Math 220a/b, and Math 221a/b
N.B.: Credit will only be granted for either CS 210 or for courses in the CS 370/371 sequence.

Note
Enrolment in some fourth year courses may be restricted to students registered in Honours Computer Science.

CS 371  F,W  2C,2T  0.5
Introduction to Scientific Computation: Numerical Approximation
Polynomial interpolation; least squares and minimax approximation; numerical integration and differentiation; numerical solution of initial value problems and boundary value problems. As in CS 370, the intent is to expose students to modern computer techniques for solving mathematical problems.  Prereq: Knowledge of a high level programming language, preferably FORTRAN; Math 220a/b, and Math 221a/b
N.B.: Credit will only be granted for either CS 210 or for courses in the CS 370/371 sequence.

CS 371  F,W  2C,2T  0.5
Introduction to Scientific Computation: Numerical Approximation
Polynomial interpolation; least squares and minimax approximation; numerical integration and differentiation; numerical solution of initial value problems and boundary value problems. As in CS 370, the intent is to expose students to modern computer techniques for solving mathematical problems.  Prereq: Knowledge of a high level programming language, preferably FORTRAN; Math 220a/b, and Math 221a/b
N.B.: Credit will only be granted for either CS 210 or for courses in the CS 370/371 sequence.

CS 432  W  3C  0.5
Business Systems Analysis

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: Stat 220; CS 330 and CS 331, or CS 340.

CS 442  W  3C  0.5
Comparative Programming Languages
This course is designed to give students a critical understanding of programming language concepts and to provide them with an appreciation for the implications of various language design decisions. Students also learn some fundamentals about language processors.  Prereq: CS 340

CS 446  F.W.S  3C  0.5
Scientific Applications Software
Practical computing problems encountered in scientific applications: an overview of batch operating systems; the importance of loaders and overlays; check points, post mortems, and operating system services. FORTRAN as a programming language; current programming techniques: design and use of program libraries and human engineering of input and output; magnetic tapes and bulk storage.  Prereq: CS 340
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

Computer Architecture
The course is intended to prepare the student to choose a suitable computer for a given application. Review of combinational and sequential logic circuits. Discussion of "building blocks" - central processing units, stores, input/output systems, and bus structures. Case studies of machines.
Prereq: CS 350 and CS 369

Real Time Applications of Minicomputers
This course is intended to give students experience with minicomputers and their applications to process control, data acquisition, and communication. A major part of the course involves hands-on experience.
Prereq: CS 340 and CS 350

Principles of Operating Systems
Basic concepts of computer hardware; program translation; program loading and linking; co-operating sequential processes - computational and data structures, critical section problem, process synchronization primitives, parallel programming; introduction to multiprocessing; operating system nucleus; file systems; reliability; protection; system performance, measurement and evaluation.
Prereq: CS 340 and CS 350

Data Communications
This course is intended to introduce the student to the basic concepts of data communications, the computer - communication interface, and new communications services. Topics include: basic queuing theory, data communications and the telephone network, computer architecture for data communications, protocols, error handling, multiplexing and switching, and packet switching networks.
Prereq: The equivalent of CS 240, CS 340, CS 350, CS 450, CS 457, Stat 230/231, and Stat 333 or 340

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 to queueing models to computer systems and computer communication networks.
Prereq: Stat 231 and Stat 333 or 340; CS 240 and CS 350

Formal Languages and Parsing
Prereq: CS 360

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. Computational complexity for specific models and abstractions fitting all models. Formal reducibilities between computational problems, and the complexity of these reducibilities.
Prereq: CS 360

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. CS 360 is recommended

Program Verification
Methods of program verification. Implications for structured programming. Inductive reasoning about recursive programs and recursively defined data structures.
Prereq: CS 360

Numerical Linear Algebra
Prereq: CS 370, Math 221b
CS 474 W 3C 0.5
**Numerical Approximation**
*Prereq: CS 371, Math 322b*

CS 475 F 3C 0.5
**Numerical Solution of Differential and Integral Equations**
*Prereq: Consent of the instructor*

CS 476 W 3C 0.5
**Numerical Solution of Partial Differential Equations**
*Prereq: Consent of the instructor*

CS 482 F,S 3C,2T 0.5
**Techniques in Systems Analysis**
Techniques in organization and management theory. Organization of large software systems. Data base concepts. Implementation of computer based information systems. Survey of current topics of interest such as distributed processing, microcomputers and on-line systems.
*Prereq: CS 340 and fourth year standing in Honours Computer Science.*

CS 486 W 2C,2T 0.5
**Introduction to Artificial Intelligence**
*Prereq: CS 340*

CS 487 F 3C 0.5
**Introduction to Symbolic Computation**
An introduction to the use of computers for symbolic mathematical computation, involving traditional mathematical computations such as solving linear equations (exactly), analytic differentiation and integration of functions, and analytic solution of differential equations.
*Prereq: CS 240, Math 331a/b*

CS 488 F,W 3C 0.5
**Introduction to Computer Graphics**
Software and hardware for interactive computer graphics. Implementation of device drivers, 3-D transformations, clipping, perspective, and input routines. Data structures, hidden surface removal, colour shading techniques, and some additional topics will be covered.
*Prereq: Consent of the instructor*

CS 492 W 4C 0.5
**The Social Implications of Computers**
This course is designed to consider the problems caused for organizations and society by the advent of computer technology so that constructive solutions to these problems may be discussed.
*Prereq: Consent of the instructor*

CS 498 0.5
**Advanced Topics in Computer Science**
See the course offerings list for topics available.

CS 499 0.5
**Readings in Computer Science**

**Department of Pure Mathematics Course Descriptions**

**Note**
More detailed course descriptions and course outlines are available upon request from the Pure Mathematics Department.

PMath 230a F 2C,1T 0.5
**Introduction to Pure Mathematics**
Ideas and examples in geometry, number theory, algebra, and analysis. Modern theories are motivated by consideration of historically important topics such as angle trisection, solution by radicals, the real number system, non-Euclidean geometry, and computability of functions.
*Prereq: None*

PMath 230b W 2C,1T 0.5
**Introduction to Pure Mathematics**
Similar to, but independent of PMath 230a.
*Prereq: None*
Course Descriptions
Pure Mathematics

PMath 341a F,S 3C 0.5
Algebra
Fundamentals of group, ring, field theory, and other algebraic structures.
Coreq: Math 231a
N.B.: PMath 341a may be substituted for Math 331a whenever this is a requirement in an honours programme.

PMath 341b W 3C 0.5
Algebra
Continuation of PMath 341a
Prereq: PMath 341a
N.B.: PMath 341b may be substituted for Math 331b whenever this is a requirement in an honours programme.

PMath 351a F,S 2C,1T 0.5
Real Analysis 1a
Theory of functions of real variables. The notions of compactness, connectedness and uniformity are used in a study of continuity, differentiation, and integration. Prereq: Math 230a/b
N.B.: PMath 351a may be substituted for Math 332a whenever this is a requirement in an honours programme.

PMath 351b W 2C,1T 0.5
Real Analysis 1b
Continuation of PMath 351a. Prereq: PMath 351a

PMath 352a F,W,S 2C,1T 0.5
Complex Analysis 1a
Holomorphic functions, Cauchy's integral theorem, Cauchy's integral formulas, Taylor and Laurent expansions, classification of isolated singularities, the Residue theorem. Prereq: Math 230a/b
N.B.: PMath 352a may be substituted for Math 332b whenever this is a requirement in an honours programme.

PMath 352b W 2C,1T 0.5
Complex Analysis 1b
Continuation of PMath 352a. Prereq: PMath 352a

PMath 361 F 3C 0.5
Euclidean Geometry
Concurrent lines, collinear points, the Euler line, the Simson line, the nine-point circle. Cross ratio, projection, harmonic range, the quadrilateral and the quadrangle. Properties of circles. Prereq: None

PMath 362 W 3C 0.5
Projective Geometry
Projective spaces over fields, collineations and correlations, quadric curves and surfaces. References to non-euclidean geometries. Prereq: Math 231a/b

PMath 363 W 3C 0.5
Geometry of the Complex Numbers
The plane of complex numbers. The group of circle-preserving mappings and its subgroups. Connections with non-euclidean geometries (Laguerre, Minkowski). Prereq: Math 231a/b

PMath 365/AM362 F 2C,1T 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. Coordinate transformations and tensors in n-dimensions; n-dimensional Riemannian spaces, covariant differentiation, geodesics, the curvature, Ricci and Einstein tensors. Prereq: Math 230a/b, or consent of instructor.

PMath 367 F 3C 0.5
Set Theory and General Topology
Intuitive set theory, metric spaces, point set topology. Prereq: Math 230a/b

PMath 399
Readings in Pure Math

PMath 430a F,S 2C,1T 0.5
Introduction to Mathematical Logic
A broad introduction to Mathematical Logic. The logic of sentences: truth-functions and an axiomatic approach (Natural Deduction). The logic of predicates and quantifiers. Foundations of Mathematics. N.B.: Credit will only be granted for one of PMath 430a or 432a.

PMath 430b W 2C,1T 0.5
Introduction to Mathematical Logic
Continuation of PMath430a. 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). Prereq: PMath 430a
N.B.: Credit will only be granted for one of PMath 430b or 432b.
Course Descriptions
Pure Mathematics

PMath 432a  F  2C  0.5
Mathematical Logic
First order languages and theories. This course is more specialized and at a more advanced level than PMath 430.
N.B.: Credit will only be granted for one of PMath 430a or 432a.

PMath 432b  W  2C  0.5
Mathematical Logic
Continuation of PMath 432a. A treatment of at least one of the following: set theory, model theory, undecidability.
Prereq: PMath 432a
N.B.: Credit will only be granted for one of PMath 430b or 432b.

PMath 441a  F  2C  0.5
Theory of Numbers 1
Elementary Theory of Numbers, quadratic reciprocity, applications to Diophantine equations.
Coreq: Math 331a/b or PMath 341a/b

PMath 441b  W  2C  0.5
Theory of Numbers 2
Continuation of PMath 441a.
Prereq: PMath 441a

PMath 443  Linear Algebra 2
Not offered 1979-80

PMath 444  Lattice Theory
Not offered 1979-80

PMath 445  F  2C  0.5
Ring Theory
Continuation of the theory of rings and modules.
Prereq: Math 331a/b or PMath 341a/b
Offered in Fall 1979 and Winter 1981.

PMath 446  F  2C  0.5
Group Theory
Permutations, Cayley Theorem, Sylow Theorem, Jordan Holder Theorem, nilpotent and solvable groups, direct and semidirect products, free groups.
Coreq: Math 331a/b or PMath 341a/b
Offered in Fall 1980.

PMath 447  W  2C  0.5
Field Theory
Field extension and Galois theory.
Prereq: Math 331a/b or PMath 341a/b
Offered in Winter 1980 and Fall 1981.

PMath 451a  F  2C  0.5
Real Analysis 2a
An introduction to integration and measure theory with emphasis on the real line.
Prereq: Math 332a or PMath 351a/b

PMath 451b  W  2C  0.5
Real Analysis 2b
Continuation of PMath 451a.
Prereq: PMath 451a

PMath 452a  Complex Analysis 2a
Not offered 1979-80

PMath 452b  Complex Analysis 2b
Not offered 1979-80

PMath 461  Finite Geometries
Not offered 1979-80

PMath 462  Foundations of Geometry
Not offered 1979-80

PMath 463/AM 463  F  2C,1T  0.5
Introduction to Differentiable Manifolds
Differentiable manifolds, vector fields, linear connections, tensor fields, differential forms and structure equations.
Prereq: PMath 365/AM 362 or consent of instructor

PMath 464  Algebraic Geometry
Not offered 1979-80

PMath 465  W  2C,1T  0.5
Introduction to Riemannian Manifolds
Linear connections and Riemannian structures, geodesics and variations of geodesics, differential forms, integration theory and Stokes' theorem.
Prereq: PMath 463/AM 463, or consent of instructor

PMath 467  W  2C  0.5
Topology
Topics from algebraic, combinatorial and geometric topology.
Prereq: PMath 367

PMath 470a  W  2C  0.5
Functional Equations
Cauchy's, Pexider's, and similar equations. Equations for polynomials and for trigonometric functions. Reduction to differential equations. General methods and theorems. Iteration. Applications. Further topics, such as equations for functions of several variables, or equations for analytic functions, or equations on algebraic structures.

PMath 470b  W  2C  0.5
Functional Equations
Continuation of PMath 470a.
Prereq: PMath 470a

PMath 499  Readings in Pure Math
Department of Statistics
Course Descriptions

Stat 202  F  2C,1L  0.5
Elementary Statistics for Biologists
Elementary probability, populations, samples and distributions with biological examples. Methods for data summary and presentation including an introduction to interactive programming. Estimation, hypothesis testing, two-sample techniques and paired comparisons. Contingency tables.
Prereq: None
N.B.: Stat 202 is for Science Students only.

Stat 204  F  2C,1L  0.5
Statistics for the Physical Sciences 1
Prereq: None
N.B.: Stat 204 is for Science Students only.

Stat 205  W  2C,1L  0.5
Statistics for the Physical Sciences 2
Prereq: Stat 202 or 204
N.B.: Stat 205 is for Science Students only.

Stat 210  F, W  3C,1T  0.5
Applied Probability and Statistics
Prereq: Math 110a/b
N.B.: This course is for students in Mechanical Engineering, and is cross listed in Management Sciences as M Sci 21.

Stat 220  F,W,S  3C,1T  0.5
Introduction to Statistical Methods
Descriptive statistics, graphical methods, model fitting. Probability theory; discrete and continuous random variables.
Prereq: Math 120a/b, one of CS 116, CS 118, CS 140
N.B.: Stat 220 is not open to Honours Mathematics students. Credit will be given for only one of Stat 220, 230.

Stat 221  F,W,S  3C,1T  0.5
Introduction to Statistical Methods 2
Tests of significance, maximum likelihood estimation and large sample theory; estimation and testing in the normal distribution. Correlation, regression and the method of least squares.
Prereq: Stat 220
N.B.: Stat 221 is not open to Honours Mathematics students. Credit will be given for only one of Stat 221, 231.

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 120a/b
N.B.: Credit will be given for only one of Stat 220, 230.

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: Stat 230
N.B.: Credit will be given for only one of Stat 221, 231.

Stat 270  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: Math 120a/b
N.B.: Only one of Stat 270, 273 can be taken for credit. Students planning to enroll in Honours Actuarial Science must take Stat 273.

Stat 273  F,W  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 130a/b
N.B.: Only one of Stat 270, 273 can be taken for credit. Students planning to enroll in Honours Actuarial Science must take Stat 273.

Stat 284  F,W,S  3C  0.5
Introduction to Life Contingencies
Applications of probability to problems of life and death. The determination of single and annual premiums for assurances and annuities. Reserves. Company expenses and their incorporation into premium and cash value calculations.
Prereq: Stat 270 or 273 and MTHEL 305a
Stat 300 W 2C,1T 0.5
**Principles of Survey Design**
The design of surveys of human or natural populations for research and planning. How to take a representative sample; efficient estimation of population quantities and sample size determination; ways of reducing response bias.
Prereq: An introductory half course in statistics.
N.B.: Stat 300 cannot be taken for credit towards a BMath degree.

Stat 330 F,W 3C 0.5
**Introduction to the Theory of Statistics**
Prereq: Stat 221
N.B.: Credit will be given for only one of Stat 330, 350.

Stat 331 F,S 3C 0.5
**Applied Regression Analysis**
Review of Normal, t, Chi-squared and F distributions and their applications. Introduction to the design of experiments. Analysis of variance, multiple linear regression.
Prereq: Stat 221 or the equivalent.
N.B.: Credit will be given for only one of Stat 331, 351.

Stat 332 F,S 3C 0.5
**Sampling**
Introduction to sampling of survey populations. Elementary sampling designs. Efficiency comparisons for sampling designs and estimation procedures.
Prereq: Stat 221 or the equivalent.
N.B.: Credit will be given for only one of Stat 332, 454.

Stat 333 W 3C 0.5
**Applied Probability**
Prereq: Stat 230 or Stat 220/221
N.B.: Credit will be given for only one of Stat 333, 340.

Stat 340 F,S 3C 0.5
**Probability and Stochastic Processes 1**
Prereq: Stat 221 or 231
N.B.: Credit will be given for only one of Stat 333, 340.

Stat 341 W 3C 0.5
**Probability and Stochastic Processes 2**
Prereq: Stat 340 or consent of instructor

Stat 350 F,W,S 3C 0.5
**Mathematical Statistics 1**
Continuous random variables; moments and moment generating function; distribution of f, chi-squared, and F, and their applications. Large sample theory.
Prereq: Math 230a/b, Stat 231 or consent of instructor
N.B.: Credit will be given for only one of Stat 330, 350.

Stat 351 F,W 3C 0.5
**Mathematical Statistics 2**
The multivariate normal distribution, its properties and uses; quadratic forms and Cochran's theorem; multiple regression; introduction to the analysis of variance.
Prereq: Stat 350, Math 231a/b
N.B.: Credit will be given for only one of Stat 331, 351.

Stat 373 F,W,S, 3C 0.5
**Finite Differences**
A course in the calculus of finite differences, to include: summation, numerical integration and differentiation, relation between integration and summation; error theory; topics in numberical analysis.
Prereq: Math 130a/b, 134a/b

Stat 374 F,W,S 3C 0.5
**Life Contingencies - Single Life Function**
An advanced course on problems with single lives, including population theory.
Prereq: Stat 284

Stat 383 F,W 3L 0.5
**Topics in Actuarial Mathematics**
Topics in Actuarial Mathematics for students intending to take the professional examinations.
Prereq: Stat 273, 373

Stat 384 F,W 3C 0.5
**Life Contingencies - Multiple Life Functions**
An advanced course on problems with multiple lives; multiple decrement theory; accidental death and disability benefits.
Prereq: Stat 374
Stat 430  F,S  2C  0.5
Experimental Design 1
The requirements for a good experimental design prior to the accumulation of data. The concepts of randomization, replication and experimental error as applied to basic designs; the completely randomized block and latin square designs. Analysis of variance. Introduction to factorial designs.
Prereq: Stat 331 or 351 or consent of instructor.
N.B.: Credit will be given for only one of Stat 430, 452.

Stat 431  W  2C  0.5
Experimental Design 2
Factorial experiments, confounding, fractional replication. Applications of designs. Incomplete block designs. Analysis of covariance.
Prereq: Stat 430
N.B.: Credit will be given for only one of Stat 431, 453.

Stat 440  F,S  2C  0.5
Exploratory Data Analysis
Prereq: Stat 331 or 351, and an ability to program in FORTRAN.

Stat 442  W  3C  0.5
Statistical Decision Theory
The decision problem: Bayesian and classical analyses; acceptance sampling; sequential procedures; an introduction to the statistical aspects of quality control.
Prereq: Stat 221, Math 220a/b

Stat 444  S  2C,1S  0.5
Statistical Methods with Socio-Economic Applications 1
Prereq: Stat 331 or 351

Stat 445  Statistical Methods with Socio-Economic Applications 2
Continuation of Stat 444.
Prereq: Stat 444
N.B.: May or may not be offered in 1979-80.

Stat 450  F  3C  0.5
Topics In 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 351

Stat 451  W  2C  0.5
Statistical Inference with Small Samples
Logic tests of significance; exact tests and confidence intervals; normal approximations accurate for small samples and relationship to the normality of the likelihood function. Introduction to problems involving more than one parameter.
Prereq: Stat 450 or consent of instructor

Stat 452  F,S  3C  0.5
Theory of Experimental Design 1
Logical requirements of designed experiments. Design and analysis of basic complete designs with fixed effects, random effects, or both. Analysis of covariance. Latin squares. Applications.
Prereq: Stat 331 or 351 or consent of instructor
N.B.: Credit will be given for only one of Stat 430, 452.

Stat 453  W  2C  0.5
Theory of Experimental Design 2
Not offered 1979-80

Stat 454  W  3C  0.5
Sampling Theory and Practice
Introduction to sample theory and practice. Elementary sampling and designs and estimation procedures. Statistical inference in survey sampling. Interrelationships between survey sampling and the design of experiments.
Prereq: Stat 331 or 351

Stat 455  Sample Survey Design
Not offered 1979-80

Stat 456  W  2C  0.5
Topics in Probability Theory
Prereq: Stat 340/1 or consent of instructor
N.B.: May or may not be offered 1979-80

Stat 457  Topics in Statistics 1
Prereq: Stat 350/1 or consent of instructor
N.B.: May or may not be offered 1979-80

Stat 458  0.5
Readings in Statistics 1
Statistics

Stat 469 0.5
Readings in Statistics 2

Stat 470 W 3C 0.5
Seminar in Actuarial Mathematics 1
Selected topics for the advanced actuarial student.
N.B.: May or may not be offered 1979-80

Stat 471 F 3C 0.5
Selection of Risks 1
The effects of diseases 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.
Prereq: Stat 374, MTHEL 305a
Coreq: MTHEL 305b

Stat 474 F,S 3L 0.5
Advanced Topics in Actuarial Mathematics
Topics in Actuarial Mathematics for students intending to take the professional examinations.
Prereq: Stat 284, 374, 384, or consent of instructor

Stat 475 F,S 3C 0.5
Construction of Life Tables
Methods of analysis of data to produce raw rates for mortality, morbidity and other tables.
Prereq: Stat 284, or consent of instructor

Stat 476 F,S 3C 0.5
Introduction to Demographic Statistics
Topics in demography with emphasis on population projections, mortality theories, and construction of life tables.
Prereq: Stat 284 or consent of instructor

Stat 477 F,S 3C 0.5
Risk Theory 1
Prereq: Stat 330, Math 332b or consent of instructor

Stat 480 W 3C 0.5
Seminar in Actuarial Science 2
Selected topics for the advanced actuarial student.
Prereq: Consent of instructor

Stat 481 W 3C 0.5
Selection of Risks 2
A continuation of Stat 471.
Prereq: Stat 471
N.B.: May or may not be offered 1979-80

Stat 486 Graduation of Life Tables
Not offered 1979-80

Course Descriptions

Stat 487 W 3C 0.5
Risk Theory 2
Calculations of net premiums and reinsurance premiums. Ruin theory. Utility theory.
Prereq: Stat 477

Stat 500 W 2C,1T 0.5
Principles of Survey Design
The design of surveys of human or natural populations for research and planning. How to take a representative sample; efficient estimation of population quantities and sample size determination; ways of reducing response bias.
Prereq: An introductory half course in statistics
N.B.: Stat 500 is intended for senior undergraduates and graduate students in faculties other than Mathematics. It cannot be taken for credit towards a Mathematics degree.

Stat 520 Introduction to Mathematical Statistics
N.B.: May or may not be offered 1979-80
Electives for Mathematics Students

The following courses may be counted as non-mathematics electives by mathematics students.

MTHEL 100 F,W,S 2C 0.5
Commercial Law for Mathematics Students
Prereq: None

MTHEL 102 W,S 3C 0.5
Uses and Abuses of Statistics
This course provides an appreciation of how to correctly use statistical arguments in a wide variety of applications. Topics include descriptive statistics, sample surveys, experimental design, index numbers, regression models.
Prereq: None

MTHEL 206a F,W 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, extra-curricular activities, the relationship between elementary and secondary school mathematics, audio-visual materials, current text books.
Prereq: None
N.B.: This course is offered only to students in the co-op Teaching Option.

MTHEL 302a F 2C 0.5
Introduction to Biomathematics 1
Biometry is a biological discipline requiring both a knowledge of Mathematics and some basic understanding of specific biological phenomena. The course material has been selected from Genetics and Gerontology to provide examples of where both mathematics and biology have contributed to the advancement of knowledge in interdisciplinary areas.
Prereq: None

MTHEL 302b W 2C 0.5
Introduction to Biomathematics 2
A continuation of Biomathematics 1. Topics considered are first order reaction kinetics in biological systems including statistical considerations in enzyme kinetics, models for and the measurement of Evolution from a knowledge of genetics and protein structure and assessing the relative importance of environmental factors as evolutionary determinants.
Prereq: MTHEL 302a
N.B.: MTHEL 302a/b are cross-listed with Helth 302/303.

MTHEL 303a Readings in Modern Mathematics
Not offered 1979-80

MTHEL 304a F 3C 0.5
Foundations of Mathematics
An introduction to the problems of the foundations of mathematics. This course will normally be taken in third or fourth year.
Prereq: Consent of instructor

MTHEL 304b F 3C 0.5
Foundations of Probability Theory
An introduction to the problems of the foundations of probability theory. This course will normally be taken in third or fourth year.
Prereq: Consent of instructor

MTHEL 305a F,W,S 3C 0.5
General Life Insurance 1
Types of Life Insurance contracts and their uses, basis of risk measurements, deficiency reserves, modified valuation methods, non-forfeiture values, dividend formulae, selection of risks, substandard risks, and principles of reinsurance.
Prereq: None

MTHEL 305b W,S 3C 0.5
General Life Insurance 2
Legal aspects of life insurance, settlement options, principles of group and industrial insurance, organization and structure of life insurance companies, financial statements, the mathematics underlying insurance taxation.
Prereq: MTHEL 305a

MTHEL 402a F 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.
Prereq: MTHEL 302a/b or consent of the instructor

MTHEL 402b W 2C 0.5
Topics in Mathematical Aspects of Chemistry, Biology and the Medical Sciences 2
Factors contributing to various disease processes will be discussed, with special references to the quantitative evaluation of environmental factors relevant to human disease and aging processes.
Prereq: MTHEL 302a/b, 402a or consent of the instructor
Course Descriptions
Mechanical Engineering

Department of Mechanical Engineering

Professor, Chairman of the Department
D. J. Burns, BSc, PhD (Bristol), PEng, CEng

Professor, Associate Chairman Graduate Studies
H. W. Kerr, BASc, MASc, PhD (Toronto), PEng

Professor, Associate Chairman Undergraduate Studies
A. B. Strong, BASc (Waterloo), MSc (London),
PhD (Waterloo), PEng

Professor, Vice President Academic
T. A. Brzustowski, BASc (Toronto), AM, PhD (Princeton),
PEng

Professor, Director, Office of Research Administration
E. L. Holmes, BSc (Bristol), MASc, PhD (Toronto), PEng

Professors
E. Brundrett, BSA (OAC), BASc, MASc, PhD (Toronto),
PEng
M. B. Danard, BASc (Br.Col.), MA (Toronto),
PhD (Chicago), PEng
D. French, BSc, CEng, PEng
C. E. Hermance, BE (Yale), MA, MSE, PhD (Princeton)
K. G. T. Hollands, BASc (Toronto), PhD (McGill), PEng
J. H. G. Howard, BSc (Queen’s), MSc, PhD (Birmingham),
PEng
H. R. Martin, BSc, MSc (Queen’s Belfast),
PhD (Nottingham), PEng
P. Niessen, BSc (McMaster), MASc, PhD (Toronto), PEng
G. F. Pearce, BASc (Br Col), MASc (Toronto), PEng
K. R. Piekarski, Dipl Ing (London),
PhD (Cambridge), PEng
A. Plumtree, BSc, PhD (Nottingham), PEng, CEng, FIM
G. D. Raithby, BESc, MSc (W. Ont.),
PhD (Minnesota), PEng
J. A. Schey, Dipl Ing, CSc (Budapest), PEng
D. M. R. Taplin, BSc (Aston), DPhil (Oxford),
PEng, CEng, FIM
M. M. Yovanovich, BSc (Queen’s), MS (Buff.),
MEScD (MIT)

Associate Professors
K. G. Adams, BSc (Queen’s), MASc, PhD (Waterloo),
PEng
G. C. Andrews, BASc, MASc (Br.Col.), PhD (Waterloo),
PEng
G. M. Bragg, BASc (Toronto), PhD (Cambridge), PEng
R. N. Dubey, BSc (Hons) (Patna), BSc (Eng) (Bihar),
PhD (Waterloo), PEng
A. M. Hale, BSc, MA (New Br.), BASc (Toronto),
MASc, PhD (Waterloo), PEng
U. H. Mohaupt, BASc, MASc, PhD (Waterloo), PEng
R. J. Pick, BASc (Br Col), MSc (Imperial College),
PhD (Waterloo), PEng
P. R. Slawson, BASc, MASc, PhD (Waterloo), PEng
H. F. Sullivan, BASc (Waterloo), AM, PhD (Princeton),
PEng

Assistant Professors
G. A. Davidson, BASc (Hons) (Toronto), PhD (Toronto),
PEng
G. E. Schneider, BASc, MASc, PhD (Waterloo)
J. L. Tevaanwerk, BASc, MASc (Waterloo),
PhD (Cambridge)

Research Assistant Professor
F. M. Luti, BASc, PhD (Waterloo)

Adjunct Professor
R. G. R. Lawrence, QC

Undergraduate Programmes

Details of the undergraduate programme in Mechanical Engineering are to be found in chapter 8. All courses extend over one term only, and consist of 3 hours of lectures per week unless otherwise specified. In general, the only prerequisites are the core courses, unless otherwise specified.
Course Descriptions

Mechanical Engineering

ME 100  F,W  3C  0.5
Introductory Survey of Law
The rights and responsibilities of the engineer as a citizen of Ontario and Canada under the law; brief history of Canadian law differentiating between Civil and Criminal Law, the rights and duties of citizens and police, a review of Domestic Law, Real Estate Law, Landlord and Tenant Law. The law as it may pertain to the engineer in his profession, brief reviews of the Laws of Contracts, Patents, Trade marks, industrial design, and copyright. Bills of Exchange, Company Law, incorporation of companies. Common and Preferred shares, the Law of Master and Servant, Surveying Law, Constitutional Law, Private International Law, and other topics. This course is restricted to senior Mechanical Engineering students.

ME 116  W,S  2C,4L  0.75
Engineering Concepts 2
A continuation of Gen E 115 with applications of graphics, measurement and other analytic principles 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.

ME 200  F,W  1C  0.0
Introduction to Mechanical Engineering 1
Discussion of Structure of Mechanical Engineering curriculum, operation of Department, Faculty, University, technical societies.

ME 201  F,W  3C,1T  0.5
Advanced Calculus
Infinite series: Tests for absolute; conditional, uniform convergence; power series; series expansions; differentiation and integration. Partial 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: gradient divergence, curl, Laplacian; integral theorems.

ME 202  F,W  3C,1T  0.5
Statistics for Engineers (Equivalent to M Sci 21)

ME 203  S,F  3C,1T  0.5
Ordinary Differential Equations

ME 204  S,F  3C,1T  0.5
Numerical Analysis
A survey of numerical procedures with emphasis upon computer implementation using the WATFIV programming language. 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.

ME 212  F,W  3C,1T  0.5
Dynamics

ME 215  F,W  3C,3L  0.5
Structure and Properties of Materials
The relevance of materials to engineering practice. The microstructure of materials, crystallinity and crystal imperfections, glasses and amorphous solids. Elastic and plastic deformation in metals, viscoelasticity of plastics, fracture of brittle and ductile solids. Electrical and magnetic properties of materials.

ME 219  F,W  2C,1D,1T  0.5
Mechanics of Deformable Solids 1

ME 220  S,F  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 super-position, energy theorems, theories of failure, elastic and inelastic analysis of symmetrical bending, torsion of circular members, columns and stability, and virtual work.
Course Descriptions
Mechanical Engineering

ME 230  S,F  3C,3L  0.5
Control of Properties of Materials  

ME 250  S,F  3C,1L  0.5
Thermodynamics  

ME 300  S,W  1C  0.0
Introduction to Mechanical Engineering 2  
Technical specialties in Mechanical Engineering, discussion of options in Mechanical Engineering curriculum, seminars and technical topics in the various options.

ME 305  S,W  3C,1T  0.5
Partial Differential Equations  
Modelling physical systems with distributed parameters. Boundary and initial conditions. Division into hyperbolic, parabolic and elliptic equations by means of discriminant.


ME 321  S,W  3C,1L  0.5
Kinematics and Dynamics of Machines  

ME 322  F,W  3C,1T  0.5
Mechanical Design 1  
Analysis and synthesis of machine elements. Factors affecting working stresses, fatigue, creep and impact considerations. Design of shafting, springs, screws, clutches, brakes and gears.

ME 340  S,W  3C  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 costs and production rates of competitive processes.

ME 351  S,W  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.

ME 352  F,W  3C,2to3L  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.

ME 354  S,W  3C  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. Introduction to the kinetic theory of gases.

ME 360  F,W  3C,2T  0.5
Introduction to Control Systems  

ME 362  F,W  3C,1T  0.5
Fluid Mechanics 2  
Basic equations of two-dimensional flow, exact viscous solutions, introduction to lubrication, boundary layers, and introduction to turbulence. Turbomachinery fundamentals and applications. Selected advanced topics.
ME 400  S,F  1C  0
Introduction to Mechanical Engineering 3
Research frontiers in Mechanical Engineering, specific
discussion of research done at Waterloo, seminars by
members of research groups.

ME 423  F,S  3C,1T  0.5
Mechanical Design 2
This is a continuation of the ME 322 course in analysis
and synthesis of machinery, including advanced
analysis of machine elements such as clutches, brakes,
couplings, journal bearings and gears. The latter part of
the course includes advanced machine design
concepts such as reliability, optimization and
techniques for stimulating innovative design. A
synthesis project involving the machine elements
studied is usually included.
Prereq: ME 322

ME 432  F,S  0.5
Physical Metallurgy 2 - Plastic Deformation and
Fracture
Microscopic origins of elastic and an elastic 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. Applications of
fracture mechanics. Environmental effects.

ME 435  F,W  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, iron-carbon alloys,
heat treatment and the function of alloying elements in
steel, corrosion and scale resistant alloys, copper and
nickel base alloys, light metals and their alloys; casting,
hot and cold working of metals; soldering, brazing and
welding; corrosion and oxidation; metal failure analysis.

ME 440  W  3C  0.5
Metal Casting Processes
Moulding from the liquid state. Review of applicable
heat transfer and fluid theory. Influence of time in
casting. Solidification time, freezing waves and riser
design. Pouring time, fluidity, grating and running. Hot
tears, distortion, shrinkage and residual stresses. Die
casting; thermal stability, pressure pulse effects. Other
casting methods.

ME 448  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.

ME 452  W  3C  0.5
Air Conditioning
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 of
loads on buildings; effects of the thermal environment;
air conditioning and calculations: air flow in and around
buildings. diffusers.

ME 456  F,S  3C  0.5
Heat Transfer 2
Selected topics in heat transfer fundamentals and
applications. Topics to be covered include the
fundamentals of convection with analytical solutions to
simple laminar flow problems and approximate
solutions to turbulent flow problems based on
analogies between momentum and heat transfer. Also
covered is radiant exchange in grey enclosures and in
black enclosures containing emitting-absorbing gases.
The remaining topics will be chosen from design of heat
exchangers; condensation heat transfer; boiling heat
transfer, and the treatment of problems in heat
conduction.

ME 459  S,F  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 460  S,F  2C,2T,3L  0.5  Instrumentation
Choice of instrumentation systems, sensing devices and conversion devices. Examples and experiments on techniques used in the measurement of flow, pressure, temperature, position, velocity, acceleration, strain, sound and vibration measurements, use of microprocessors in instrumentation.

M 462  F,W  3C  0.5  Introduction to Automation

M 463  F,W  3C  0.5  Tribology 1

M 469  F,W  3C  0.5  Introduction to the Environmental Sciences
Composition and structure of the atmosphere and oceans. Thermodynamics of moist air. Hydrostatic equation. Stability. Winds and current on a rotating earth gradient, geostrophic and inertial flow. Vortical variation of wind, convection, thermals, plumes, basic diffusion theory-coastal currents, gulf streams, tides, internal waves.

M 482  S,F,W  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 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 524  W  3C,1T  0.5  Advanced Dynamics and Stress Analysis in Design
This course is related to M 423, although M 423 is not an essential prerequisite. M 524 brings together dynamics and stress analysis in an application to design of dynamic machinery. Basic kinematic and dynamic concepts are reviewed and extended. Lagrangian and computer simulation methods are introduced. Basic stress analysis methods are reviewed and indeterminate structures are discussed, along with finite-element and other computer techniques. A design project (involving synthesis), utilizing the concepts studied, is usually included.

M 525  F,S  3C  0.5  Mechanical Vibrations in Machines

M 527  W  3C  0.5  Mechanics of Deformable Solids 3

M 531  F,S  3C  0.5  Physical Metallurgy 1

M 534  W  3C  0.5  Non-metallic Materials

M 541  W  4C  0.5  Deformation Processes
Course Descriptions
Mechanical Engineering

ME 544  W  3C  0.5
Welding Processes
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 dynamical design of welded joints. Residual stresses, distortion and fracture of welds.

ME 548  S,F  3C,4L  0.5
Numerical Control of Machine Tools I

ME 557  W  3C  0.5
Combustion 1
Combustion thermodynamics; Introduction 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.

ME 561  S,F  3C  0.5
Fluid Power Control Systems

ME 563  W  3C  0.5
Turbomachines

ME 565  W  3C  0.5
Gas Dynamics
Basic laws of compressible fluid flow. Wave propagation in compressible fluids, isentropic flow of a perfect gas, normal and oblique shock waves. Prandtl-Meyer flow. Flow in ducts and over bodies, flow with friction (Fanno) and heat transfer (Rayleigh), imperfect gas effects, measurement of compressible flows, use of formulae, charts and tables, introduction to the methods of characteristics.

ME 566  S,F  3C  0.5
Fluid Mechanics 3

ME 568  W  3C  0.5
Noise Analysis and Control

ME 569  S,F  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.

ME 571  S,F  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, thermals, jets in stratified flow, radioactive plumes, particulate dispersion, instrumentation (micrometeorological), air pollution control techniques and equipment monitoring instrumentation.
School of Optometry

Professor, Director of School
M. E. Woodruff, OD (College of Optometry of Ontario), PhD (Indiana)

Professors
C. W. Bobier, OD (College of Optometry of Ontario), BA (Toronto), MS (Ohio State)
E. J. Fisher, BA, MA (Toronto), DSc (Penn. College of Optometry)
W. S. Long, OD (College of Optometry of Ontario), BA (Toronto), MS, PhD (Indiana)
J. A. Brisson, OD (Waterloo)

Associate Professors
R. D. Beauchamp, BA (McMaster), MA, PhD (Brown)
D. A. Bader, OD (College of Optometry of Ontario), BFA (Manitoba), MS, PhD (Indiana)
T. D. Williams, OD (College of Optometry of Ontario), MS, PhD (Indiana)

Assistant Professors
W. F. Long, BA (William Jewel Coll, Miss), MS, PhD (Mich State Univ), OD (Indiana)

Adjunct Professors
D. E. Andrew, BA, MD (Toronto)
R. R. Hansenford, OD (College of Optometry of Ontario), BCs (Sir G Wms), MSc (Waterloo)
C. W. Schwenger, MD, DPH (Toronto)
G. W. Wyszecki, Dipl Ing, Dr Ing (Tech. Univ. Berlin)

Adjunct Lecturer
M. H. Todd, BSc, PhD (Leeds)

Lecturer
M. J. Samek, OD (College of Optometry of Ontario), MSc (Waterloo)

Visiting Professor (1978-1979)
W. D. Wright, ARCS, DIC, PhD, DSc (London)

Course Descriptions
Optometry

Clinic Supervisors – Full time (1978-1979)
D. B. Buck, OD (College of Optometry of Ontario)
C. C. Dalziel, OD (Waterloo)
P. E. Earle, OD (College of Optometry of Ontario)
D. J. Egan, BSc (St. John's Univ), OD (Penn College of Optometry)
J. P. Johnson, OD (College of Optometry of Ontario)
B. Levy, Dip Opt (SA), OD (California, Berkley)
H. A. McDonald, BA (Sask), OD, MSc (Waterloo)
R. Wiggins, BS, OD (Indiana)

Clinic Supervisors – Part-time (1978-1979)
W. B. Andrews, OD (Waterloo)
W. R. Andrews, OD (College of Optometry of Ontario)
D. A. Bader, Dip Opt (SA), OD (Houston), MSc (Waterloo)
R. R. Bock, OD (College of Optometry of Ontario)
J. A. Brisson, OD (Waterloo)

Clinic Residents (1978-1979)
D. A. Neff, OD (Waterloo)
R. J. Pace, OD (Waterloo)
S. N. A. Peta, OD (Waterloo)
P. E. Rae, OD (Waterloo)
B. H. Rice, OD (Waterloo)
R. L. Saari, OD (Waterloo)
R. J. Scheid, OD (Waterloo)
P. J. Shaw, OD (Waterloo)
M. L. Sheldon, OD (Waterloo)
N. Van Ymeron, OD (Waterloo)
M. Wolf, BSc, OD (Waterloo)
W. R. Woolner, OD (Waterloo)
Course Descriptions

Students in other disciplines may register for Optometry courses only upon the approval of the Director of the School of Optometry.

Optom 200  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 206  F  3C,3L  0.5
Geometrical Optics
Prereq: Phys 121, 121L, 122, 122L, Math 113

Optom 211  W  3C,3L  0.5
Physiological Optics
Prereq: Optom 206

Optom 224  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 234.
Coreq: Biol 201

Optom 234  W  3C,2L  0.5
Anatomy of the Eye and Associated Structures
A continuation of Optom 224.
Prereq: Optom 224

Optom 301  F  3C,3L  0.5
Physiological Optics
Ocular motility: Kinematics of eye movements, muscle actions, measurements of eye movements, types of eye movements, innervational systems subserving eye movements, clinical application.
Prereq: Optom 211

Optom 302  F  3C,3L  0.5
Clinical Optometry
Lectures and laboratories on clinical techniques for examination of the optical properties of the eye.
Prereq: Optom 211

Optom 305  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.
Prereq: Biol 201, Optom 224-234

Optom 306  F  3C,4L  0.5
Optometrical Optics
The properties of ophthalmic glass and lenses, and the problems and solutions involved in fitting lenses of the eyes. Laboratory work involves processing prescriptions, as well as experiments in optics.
Prereq: Optom 206

Optom 309  F  2C,1T  0.5
Light and Illumination
(See Optom 409 for detailed description)

Optom 311  W  3C,3L  0.5
Physiological Optics

Optom 312  W  3C,3L  0.5
Clinical Optometry
Lectures and laboratories on clinical techniques for examination of the optical properties of the eye.
Prereq: Optom 301, 302

Optom 315  W  4C,1T  0.5
General Pathology
A continuation of 305.
Prereq: Optom 305

Optom 316  W  3C,4L  0.5
Optometrical Optics
A continuation of 306, dealing with problems peculiar to bifocal and multifocal lenses. Aberrations of thin lenses and the design of lenses of ophthalmic use.
Prereq: Optom 306
Course Descriptions
Optometry

Optom 401  F  3C,3L  0.5
Physiological Optics

Optom 402  F  3C,2L  0.5
Clinical Optometry
Case analysis of the nonstrabismic patient: case history, testing the health and integrity of the visual system, refractive tests, binocular relations, analysis, diagnosis, prognosis and modes of therapy.
Prereq: Optom 302, 312

Optom 404  F  2C,2L  0.5
Physiology of the Visual Systems
The physiology of the smooth muscles of the eye, the extracurricular 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 intracocular pressure. The vascular supply of the eye.
Prereq: Optom 224

Optom 405  F  3C,1L  0.5
Ocular Pathology
A detailed study of the diseases which involve the eye and related structures with emphasis on early recognition. Symptomatology, differential diagnosis. Evidence of systematic disease as manifest in the eye. A study of headaches.
Prereq: Optom 305, 315

Optom 406  F  2C,4L  0.5
Optometrical Optics
The lecture course deals with problems involved in selecting, preparing and fitting ophthalmic materials. Optical, cosmetic and comfort requirements, and patient counselling are considered. The laboratory course provides experience in preparing and fitting materials to patients.
Prereq: Optom 306, 316

Optom 407  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.
Prereq: Optom 401, 402

Optom 408  Y  8 Clinic  1.0
Optometric Clinic
The student is assigned to the Visual Analysis Clinic and under the direct supervision of optometrists of the clinic staff, carries out routine clinical investigations of patients who attend the public clinic.
Prereq: Permission of Clinic Director

Optom 409  F  2C,1T  0.5
Light and Illumination
Principles of radiometry and photometry; illumination and related factors involved in the design and control of the visual environment in relationship to the human visual system; lighting surveys.

Optom 411  W  3C,3L  0.5
Physiological Optics
Binocular vision and perception: The binocular system; binocular integration and interaction; effects of disparate stimulation; perceived size, shape, direction, distance, motion, colour, illusions.
Prereq: Optom 401

Optom 412  W  3C,2L  0.5
Clinical Optometry
Detection and evaluation of sensory and motor characteristics of vision in strabismus. Classifications, diagnosis, prognosis, modes of therapy for strabismus and amblyopia.
Prereq: Optom 302, 312, 402

Optom 414  W  3C,2L  0.5
Physiology of the Visual Systems
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 404

Optom 415  W  3C,1L  0.5
Ocular Pathology
A continuation of 405.
Prereq: Optom 405

Optom 427  W  2C,2L  0.5
Optometric Specialties: Aniseikonia and Low Vision Aids
A series of lectures and laboratories in examining low vision and aniseikonic patients with specific techniques described. Treatment and therapy will be included.
Prereq: Optom 401, 402
Course Descriptions
Optometry

Optom 428 W 1.0
\textbf{Spring Clinic}
Each student is required to complete 120 hours of clinical practice during the spring. Times will be arranged by the student with the approval of the clinic staff.
\textit{Prereq: Successful completion of Year 4 programme.}

Optom 500 F 2C 0.5
\textbf{Optometrical Praxis}
Practice management; financial management, establishing a practice, interprofessional relations, office design, optometric assistants, professional associations.

Optom 501 F 3L 0.5
\textbf{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 Psyeh357. Contact the course co-ordinator for details.

Optom 502 F 3C 0.5
\textbf{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.

\textbf{Pediatric Optometry}
Special aspects of the management of vision problems of infants and young children are discussed.

\textbf{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.
\textit{Prereq: Optom 302, 312, 402, 412}

Optom 504 F 4C, 1L 0.5
\textbf{Ocular Pharmacology}
Neurohumoral theory, response to drugs, sterile techniques, disinfectants. Drugs used in contact lens practice, drugs used topically on the eye, drugs on the eye and vision.
\textit{Prereq: Optom 404, 405, 415}

Optom 508 F 2C Clinic 0.5
\textbf{Optometry Clinic}
The clinical programme teaches the student how to provide optometrical services including pathology detection, strabismus evaluation and the application of spectacle therapy, contact lenses and vision training. The patients cared for extend from the pediatric to the geriatric, and include those with perceptual problems, or with low vision.
\textit{No credit given until successful completion of Optom 518. Prereq: Permission of Clinic Director}

Optom 509 F 4C 0.5
\textbf{Community Health Optometry}
Governmental and social aspects of health and vision care delivery are discussed in relation to the epidemiology of vision problems.

Optom 510 W 2C 0.5
\textbf{Optometrical Jurisprudence}
Lectures relating to the legal aspects of practicing optometry in Canada. The rights and responsibilities of the optometrist in practice are examined and discussed.

Optom 511 F 3L 0.5
\textbf{Optometry Research Project}
A continuation of 501. This course serves as an alternative to Optom 513.
\textit{Prereq: Optom 501}

Optom 512 W 3C 0.5
\textbf{Advanced Contact Lens Practice}
A continuation of Optom 502

\textbf{Visual Gerontology}
Aspects of the aging process on the visual system and the optometrical management of the visual problems of older persons.

\textbf{Recent Advances in Optometrical Technology and Instrumentation}
The use and interpretation of new resources for collecting, recording, analyzing and using optometrical data.

Optom 513 W 2C 0.5
\textbf{Optometric Communication}
Verbal communication and counselling during the optometrical examination, alternatives to technical terminology, report and letter writing, preparing and delivering papers and talks for professional societies and public information.
Optom 514 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, etc. Genetic counselling, and the detection of carriers.
Prereq: Optom 405, 415

Optom 518 W 24 Clinic 0.5
Optometry Clinic
A continuation of 508
Prereq: Optom 508

Optom 519 W 4C 0.5
Aspects of prevention of accidents and injury to the visual system.
The production of efficient and comfortable vision at work and recreation.

Note
Graduation in Optometry is contingent upon successful completion of comprehensive examinations involving oral, written and clinical applications of optometry. These examinations are ordinarily held in the Winter term of the fourth professional year.

Course Descriptions
Peace and Conflict Studies

Optom 514 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, etc. Genetic counselling, and the detection of carriers.
Prereq: Optom 405, 415

Optom 518 W 24 Clinic 0.5
Optometry Clinic
A continuation of 508
Prereq: Optom 508

Optom 519 W 4C 0.5
Aspects of prevention of accidents and injury to the visual system.
The production of efficient and comfortable vision at work and recreation.

Note
Graduation in Optometry is contingent upon successful completion of comprehensive examinations involving oral, written and clinical applications of optometry. These examinations are ordinarily held in the Winter term of the fourth professional year.

Peace and Conflict Studies
Assistant Professor, Chairman of the Programme
C. G. Brunk, BA (Wheaton), MA, PhD (Northwestern)

Members of the Peace and Conflict Studies Faculty Group

Professors
L. Costa-Pinto, BA, PhD (Brazil)
W. Klaassen, BA, BD (McMaster), D.Phil (Oxford)
D. E. Smucker, BA (Bluffton), BD (Princeton), MA, PhD (Chicago)

Associate Professors
T. S. Abler, BA (Northwestern), MS (Wisconsin-Milwaukee), PhD (Toronto)
F. H. Epp, BA (Bethel), MA, PhD (Minnesota)
J. G. Holmes, BA, MA (Carleton), PhD (North Carolina)

Assistant Professors
C. G. Brunk, BA (Wheaton), MA, PhD (Northwestern)
M. F. McDonald, BA (Toronto), MA, PhD (Pittsburgh)
R. J. Sawatsky, BA (Bethel), MA (Minnesota), MA, PhD (Princeton)
J. O. Stubbs, BA (Toronto), MSc Econ (London), DPhil (Oxford)

Lecturers
W. B. Moul, BA, MA (Br.Col.)

Core Courses

The Core Courses for each year of the programme are designed to bring together students from various disciplines who are interested in the problems of conflict and peace, with the objective of acquainting them with other disciplinary approaches to those problems. Core courses are taught in Conrad Grebel College by members of the PACS Faculty Group, other qualified and interested members of participating departments, or by eminent scholars in the field who will be invited to the University from time to time.

PACS 201 F 2C,1D 0.5
Peace and Conflict Studies 1
An examination of influential theories of the nature and roots of human conflict on both the interpersonal and inter-group level. Contributions of the behavioral and social sciences, as well as the humanities, will be explored.
Brunk
PACS 202 W 2C,1D 0.5
Peace and Conflict Studies 2
A continuation of PACS 201, with 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.
Brunk

PACS 301 F 3S 0.5
Peace and Conflict Studies 3
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.
Staff

PACS 302 W 3S 0.5
Peace and Conflict Studies 4
(Same as 301, above)
Staff

PACS 498 F T 0.5
Senior Honours Seminar 1
Each Honours student will work on a research paper and will meet regularly with other students working on similar projects to discuss and evaluate his own work.
Staff

PACS 499 W T 0.5
Senior Honours Seminar 2
Continuation of PACS 498.
Staff

Peace and Conflict Studies Content Courses Offered by Participating Departments

The following are courses approved as PACS-related which are offered by the participating departments under their own designations. Additions may occur following the suggestion of the departments concerned and approval by the PACS Faculty Group. Full course descriptions are found in the departmental sections elsewhere in this chapter.

Anthropology
101C Ancient Man the Hunter
205 Anthropology of Race and Racism in Canada
214 Conflict, Feud, and Warfare
261 Primate Behaviour
359 Political Anthropology

Arts
These are PACS Content Courses offered by Conrad Grebel College to pick up special areas of interest relating to peace and conflict.
219G Dissent
230G Nonviolence and Political Reality
271G Peace Research
398G Special Topics in Peace and Conflict
399G Special Topics in Peace and Conflict

History
204E War and Society in the 20th Century
214A Irish History, Part 1
214B Irish History, Part 2
252 20th Century America: Change and Conflict
260 Europe in Renaissance and Revolution
267G Canadian Minorities 1
268G Canadian Minorities 2
269R History of Modern Revolutions
347G Radical Reformation 1
348G Radical Reformation 2
368 International History Since 1870
374G Middle East Conflict
389G Canada and World Affairs

Philosophy
125 Fundamentals of Social and Political Philosophy
216 Rational Behaviour and Decision-Making
225 Social and Political Philosophy: Canadian Problems
243 Risk, Decision, Games, Amalgamation
325 Political Philosophy 1
326 Political Philosophy 2
327 Philosophy of Law
328 The Philosophy of Karl Marx
329 War, Peace, and Justice

Political Science
101 Introduction to Politics
102A Imperialism and International Relations
102K Mass Political Violence
225 Political Theory 1
226 Political Theory 2
281 International Politics 1
282 International Politics 2
321 Marxist Theory
322 Marxism and Revolution after Marx
350 The Politics of Developing Areas
380 World Politics
481 Research Seminar on World Politics

Psychology
253 Social Psychology
254 Interpersonal Relations
316 Moral Development
333 Industrial Psychology
353 Aggression and Social Conflict
354 Interpersonal Processes in Critical Situations
Course Descriptions

Philosophy

Religious Studies

253 History and Thought of Christian Pacifism 1
254 History and Thought of Christian Pacifism 2
255 Christian Ethics 1
256 Christian Ethics 2
262 Religion and Politics 1
263 Religion and Politics 2
275 Religion and Psychotherapy
353 Ethics in Indian Thought

Sociology

210 Social Psychology of Beliefs and Attitudes
240 Collective Behavior
250 Crime and Society
251 Ethnic and Racial Relations
252 Juvenile Delinquency
311 Social Structure and Character in Crisis
331 Theories of Social Change
332 Social Conflict and Modernization
336 Sociology of Militarism
361 Conflict Simulation Workshop
370G Sociology of Law
402 Marxist Social Theory

Department of Philosophy

Associate Professor, Chairman of the Department
J. R. Horne, BA, MA (W. Ont.), BTh (Huron), PhD (Columbia)

Professor, Associate Chairman
R. A. George, MA, PhD (Michigan State)

Professors
E. J. Ashworth, BA, MA (Cambridge), PhD (Bryn Mawr)
T. L. Batke, MASC, PhD (Toronto)
L. L. Haworth, BA (Rollins), MA, PhD (Illinois)
J. S. Minas, BA (W. Ont.), PhD (Illinois)
J. F. Narveson, BA (Chicago), MA, PhD (Harvard)
B. H. Suits, BA, MA (Chicago), PhD (Illinois)
J. W. Tucker, BSc, BA, PhD (London)

Professor Emeritus
P. Seligman, BA, PhD (London), (part-time)

Associate Professors
W. R. Abbott, BA (Kenyon), PhD (Ohio State)
F. Centore, BSc (Canisius), MA (Maryland),
PhD (St. John's)
D. T. DeMarco, BS (Stonehill, Mass.),
MA, PhD (St. John's)
B. P. Hendley, BA (Marquette), MA, PhD (Yale)
J. Huertas-Jourda, BA (Florida), MA, PhD (New York),
(part-time)
A. Kerr-Lawson, BA (Toronto), MA (Chicago),
PhD (McMaster)
A. C. Minas, BA (Radcliffe), MA, PhD (Harvard)
D. D. Roberts, BA (Roosevelt), MA, PhD (Illinois)
J. W. VanEvra, BA (Valparaiso),
MA, PhD (Michigan State)

Assistant Professors
C. G. Brunk, BA (Wheaton), MA, PhD (Northwestern)
G. T. Campbell, BA (W. Ont.), PhL, PhD (Laval)
C. R. Girodat, BA (W. Ont.), MA (Detroit), PhD (Toronto)
R. H. Holmes, BA, MA (Montana), PhD (Washington)
M. F. McDonald, BA (Toronto), MA, PhD (Pittsburgh)
J. Wuhning, BA (Swarthmore), MA, PhD (Yale)

Faculty members holding joint appointments as shown

1Department of Pure Mathematics
2Department of Chemical Engineering
Course Descriptions

Note 1
Any full course or two half courses in Philosophy can be used to satisfy the Group A(i) requirement.

Note 2
Courses 370 to 372, 380 to 389, 435 to 439, 440 to 444, 471 to 473, 480 to 489, are special courses offered in response to student demand or special interests of the faculty. Each Spring, the Department will publish a list of the courses offered under these numbers for the following academic year. This list will include descriptions of those courses whose content is not specified below and names of instructors for each course.

Note 3
Courses suffixed with "J" are administered by St. Jerome’s College; those suffixed with a "P" are administered by St. Paul’s College; and those suffixed with a "G" are administered by Conrad Grebel College.

Note Concerning Introductory Courses
It is Departmental policy to have small sections of each introductory course staffed by regular faculty. In addition there are weekly seminar-sized discussion groups in each course.

Phil 100 Y 2C,1D 1.0
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? Can we know whether there is a God? Is mind in any sense distinct from matter? Original texts of both classical and contemporary thinkers are employed.

Phil 101 Y 2C,1D 1.0
Great Works of Western Philosophy
This is a year long examination of some of the greatest writings in Western philosophy. Students will be encouraged to come to a critical appreciation of such masterworks as Plato's Republic, Descartes' Discourse on Method, Hobbes' Leviathan, Hume's Enquiry, Kant's Prolegomena, Nietzsche's Zarathustra, and an outstanding work in contemporary philosophy.

Phil 111 F,W 3C 0.5
Philosophy of Life
"Who am I?" "What can I hope for after death?" "How can I tell what to do?" "What can I know?" are questions that have led people to philosophize.
Approaches, such as those of the mystic, the scientist, the existentialist, the pleasure seeker, and the practical man, will be discussed.

Phil 120 F,W,S 3C 0.5
Science, Technology, and Society
Alternative philosophical perspectives on problems raised by scientific and technological developments including moral issues (e.g. privacy and data-gathering, 'clean' vs. 'dirty' energy. Also an examination of the nature and scope of scientific and technical knowledge as it bears on the responsibilities of scientists and engineers.

Phil 125 F,W 2C,1D 0.5
Introduction to Social and Political Philosophy
An introduction to basic concepts and principles in classical and contemporary social and political philosophy. Differing views on basic questions are examined, with applications to such issues as capital punishment, welfare provisions, taxation, natural resource ownership, and terrorism.

Phil 135 F,W 3C 0.5
Introduction to the Philosophy of Religion
Beginning with a consideration of such contemporary religious and anti-religious options as secularism, mysticism, occultism, and charismatic renewal, this course moves to a critical discussion of such topics as religious experience, faith, God, and miracles.

Phil 140 F,W,S 3C 0.5
Introduction to Formal Logic
Elementary sentence and predicate logic. Translation from English into the formalism, decision methods and deductions. Application of Graphic Methods to Logic. This course is a preparation for courses in the foundations of mathematics, scientific methods, and more advanced logic courses.

Phil 145 F,W,S 3C 0.5
Critical Thinking
An analysis of basic types of reasoning, structure of arguments, critical assessment of information, common fallacies, problems of clarity and meaning.

Phil 150 W 2C,1D 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.

Phil 201 F,W 2C,1D 0.5
Love
A philosophical analysis of different forms and functions of love. Among the topics to be considered: love and sexuality, religious love, love and knowledge. Classical and contemporary sources will be treated.
Phil 202 F 3C 0.5  
**Philosophy of Women**  
A study of some of the issues raised by the Women’s Liberation movement. Philosophical writings of the past and present will be used on such subjects as: the two sexes, physiological femininity, personal and social relations between the sexes, the position of women in public life, marriage and its alternatives, the importance of childbirth.

Phil 203 3C 0.5  
**Philosophical Perspectives on Death**  
This course critically examines how philosophers from the Pre-Socratics to Wittgenstein have analysed the concept of death. The course is also concerned with topics like the concept of a person, personal identity, and survival after death.

Phil 210 W 2C,1D 0.5  
**Philosophy in Literature**  
Each term philosophical themes (such as alienation, freedom, and responsibility) will be explored through appropriate literary works (e.g. works by Camus, Dostoevsky, Kafka, and Sartre).

Phil 215 F 3C 0.5  
**Professional Ethics**  
Study of ethical and moral issues that typically arise in professional activity. What responsibilities to society at large do people in such professions as teaching, engineering, planning, architecture, and accounting have? How far should professional autonomy extend?

Phil 216 W 3C 0.5  
**Rational Behaviour and Decision-Making**  
An elementary introduction to the subject of 'rational' behaviour and decision-making for individuals and groups. Emphasis is on the definition and measurement of utility functions and various criteria employed in models of decision-making. This course is intended to help those whose work will involve them in making decisions in either the public or private sectors.

Phil 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 222 W 3C 0.5  
**Contemporary Ethical Theory**  
Continues the history and discussion of ethics begun in Phil 221 with writings from 1900 to the present. Theories such as intuitionism, emotivism, utilitarianism, and relativism are examined via the writings of such people as Moore, Hare and Warnock.  
*Phil 221 recommended*

Phil 224 3C 0.5  
**Mankind and Nature**  
An examination of some of the issues raised by recent discussions on ecology. Various theories of nature, the human being, and relations between the two will be explored. Possible foundations for duties of mankind toward nature will be examined.

Phil 225 W 3C 0.5  
**Social and Political Philosophy: Canadian Problems**  
Basic ideological perspectives – conservative, socialist, and liberal – on Canadian problems – such as native rights, nationalism, separatism, and regionalism – are philosophically presented and assessed.  
*Prereq: Philosophy 125 or consent of the instructor.*

Phil 226 3C 0.5  
**Ethics and Life Sciences**  
An investigation of some critical ethical issues in human research and therapy. Includes discussion of the right to live and right to die, behavior control (e.g. psychosurgery, behavior modification and psychotherapy), human experimentation (including “informed consent” and fetal research) and human engineering.  
*Prereq: One of Phil 125, 221, 222, or consent of instructor*

Phil 235 2C 0.5  
**Philosophy and Mysticism**  
A critical examination of mystical writings, with regard to the nature of the experience reported, their typology, and their implications for epistemology, ethics, and philosophy of religion.
Phil 236 2C 0.5
Philosophy of Religion: The Occult
A critical philosophical discussion of reports of several kinds of extraordinary experiences, such as magic, extra-sensory perception, mysticism, and divination will lead us to discussions of such concepts as insanity, irrationality, the supernatural, and the miraculous.

Phil 240 Y 3C 1.0
Logic
A systematic development of the propositional calculus and of the first-order functional calculus. Some attention will be devoted to extensions and interpretations of such formal systems.
Prereq. None for second-year students and above; consent of instructor for others.

Phil 241 F,W 3C 0.5
Intermediate Logic
Axiom systems of logic are developed and compared with natural deduction procedures. Then certain properties of these logical systems, such as consistency, completeness, and compactness, will be investigated.
Prereq. Phil 140 or consent of the instructor.

Phil 242 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 obligation, belief and knowledge, necessity, and temporal order. Essentialism, future contingencies, proofs for the existence of God will be discussed.
Prereq. Phil. 140 or consent of the instructor.

Phil 243 F,W 3C 0.5
Risk, Decision, Games, Amalgamation
Fundamentals of probability and game theory. Problems of decisionmaking under conditions of certainty, risk and uncertainty. The definition and measurement of utility functions. Translation of decisions and preferences of members of a group into collective preference. Some applications to the Social Sciences.
Prereq.: Phil 140, 145 or consent of instructor.

Phil 258 F 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 explanation, the structure of scientific theories, the nature of law-likeness, the grounds for scientific confirmation, and the debate between rationalism and empiricism in science.

Phil 265 3C 0.5
The Existentialist Experience
An introduction to the existentialist view of man using both literary and philosophical texts from such authors as Kierkegaard, Unamuno, Nietzsche, Ortega y Gasset, Camus, Sartre, Heidegger and others.

Phil 270/271 3C 0.5
Special Topics in Philosophy
Philosophic examination of areas of current or traditional social or conceptual interest. No special preparation in Philosophy. Topics dealt with may include Philosophical Anthropology, Philosophy and Linguistic theory, Minds and Machines, The Concept of Deviance.

Phil 280 F 3C 0.5
History of Ancient Philosophy 1
From the beginnings to Plato.
Prereq: Second year standing or above, or consent of instructor

Phil 281 W 3C 0.5
History of Ancient Philosophy 2
From Aristotle to the close of classical antiquity.
Prereq: Phil 280

Phil 282 F 3C 0.5
History of Modern Philosophy 1
Earlier period beginning with Descartes.
Prereq: Second year standing or above, or consent of instructor

Phil 283 W 3C 0.5
History of Modern Philosophy 2
Later period including Hume and Kant.
Prereq: Second year standing or above, or consent of instructor. Phil 282 recommended.

Phil 284 3C 0.5
19th Century Philosophy
The 19th century. Philosophers covered may include Hegel, Mill, Schopenhauer, James, and Kierkegaard.

Phil 285 3C 0.5
20th Century Philosophy
A course intended to introduce the student to the dominant themes of 20th century philosophy, centering on the major figures of this century, such as Bertrand Russell, Ludwig Wittgenstein, G. E. Moore, Edmund Husserl, and Jean-Paul Sartre.

Phil 300 F,W 3C 0.5
The Philosophy of Games
An introduction to philosophical issues relating to sports and other games. Among the issues examined will be the nature of games, games and sports, and the relevance of games and sports to other philosophical interests: e.g., ethics and aesthetics.
Phil 311  W  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  F  3C  0.5  
**Philosophy of Education 2**  
An introduction to current work in the field, particularly that of Peters, Hirst, and Dearden. Special attention will be paid to the question of the desirability of a core curriculum and its proposed content.  
*Prereq:* Phil 311 or consent of instructor

Phil 321/324  3C  0.5  
**Studies in Ethics**  
Various half courses dealing with special topics; one or more of these will be offered each year as announced by the Department.  
*Prereq:* Phil 221/222. See Note 1

Phil 325  3C  0.5  
**Political Philosophy 1**  
Philosophical analysis of central concepts in political theory and its relation to moral and metaphysical problems of various periods.  
*Prereq:* Phil 125 or consent of the instructor

Phil 326  3C  0.5  
**Political Philosophy 2**  
A detailed discussion of contemporary theories.  
*Prereq:* Phil 125 or consent of the instructor

Phil 327  F  3C  0.5  
**Philosophy of Law**  
Besides considering some of the more prominent views of what law is (e.g., those of Aquinas, Kant, Austin, Kelsen, and Hart), we will also take up some other topics central to Jurisprudence, such as liability, right, and judicial reasoning.  
*Prereq:* One full or two half Philosophy courses or consent of instructor

Phil 328  3C  0.5  
**The Philosophy of Karl Marx**  
A systematic, critical study of the main philosophical ideas of Marx and Engels. Considerable reading from their original writings, early and late, with discussion and analysis, is the main work of the course; some recent interpretative and critical work is used.  
*Prereq:* One full or two half Philosophy courses, or consent of instructor

Phil 329  3C  0.5  
**War, Peace and Justice**  
An intensive study of the moral issues involved in war and armed revolution. Critical evaluation of "just war" theories, and international rules of warfare is pursued as well as the moral arguments for and against pacifism and conscientious objection.  
*Prereq:* Phil 125, or 221/222, 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:* One full or two half Philosophy courses, or consent of instructor.

Phil 335  3C  0.5  
**Philosophy of Religion**  
A critical examination of the methods and substantive arguments found in selected major works of religious philosophy. The writings chosen for consideration will be announced in advance each year.  
*Prereq:* One full or two half Philosophy courses, or consent of instructor.  
See Note 1.

Phil 340  Y  3C  1.0  
**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:* Phil 140, or (preferably) Phil 240, 241 or 242, or consent of instructor

Phil 350  3C  1.0  
**Epistemology**  
An analysis of human knowledge, its conditions and types. The first part concentrates on criteria of meaningfulness, the possibility of a priori knowledge, and the concept of knowledge. The second part deals with our knowledge of the physical world and other minds.  
*Prereq:* One full or two half courses in Philosophy.

Phil 350A  F  3C  0.5  
**Epistemology 1**  
The first part of Phil 350.

Phil 350B  W  3C  0.5  
**Epistemology 2**  
The second part of Phil 350.
Course Descriptions
Philosophy

Note
Either 350A or 350B may be taken separately.

Phil 359 3C 0.5
Philosophy of the Formal Sciences
A study of philosophical problems concerning mathematics. Topics discussed include formalism, intuitionism, logicism, the mathematical paradoxes, and other topics in foundations and metamathematics.
Prereq: At least second year standing or consent of instructor

Phil 362 3C 0.5
Philosophy of the Social Sciences
Problems about the fundamental methods and aims of the social sciences generally, and problems specific to Psychology, Sociology, Political Science, etc., and their relations to one another will be considered. (Cross-numbered as Soc 371)

Phil 363 Y 3C 1.0
Philosophy of Language and Linguistic Analysis
The first part examines issues in the philosophy of language, such as synonymy, propositions, meaning, semantics, reference. The second part will consider ordinary language analysis as a method for solving philosophical problems as compared with structural linguistics.
Prereq: At least second year standing or consent of instructor

Phil 363A F 3C 0.5
Philosophy of Language
The first part of Phil 363.

Phil 363B W 3C 0.5
Linguistic Analysis
The second part of Phil 363.

Note
Either Phil 363A or Phil 363B may be taken separately.

Phil 365-366 3C 0.5
Oriental Philosophy
Studies of a selected area of non-western Philosophy (e.g. Indian or Chinese). Parallels will be drawn between modes of Eastern thinking and European conceptions with emphasis on essential differences as well as similarities.
Prereq: Consent of instructor

Phil 370-372 3C 0.5
Special Subjects
One or more half courses will be offered at different times as announced by the Department.
Prereq: Consent of instructor. See Note 1

Phil 380-389 3C 0.5
Studies in the History of Philosophy
Various half courses dealing with a particular philosopher, a selected work or period; one or more of these will be offered each year as announced by the Department.
Prereq: Appropriate course(s) from Phil 280-285 or Phil 390/391, or consent of instructor.
See Note 1

Phil 390 3C 0.5
Medieval Philosophy 1
The early period to the 13th century. Among those considered will be: Augustine, Boethius, Anselm, and Abailard.
Prereq: one full or two half courses in Philosophy

Phil 391 3C 0.5
Medieval Philosophy 2
The later period from the 13th century. Among those considered will be: Bonaventure, Aquinas, Scotus, and Ockham.
Prereq: Phil 390

Phil 398a-b F,W,S R 0.5
Directed Reading in Special Areas
Prereq: Consent of instructor

Phil 399 T 1.0
Tutorial for Honours Students
Students wishing to enrol in 399 should consult the Department.

Phil 425 3C 0.5
Philosophy of the City
Analysis and evaluation of the philosophical points of view that underlie current criticism of urban life and prevalent schemes for its reconstruction.
Prereq: One half Philosophy course

Phil 435-439 3C 0.5
Students in Philosophy of Religion
A study of a particular philosopher or problem. The topic will be announced in advance each year.
Prereq. Consent of instructor. See Note 1

Phil 440-444 3C 0.5
Studies in Logic
Various half courses dealing with specific topics; one or more of these will be offered each year as announced by the Department.
Prereq: Phil 240, 241, 242 or 340 or Math 346.
See Note 1
Phil 446 3C 0.5
**Philosophy of History**
Consideration of various possible views about ultimate nature of history and historical knowledge. Offered in sequence with Hist 466.
*Prereq: One full course equivalent in Philosophy, or consent of instructor*

Phil 455 3C 1.0
**Metaphysics**
Theories of reality, historical and contemporary, with emphasis on metaphysical problems in the light of recent studies.
*Prereq: Two full courses (or equivalent) in Philosophy.*

Phil 465 3C 1.0
**Existential Philosophy**
An in-depth study of the thought of a major existentialist figure such as Kierkegaard, Unamuno, Nietzsche, Heidegger, Sartre, Camus, Marcel, Jaspers, Ortega y Gasset.
*Prereq: Consent of instructor*

Phil 470 3C 1.0
**Phenomenology**
A critical examination of the issues and methods of phenomenology, including the attempt to understand the uses and ramifications of phenomenological methods through the working out of a particular analyses. The basic writings of phenomenologists such as Husserl and Merleau-Ponty will be used.
*Prereq: One full or two half courses in Philosophy, or consent of instructor*

Phil 471-473 3C 0.5
**Problems**
One or more half courses will be offered at different times, as announced by the Department.
*Prereq: Consent of instructor. See Note 1*

Phil 480-489 3C 0.5
**Advanced Studies in the History of Philosophy**
Various half courses dealing with a particular philosopher, a selected work or period; one or more of these will be offered each year as announced by the Department.
*Prereq: Consent of instructor. See Note 1*

Phil 498(a-b) F,W,S R 0.5
**Directed Reading in Special Areas**
*Prereq: Consent of instructor*

Phil 499 Y T 1.0
**Tutorial and Honours Essay**
Students wishing to enrol in 499 should consult the Department.

The following courses are administered by St. Jerome’s College

Phil 100J Y 3C 1.0
**Introduction to Philosophy**
A broad selection of the main problems in philosophy will be considered. For example: how can we know whether anything is right or wrong? How can we know about things we cannot directly observe. Can we know whether there is a God? Is mind in any sense distinct from matter?

Phil 120J F 3C 0.5
**Philosophy of Life and Death**
A study of what some of the great philosophers have said about the meaning of life and death and the transition from life to death. Students are urged to raise questions and help direct discussion.
*Offered in the evening.*

Phil 130J W 3C 0.5
**Philosophy of Discontent**
A study of what some of the great philosophers have said about the causes of discontent. Social disobedience and the extent to which ethical principles can be altered to accommodate changing conditions are possible topics for discussion.
*Offered in the evening.*

Phil 200J W 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 to argue with order, with facility and without error.

Phil 205J F,J 3C 0.5
**Philosophy of Nature**
An examination of ancient and modern accounts of the natural world. Problems include whether matter alone can account for change, whether there is more than one cause, whether nature operates by purpose or chance.

Phil 206J A 3C 0.5
**Philosophy of Science**
A philosophical study of the approaches to the material world used by contemporary physical science. The nature and the value of the experimental method in the writings of scientists past and present will be examined.

Phil 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?
Phil 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.
*Also offered in the evening.*

Phil 219J  W  3C  0.5
**Practical Ethics**
This course will discuss the applications of general ethics to more specific areas of human endeavour. Among the topics discussed will be abortion, contraception, sex, obscenity, violence, drugs, egoism, dishonesty, and various forms of human exploitation.
*Also offered in the evening.*

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 237J  Ethics and Society
*Not offered in 1979-80.*

Phil 260J  Issues in Higher Education
*Not offered in 1979-80.*

Phil 300J  F  3C  0.5
**The Western Philosophical Tradition (to 1600)**
An intensive overview of the major recurring themes in Western intellectual history from both an historical and a philosophical viewpoint.
*Prereq: Second year standing.*

Phil 301J  W  3C  0.5
**The Western Philosophical Tradition (1600 – Present)**
A continuation of 300J. Descartes to Existentialism.
*Prereq: Second year standing*  

Phil 333J  Contemporary Philosophical Problems in Art
*Not offered in 1979-80.*

Phil 396J-397J  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*  

Phil 399J  Y  1.0
**Tutorial**
Students wishing to enroll in 399J should consult the College Department.

Phil 450J  Y  3C  1.0
**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 496J-497J  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*  

Phil 499J  Y  1.0
**Tutorial and Honours Essay**
Students wishing to enrol in 499J should consult the College Department.
Course Descriptions

Physics

Research Assistant Professor
G. L. H. Harris, BA (Mount Holyoke), MA (Wesleyan), PhD (Toronto) (part-time)

Adjunct Professors
W. E. Harris, BSc (Alberta), MSc, PhD (Toronto)
M. L. Klein, BSc, PhD (Bristol)
L. A. A. Read, BA, MSc (McMaster), PhD (Waterloo)
P. G. Sutherland, BSc (McGill), MS, PhD (Illinois)

Faculty members holding cross appointments as shown:
1 Department of Biology
2 Department of Chemistry
3 Department of Applied Math
4 National Research Council
5 Wilfrid Laurier University
6 McMaster University

Course Descriptions

Note 1
Details of the undergraduate programmes offered by the Faculty of Science are to be found in Chapter 13.

Note 2
Prerequisites are given as a guide to the student and may be waived with the consent of the instructor.

Physics

Phys 001 T 0.0

Pre-University Physics

This course covers the topics in Ontario Year 3 to 5 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.

Phys 010 F.W.S 1C 0

Physics Seminar

This seminar brings together Honours Physics (including Co-op students) in Years 2, 3, and 4, to receive information concerning the activities of the Physics Department and to hear invited speakers.

Phys 011 F 4C.2T 0.5

Mechanics

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. A course for Kinesiology students.  
Lab alternate weeks, optional tut.

**Note**  
Normally students who have completed Ontario Year 5 Phys should select Phys 104 instead of 103.

Phys 104  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. A course for Kinesiology students.  
Prereq: Ontario Year 5 Phys. Lab alternate weeks, optional tut.

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. A course for Kinesiology students.  
Prereq: Phys 103 or 104. Lab alternate weeks, optional tut.

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.  
Prereq: Ontario Year 5 Math-Functions and Relations, and Calculus. Science students must take 111L with this course.

Phys 111L  F  3L  0.25  
**Physics For The Life Sciences 1 Laboratory**  
For students taking Phys 111. Lab alternate weeks.

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.

Phys 112L  W  3L  0.25  
**Physics For The Life Sciences 2 Laboratory**  
For students taking Phys 112. Lab alternate weeks.

Phys 121  F  3C,1T  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.  
Prereq: Ontario Year 5 Math-Functions and Relations, and Calculus. Ontario Year 5 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,1T  0.5  
**Introductory Physics 2**  
This course is a continuation of Phys 121; includes rotational kinematics and dynamics, conservation of angular momentum, oscillating systems, gravitation, electrical currents and resistive circuits, capacitative and inductive circuits, alternating currents and resonant circuits.  
Prereq: Phys 121. Science students must take 122L with this course.

Phys 122L  W,S  3L  0.25  
**Introductory Physics 2 Laboratory**  
For students taking Phys 122. Lab alternate weeks.

Phys 162  F  3C,1T  0.5  
**Enriched Introductory Physics 1**  
This is an enriched version of Phys 121; includes the topics listed in the description of Phys 121 plus enrichment topics, e.g. Taylor series, numerical methods for solving differential equations and programming the Physics Nova computer.  
Prereq: At least 75% average in Ontario Year 5 Phys, Math-Functions and Relations, and Calculus. Science students must take 162L with this course.

Phys 162L  F  3L  0.25  
**Enriched Introductory Physics 1 Laboratory**  
For students taking Phys 162. Lab alternate weeks.

Phys 163  W,S  3C,1T  0.5  
**Enriched Introductory Physics 2**  
This course is a continuation of Phys 162; includes topics listed in the description of Phys 122 plus enrichment topics, e.g. Fourier series, complex exponentials.  
Prereq: Phys 162. Science students must take 163L with this course.
**Course Descriptions**

**Physics**

**Phys 163L** W 3L 0.25

**Enriched Introductory Physics 2 Laboratory**

For students taking Phys 163. 

*Lab alternate weeks.*

**Phys 222 F 3C 0.5**

**Electricity and Magnetism 1**

Coulomb’s law, electric field, Gauss’ law, potential, capacitance, properties of dielectrics, current, resistance, electromagnetic force, D.C. circuits and instruments. 

*Prereq: First year phys and calculus. Not for Hons. Phys majors must take 222L with this course.*

**Phys 222L F 3L 0.25**

**Electricity and Magnetism 1 Laboratory**

For students taking Phys 222. 

*Lab alternate weeks.*

**Phys 223 W,S 3C 0.5**

**Electricity and Magnetism 2**

Magnetic fields, induced electromotive forces, magnetic properties of matter, alternating currents, electromagnetic waves. 

*Prereq: Phys 222. Not for Hons. Phys majors must take 223L with this course.*

**Phys 223L W,S 3L 0.25**

**Electricity and Magnetism 2 Laboratory**

For students taking Phys 223. 

*Lab alternate weeks.*

**Phys 226 F 2C 0.5**

**Optics 1**

Reflection and refraction at plane and curved surfaces, thin and thick lenses, optical instruments. 

*Prereq: First year phys and calculus. Not for Hons. Phys majors must take 226L with this course.*

**Phys 226L F 3L 0.25**

**Optics 1 Laboratory**

For students taking Phys 226. 

*Lab alternate weeks.*

**Phys 227 W 2C 0.5**

**Optics 2**

The wave nature of light, interference, diffraction, slits and gratings, resolution, polarization, photometry, colour. 

*Prereq: Phys 226. Not for Hons. Phys majors must take 227L with this course.*

**Phys 227L W 3L 0.25**

**Optics 2 Laboratory**

For students taking Phys 227. 

*Lab alternate weeks.*

**Phys 224 F,W,S 3C 0.5**

**Electricity and Magnetism**

Magnetic fields, electromagnetic induction. A.C. circuits, electrical measurements, diodes, transistors. 

*Prereq: First year phys and calculus. This course is primarily intended for Hons. Chem students.*

**Phys 243L F,W,S 3L 0.25**

**Electricity and Magnetism Laboratory**

For students taking Phys 243. 

*Lab alternate weeks.*

**Phys 244A F 2C 0.5**

**Quantum Physics 1**

Electronic charge, special relativity, particle accelerators, black body radiation and Planck’s law, photoelectric effect. Bohr atom, wave equation, eigenfunctions and eigenvalues, wave properties of light, x-ray production and properties, Compton effect, de Broglie’s hypothesis, Heisenberg’s uncertainty principle. 

*(Term A)* 

*Prereq: A first year phys course and Math 113 or equivalent.*

**Phys 244B W 2C 0.5**

**Quantum Physics 2**

Schrödinger equation, wave functions, potential steps barriers and wells, transmission and reflection probabilities, tunnel effect, Hydrogen atom, Zeeman effect, selection rules, electron spin and the Pauli exclusion principle, relativistic Doppler effect, elementary statistical mechanics, basic crystallography. 

*(Term B)* 

*Prereq: Phys 244A or equivalent.*

**Phys 246 W 3C,1T 0.5**

**Physical Optics**


*Prereq: First year phys and calculus. Coreq: Phys 246L. This course is primarily intended for students registered in the Optom programme.*

**Phys 246L W 3L 0.25**

**Physical Optics Laboratory**

For students taking Phys 246. 

*Lab alternate weeks.*
Phys 250  F  3C  0.5
The Solar System
An introduction to the astronomy and astrophysics of the solar system for students with a background in (elementary) University Physics and Mathematics.
Prereq: First year Phys and Math.

Phys 251  W,S  3C  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.
Prereq: First year Phys and Math.

Phys 253  W,S  3C  0.5
Electricity and Magnetism
An introductory course in electricity and magnetism; includes Coulomb's Law, electric fields, Gauss' Law, electric potential, capacitance and dielectrics, magnetic forces and fields, inductance, magnetization, Maxwell's equations, electromagnetic waves.
Prereq: First year phys and calculus, Math 216. Physics majors must take 253L with this course. Recommended for students in Honours programmes. This course forms a basis for the understanding of most of today's electronic and electrical technology.

Phys 253L  W,S  3L  0.25
Electricity and Magnetism Laboratory
For students taking Phys 253. Lab alternate weeks.

Phys 254  F  3C  0.5
Thermal Physics and Properties of Matter
An introductory course in properties of matter, kinetic theory and heat; includes elasticity, fluid mechanics, viscosity, diffusion, kinetic theory of gases, transport properties, temperature and heat, thermodynamics, heat engines.
Prereq: First year phys and calculus. Recommended for students in Honours programmes.

Phys 255  W,S  3C  0.5
Quantum Physics
Background to quantum physics: special relativity, Bohr atom, wave-particle properties, uncertainty and wave packets. Introduction to quantum mechanics: equation for travelling wave, Schrödinger equation, solutions with potentials, correspondence principle, brief description of transitions and radiation processes.
Prereq: First year phys and calculus. Recommended for students in Honours programmes.

Phys 256  F  3C  0.5
Wave Motion and Optics
An introductory course in wave motion and optics; includes wave functions, the wave equation and wave speeds, superposition, energy density, standing waves, Fourier analysis, modulation and detection, Doppler shift, interference, diffraction, resolution of optical instruments, polarization.
Prereq: First year phys and calculus. Physics majors must take 256L with this course. Recommended for students in Honours programmes.

Phys 256L  F  3L  0.25
Optics Laboratory
For students taking Phys 256. Lab alternate weeks.

Phys 258  F  3L  0.25
Geometrical Optics
Reflection and refraction at plane and curved surfaces using the matrix method. Thin and thick lenses. Optical instruments.
Prereq: First year phys and calculus. An 18 hour lab. and lecture course to complement Phys 256. Recommended for students in Honours programmes.

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 phys 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 270  F  3L  0.25
Laboratory
Further experiments in optics and properties of matter, for students taking Phys 256L.
Lab alternate weeks.

Phys 271  W,S  3L  0.25
Laboratory
Further experiments in electricity, magnetism and properties of matter, for students taking Phys 253L.
Course Descriptions

Physics

Phys 301 F 3C 0.5
Physical Techniques for Biologists 1
Visible, UV, dark field, phase, interference, polarizing and fluorescence microscopy; electron microscopy; visible and UV spectroscopy; polarography; pH and ion electrodes; osmometers; densitometers; radioactive tracers and counters; introductory electronics; data analysis.
Prereq: First year phys. Physics students may not take this course for credit.

Phys 302 W 3C 0.5
Physical Techniques for Biologists 2
Infrared, Raman and fluorescence spectroscopy; nuclear magnetic and electron paramagnetic resonance spectroscopy; optical rotary dispersion and circular dichroism; X-ray diffraction; chromatography and electrophoresis; differential scanning calorimetry; ultra centrifugation; flame photometry; X-ray and atomic absorption spectroscopy; cell counting, cytofluorometry and cell viability.
Prereq: First year physics. Physics students may not take this course for credit.

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.
Recommended for students in General programmes.

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 programmes.

Phys 350 F 3C 0.5
Astrophysics 1
Prereq: None, however familiarity with the contents of Phys 250-251 will be assumed. For third and fourth year students.

Phys 351 W,S 3C 0.5
Astrophysics 2
Prereq: None, however, familiarity with the contents of Phys 250-251 will be assumed. For third and fourth year students.

Note
Phys 450, Phys 451, are also open to third and fourth year students. Phys 350 alternates with Phys 450 and Phys 351 alternates with Phys 451.

Phys 352 F,S 3C 0.5
Electronics 1
A brief introduction to modern electronics including a discussion of semiconductors and solid state components. Basic electronic circuits including power supplies and amplifiers.
Prereq: Phys 122 or 243. Coreq: Phys 352L

Phys 352L F,S 3L 0.25
Electronics 1 Laboratory
For students taking Phys 352.
Lab alternate weeks, given in the same terms as Phys 352.

Phys 353 W 3C 0.5
Electronics 2
A continuation of the study of electronic circuits. Introduction to simple digital circuits. Commonly used analogue and digital instruments
Prereq: Phys 352. Coreq: Phys 353L.

Phys 353L W 3L 0.25
Electronics 2 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-dimension potentials, hydrogen atoms, angular momentum and spin, molecular vibrations and rotations, many electron atoms, radiation processes.
Prereq: Phys 255.

Phys 355 W 3C 0.5
Nuclear and Particle Physics
Nuclear structure, interactions of nuclear radiations with matter, radioactive decay, nuclear reactions, nuclear force, elementary particles.
Prereq: Phys 255.
Course Descriptions

Physics

Phys 358  F,S  3C  0.5  
**Thermodynamics**
Thermodynamic systems, equation of state, the laws of thermodynamics with applications. Change of phase.  
*Prereq:* Math 213 and a first year physics course.

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.  
18 hours of experiments

Phys 360B  W  3L  0.25  
**Intermediate Laboratory**
Continuation of 360A.  
18 hours of experiments

Phys 362  F,S  3C  0.5  
**Classical Mechanics 1**
*Prereq:* First year physics, Math 113, 213 and 216. This course is primarily intended for Hons. Phys students.

Phys 363  W  3C  0.5  
**Classical Mechanics 2**
Statics, translation and fixed-axis rotation of a rigid body. Moving frames of reference, gravitation.  
Lagrange's equations.  
*Prereq:* Phys 362. This course is primarily intended for Hons. Phys students.

Phys 364  F,S  3C  0.5  
**Mathematical Physics 1**
Vector and tensor analysis with applications.  
*Prereq:* Math 213 and 216. This course is primarily intended for Hons. Phys students.

Phys 365  W  3C  0.5  
**Mathematical Physics 2**
*Prereq:* Math 213 and 216. This course is primarily intended for Hons. Phys students.

Phys 368  F  2C  0.5  
**Geophysics 1**
*Prereq:* First year physics and calculus.

Phys 369  W  2C  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. (Identical to Earth 369).  
*Prereq:* First year physics and calculus

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 380  F  3C  0.5  
**Molecular Biophysics**
Macromolecular structure and function, weak interactions, DNA replication, protein synthesis, energy production, photosynthesis, control of intracellular processes, structure of viruses, physical techniques.

Phys 381  W  3C  0.5  
**Cell Biophysics**
Structure and function of cellular membranes and organelles, membrane potentials and ion transport, nerve conduction, muscle contraction, vision and interaction of light with cells intercellular communication, growth control.

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 433  Y  6L  1.0  
**Experimental Research Project**

An experimental research project. This course is designed for students in the Honours Physics Programme and in the Co-operative Applied Physics programme. Students in the regular Hons Phys programme must take either Phys 433 or Phys 437. Although students in the Co-operative Applied Phys (Hons) programme are recommended to take one of these courses, enrolment may be limited.

Phys 434A  F  3C  0.5  
**Introductory Quantum Mechanics**


Phys 434B  W  3C  0.5  
**Quantum Mechanics**


Note

Phys 434B is strongly recommended for students intending to do graduate work.

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: Phys 255

Phys 437A  F,W  3R  0.5

**Theoretical Physics Project**

Selected subjects for advanced study by theoretically inclined students, topics in relativistic, quantum, and statistical physics. Fall term enrolment will be limited. Students in the regular Hons Phys programme must take either Phys 437A or Phys 433. Although students in the Co-operative Applied Phys (Hons) programme are recommended to take one of these courses, enrolment may be limited.

Phys 437B  W  3R  0.5

**Continued Theoretical Physics Project**

A continuation and extension of the project initiated in Phys 437A. Available only to those students who have satisfactorily completed that portion of the project contained in Phys 437A in the immediately preceding term.

Note

Students intending to take both Phys 437A and 437B must register for both courses, and have their registration approved by the Theoretical Physics Project co-ordinator, at the start of the Fall term.

Phys 441  Y  3C  1.0

**Electromagnetic Theory**


Phys 442  W  3C  0.5

**Structure of Solids**

A survey with emphasis on the physical properties and behaviour of metals and alloys. Elastic and plastic deformations of crystals. Solidification, structure of alloys, free energy of alloy systems, equilibrium diagrams, diffusion, solid state phase transformations. Prereq: Phys 435

Phys 443  F  3C  0.5

**Continuum Mechanics**


Phys 444  W  3C  0.5

**Nuclear Physics**

Elements of nuclear structures and systematics. Alpha emission, beta decay, gamma emission, two-body systems and nuclear forces, nuclear reactions. Neutron physics. Sub-nuclear particles. Prereq: Phys 355
Phys 445  F  3C  0.5  
**Modern Optics**  
*Prereq: Phys 256, Phys 354*

Phys 449  W,S  3C  0.5  
**Radio Astronomy**  
Radio telescopes. Radio sources including the sun. H II regions, H I regions. The galactic centre, pulsars, quasars, other extragalactic sources, cosmological implications.  
*Prereq: Phys 223 and Phys 250-251*

Phys 450  F  3C  0.5  
**Astrophysics 3**  
The physical nature of planetary (and satellite) surfaces, atmospheres and interiors. Asteroids, meteorites and comets. The interplanetary medium (solar wind). Solar interactions with the interplanetary medium and earth's magnetosphere.  
*Prereq: none, however, familiarity with the contents of Phys 250-251 will be assumed.*

Phys 451  F  3C  0.5  
**Astrophysics 4**  
The structure of stellar interiors, nuclear reactions and energy sources in the stars of the main sequence, early evolution of stars from the main sequence, lifetimes of the stars.  
*Prereq: None, however, familiarity with the contents of Phys 250-251 will be assumed.*

**Note**  
Phys 350, Phys 351 are also open to third and fourth year students. Phys 350 and Phys 351 are offered in alternate years to Phys 449 and Phys 451.

Phys 452  F  2C,3L  0.5  
**Electronics 3**  
This course is meant to be of practical use to the experimentalist. Fundamental and advanced concepts of digital systems presented in terms of modern techniques. A brief treatment of microprocessors and minicomputers.  
*Prereq: Phys 352-353.*

Phys 453  W  3C  0.5  
**Electronics 4**  
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.  
*Prereq: Phys 352-353*
Department of Political Science

Professor and Chairman of the Department
J. M. Wilson, BA, MA (Toronto)

Professors
I. L. Campbell, BA (Carleton), MSc (London) R
J. E. Kersell, BA, MA (Queen's), PhD (London)
(On leave 1979-80)
T. H. Qualter, BA (New Zealand), PhD (London)

Associate Professors
J. D. Fraser, BA (Cambridge), PhD (Leicester)
A. D. Nelson, AB, AM, PhD (Chicago)

Assistant Professors
T. J. Downey, BA (Waterloo), MA, PhD (W. Ont.)
J. J. Jorgensen, BA, MA (North Carolina), PhD (McGill)
A. Kapur, BA (Punjab), MA (George Washington), PhD (Carleton)
J. E. Surich, BA, MA (Waterloo)
R. J. Williams, BA, MA (McMaster), PhD (Toronto)
R. P. Woolstencroft, BA PhD (Alberta)

Lecturers
S. D. Burt, BA, MA (Waterloo)
W. B. Moul, BA, MA (Br. Col.)

Adjunct Professors
D. R. Gordon, BA (Queen's), MA (Toronto)
W. W. Johnston, BA (Memorial), LLB (Queen's)
W. J. Morrison, BA (W. Ont.), LLB (Osgoode)

Course Descriptions

Note
Extensive descriptions of the content of Political Science courses are available in the Department at the time of pre-registration.

P Sci 101 W 0.5
Introduction to Politics 1
An introduction to the nature of politics and to the conflict of modern political ideas. The course involves a common lecture series and tutorials led by faculty members.

Note
Political Science 102 consists of a series of courses dealing with different aspects of politics. Students should select the course which most closely corresponds to their interests.
PSci 102M  W  0.5  
Contemporary Issues in Canadian Public Policy  
An evaluation of various public policy responses to some contemporary Canadian social, cultural, economic, environmental, and political problems, as well as the process of policy-making.

PSci 214  0.5  
Quantitative Analysis  
An introduction to the use of quantitative methods in Political Science. Only a rudimentary understanding of mathematics is required. Open to Political Science majors.

PSci 225  F  0.5  
The History of Political Theory 1  
A survey of the principal ideas of Western political theorists from the earliest times to the seventeenth century.  
Prereq: Second year standing

PSci 226  W  0.5  
The History of Political Theory 2  
A survey of the principal ideas of Western political theorists since the seventeenth century.  
Prereq: Second year standing

PSci 253  F  0.5  
Comparative Communism 1  
An examination of the historical development of the communist international system, the causes of its diversity and doctrinal variety, with emphasis on common problems and the role of ruling parties, their objectives, performance, and strategy.  
Prereq: Second year standing.

PSci 254  W  0.5  
Comparative Communism 2  
This course will concentrate on contemporary issues in communist politics, examining selected ruling and non-ruling communist parties.  
Prereq: Political Science 253 or Consent of the instructor

PSci 260  Y  1.0  
Canadian Government and Politics  
An analysis of the structure and practices of the Canadian political system.  
Prereq: Second year standing

PSci 260A  F  0.5  
Canadian Government and Politics 1  
The first half of PSci 260, for students in co-operative programmes only.  
No prereq for students in the second year and above

PSci 260B  W  0.5  
Canadian Government and Politics 2  
The second half of PSci 260, for students in co-operative programmes only.  
Prereq: PSci 260A or consent of instructor

PSci 262  0.5  
Soviet Government and Politics  
A survey of the development of Soviet political structures with analysis of the relative influence of ideological goals on the one hand and social forces on the other.  
No prereq for students in the second year and above

PSci 264  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

PSci 268  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

PSci 271  F  0.5  
Political Behaviour 1  
An examination of the impact of behaviouralism upon the study of politics, focusing on the methodological assumptions and aspirations of behaviouralism.  
No prereq for students in the second year and above

PSci 272  W  0.5  
Political Behaviour 2  
An examination of the political attitudes and behaviour of men and women in different political systems.  
Prereq: PSci 271 or consent of instructor

PSci 281  F  0.5  
International Politics 1  
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

PSci 282  W  0.5  
International Politics 2  
This course studies the roots of foreign policy behaviour of selected western and non-western (particularly Asian) states.  
Prereq: PSci 281 or consent of instructor
Course Descriptions
Political Science

P Sci 291 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 0.5
**Aspects of Canadian Law**
A study of the way in which the law reflects and influences political ideas and attitudes in Canada in relation to a number of aspects of Canadian life. Taught by a member of the legal profession.
Prereq: P Sci 291 or consent of instructor

P Sci 293 0.5
**Political Journalism**
An account of the special factors affecting political reporting and commentary in the broadcast and print media, with a critical evaluation of contemporary practice in the field. Taught by a practising journalist.
No prereq for students in the second year and above

P Sci 311 0.5
**Methodology of Political Science: The Foundations**
A selective examination of seminal works which have contributed to our understanding of the methods appropriate to the study of politics. Not a survey course.
Prereq: Consent of the 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: Consent of the instructor

P Sci 321 0.5
**Marxist Theory**
An examination of the formation of Marx's method and of its significance for the proletariat.
No prereq for students in the third year and above

P Sci 322 0.5
**Marxism and Revolution After Marx**
A selective study of developments in Marxist theory and political movements after Marx.
Prereq: P Sci 321

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 325 0.5
**Radical Political Theory**
A discussion of non-marxian political ideas such as social gospel, populism, fascism and Fabian socialism, and their socio-economic roots and sources.
Prereq: Consent of the instructor

P Sci 327 0.5
**Political Science and Political Values**
An examination of the relationship of "values" to a proper science of politics.
Prereq: Consent of instructor
Alternates with P Sci 311

P Sci 331 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 260 or consent of instructor

P Sci 332 0.5
**Public Administration 2**
Analyses 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 341 0.5
**Provincial Politics**
A comparative analysis of the political systems of the Canadian provinces which explores the possibility that as many as ten political cultures exist in Canada.
Prereq: P Sci 260

P Sci 342 W 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 260 or 341 or consent of instructor

P Sci 343 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 one previous course in Political Science
Course Descriptions
Political Science

P Sci 344 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 350 Y 1.0
The Politics of the Developing Areas
An examination of selected topics in the politics of developing areas. Emphasis will be placed upon the theoretical and empirical adequacy of explanations of both macro and micro political and economic change in Asian, African and Latin American states.
No prereq for students in the third year and above

P Sci 350A F 0.5
The Politics of the Developing Areas 1
The first half of P Sci 350.
No prereq for students in the third year and above

P Sci 350B W 0.5
The Politics of the Developing Areas 2
The second half of P Sci 350.
No prereq for students in the third year and above

P Sci 351 0.5
Comparative Federal Systems
A comparative examination of federal systems, with an emphasis on the problems and processes of integration and disintegration.
Prereq: Consent of the instructor

P Sci 352 0.5
Comparative Legislative Systems
A comparison of the institutional and behavioural characteristics of legislatures in a comparative framework, with emphasis on Canada, the United States, Great Britain, and Australia.
Prereq: Consent of the instructor

P Sci 364 0.5
Politics in Italy
An examination of the social, economic, and ideological forces underlying contemporary politics in Italy.
Prereq: Consent of the instructor

P Sci 365 0.5
Studies in Soviet Politics
Selected topics in the theory and practice of Soviet politics, with some discussion of comparative Communist studies.
Prereq: P Sci 262

P Sci 371 0.5
Political Culture
An analysis of the development of the concept of political culture as an analytical tool.
Prereq: P Sci 271/272 or consent of instructor

P Sci 372 The Political System
Not offered 1979-80

P Sci 373 0.5
Political Parties
An examination of the relationship of political parties and party systems to the dynamics of social change taking into account the imperatives of survival and adaptation and the dilemma of principles versus power.
Prereq: At least one of P Sci 260, 262, 264, 268, 271 or 272

P Sci 374 0.5
Interest Group Politics
A study of interest group theory and comparative analysis of the internal politics of interest groups and their role in the political process.
Prereq: At least one of P Sci 260, 262, 264, 268, 271 or 272

P Sci 380 Y 1.0
World Politics
An examination of the structure or institutional arrangements of global society and their interrelationships with interstate war and the allocation of misery. A wide range of theories of international violence and imperialism will be considered.
Open only to students in the third year and above

P Sci 380A F 0.5
World Politics 1
The first half of P Sci 380.
Open only to students in the third year and above

P Sci 380B W 0.5
World Politics 2
The second half of P Sci 380.
Open only to students in the third year and above

P Sci 390-398 0.5 each
Special Studies
From time to time courses of special study may be added to the programme at the third year level. Students wishing to add such courses should consult the Department's Undergraduate Officer.

P Sci 424 Contemporary Socialist and Communist Thought
Not offered 1979-80

P Sci 425 English Political Theory of the Nineteenth Century
Not offered 1979-80
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 periods. For third year Political Science students, but open to others with prereq P Sci 221, 222, 323 or 324, or consent of instructor

P Sci 427 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 221, 222, 323 or 324

P Sci 428 0.5
State and Economic Life
An analytical and comparative study of the growth of government intervention in the economic process, and of the development of the welfare state. Prereq: Consent of the instructor

P Sci 431 Canadian Public Policy 1
Not offered 1979-80

P Sci 432 Canadian Public Policy 2
Not offered 1979-80

P Sci 434 Canadian Foreign Policy
Not offered 1979-80

P Sci 435 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: Consent of instructor

P Sci 442 0.5
Politics in Ontario
A critical examination of the distinctive elements of government and politics in the Province of Ontario. Prereq: P Sci 260 or 341 or consent of the instructor

P Sci 443 0.5
Politics in Western Canada
A critical examination of the distinctive elements of government and politics in the provinces of Manitoba, Saskatchewan, Alberta, and British Columbia. Prereq: P Sci 260 or 341 or consent of instructor. Alternates with P Sci 445

P Sci 445 0.5
Politics in the Atlantic Provinces

P Sci 451 0.5
Comparative Parliamentary Systems
An analytical comparison of parliamentary institutions and processes as they have developed in various political systems influenced by Britain. Prereq: P Sci 251 or consent of instructor

P Sci 461 0.5
Problems in Canadian Politics 1
A critical examination of various problems of Canadian politics, with an emphasis on political integration, federalism and political parties. Prereq: Consent of the instructor

P Sci 462 0.5
Problems in Canadian Politics 2
A senior research course on selected aspects of Canadian political life, with emphasis on the preparation of a major and original research paper. For fourth year Political Science students but open to others with prereq P Sci 461

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 472 0.5
Voting Behaviour
A comparative study of the motivations underlying electoral choice in Canada, Great Britain and the United States. Prereq: P Sci 214, 373 or consent of instructor

P Sci 475 F 0.5
Political Socialization
A study of the processes and agents of political socialization and their effect 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
Course Descriptions
Psychology

P Sci 481 0.5
Research Seminar on World Politics
An examination of "structural theories" of the modern world system with particular emphasis on the works of J. Galtung and his colleagues.
Prereq: P Sci 380 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 programme at the fourth year level. Students wishing to add such courses should consult the Department's Undergraduate Officer.

P Sci 499 Y 1.0
Senior Honours Essay
Students wishing to undertake a senior honours essay in their fourth year should consult the Department's Undergraduate Officer.

Department of Psychology

Associate Professor, Chairman of the Department
T. G. Waller, BS, MS (Southern Mississippi), PhD (Vanderbilt)

Professor, Associate Chairman Graduate Affairs
R. A. Steffy, BA (Albright), MA, PhD (Illinois)

Professor, Associate Chairman Undergraduate Affairs
P. M. Merikle, BA (Knox), MA, PhD (Virginia)

Professors
R. K. Danks, BA, MA, PhD (Toronto)
G. A. Barnard, BA, MA (Cambridge), PhD, DSc (London)
K. S. Bowens, BA, PhD (Illinois)
M. Breidenbaugh, BA (Wittenberg), PhD (Vienna)
M. P. Bryden, BS, MSc, PhD (McGill)
W. C. Corning, BA (Heidelberg), PhD (Rochester)
D. P. Crowne, BA (Antioch College), EdM (Rochester), PhD (Purdue)
J. A. Dyal, BA (Oklahoma), PhD (Illinois)
W. D. Fenz, BA (Southern Missionary), MA, BD (St. Andrew's), MSc (Hawaii), PhD (Massachusetts)
C. K. Knapper, BA (Sheffield), PhD (Sask)
H. M. Lefcourt, BA (Antioch), MA, PhD (Ohio State)
M. J. Lerner, BA, MA (Ohio State), PhD (New York)
D. Meichenbaum, AB (City College of New York), MA, PhD (Illinois)
S. Reinis, MD, CSc (Charles)
P. M. Rowe, BA (Toronto), MA (Dalhousie), PhD (McGill)
D. A. Sprott, BA, MA, PhD (Toronto) FSS
M. D. Vogel-Sprott, BA (McMaster), MA, PhD (Toronto)

Associate Professors
R. J. Alapack, BA (Scranton), MA, PhD (Duquesne)
D. M. Amoroso, BA, MA (Toronto), PhD (Waterloo)
J. M. Anglin, BA (Toronto), PhD (Harvard)
T. E. Cadell, BA (Br. Col.), MA (Massachusetts), PhD (Wisconsin)
J. A. Cheyne, BA (Wat Luth), MA, PhD (Waterloo)
J. M. Cornell, BA, MS, PhD (Washington)
G. A. Griffin, BA (Colgate), MA, PhD (Wisconsin)
Recipient of Distinguished Teacher Award
J. G. Holmes, BA, MA (Carleton), PhD (North Carolina)
G. E. MacKinnon, BA (Queen's), PhD (Johns Hopkins)
R. G. Marteniuk, BPE, MA (Alberta), EdD (California)
P. J. Naus, BA, PhD (Nijmegen)
J. E. Orlando, BA (W. Ont.), MA (Detroit), MA, PhD (Michigan)
H. Ross, BA (Toronto), PhD (North Carolina)
M. A. Ross, BA (Toronto), MA, PhD (North Carolina)
K. H. Rubin, BA (McGill), MA, PhD (Penn State)
R. D. Seim, BA (Queen's), PhD (Waterloo)
R. V. Thysell, BA (Montana), MA, PhD (Iowa)
D. L. Wahlsten, BS (Alma College), PhD (California, Irvine)
E. E. Ware, BA, MA (Richmond), PhD (Illinois)
M. P. Zanna, BA, PhD (Yale)
Assistant Professors
F. A. Allard*, BA, BPE, MA, PhD (Waterloo)
R. F. Asarnow, BS (Rutgers), MA, PhD (Wayne State)
P. E. Bowers, BA (Rosemont), MA, PhD (Illinois) (part-time)
N. Charness, BA (McGill), MS, PhD (Carnegie-Mellon)
D. B. Coulson, BA (Dartmouth), MS, PhD (Massachusetts)
R. H. Lahue*, BSc (Fordham), PhD (Waterloo)
T. J. Lottman*, BS, MA (Xavier), PhD (Loyola of Chicago)
J. A. Van Evra*, BA (Valparaiso), MA (Bowling Green), PhD (Michigan State)
D. M. Willows, BA (Manitoba), PhD (Waterloo)

Adjunct Professors
J. R. Amdur, BS (Portland State), MA, PhD (Denver)
D. S. Barnes, BA, MD (W. Ont.)
H. Best, BA (Toronto), MA, PhD (Waterloo)
B. S. Francis, BS (Ursinus), MA, PhD (Arizona)
J. J. Hartford, MD (Toronto)
E. S. Lucy, BA (Hobart)
P. L. Ritchie, BA (McGill), PhD (Duke)
G. Sumner-Smith, MRCVS, BVS (Liverpool), FR-CVS, MSc (Guelph)
G. Sherwood, BA (Cambridge), MA, MB, BChir (London)
J. L. Williams*, BA, MA (Alberta), PhD (Missouri)

Lecturer
J. Theis*, BA (W. Ont.), MA (Notre Dame)

Faculty members holding cross appointments as shown.
1Department of Sociology
2Department of Kinesiology
3Department of Statistics
4St. Jerome's College
5Counselling Services
6Environmental Studies
7Renison College

Course Descriptions

Psych 201 F,W,J 3C,1T 0.5
Statistical Methods in Psychology
An introduction to the logical and theoretical base for the application of statistical methods to the solution of problems in the social sciences. Consideration will be given to the descriptive statistics, to sampling statistics and to an introduction to inferential statistics.

Psych 202 W 3C,1T 0.5
Experimental Design
An examination of the effective use and interpretation of statistics in design and understanding of experiments in the social sciences. 
Prereq: Psych 201

Psych 203 F,W,S 3C 0.5
Learning and Motivation
This course is designed to introduce the student to theories in Learning and Motivation and to provide the student with an understanding of the experimental techniques in these areas.
Prereq: Psych 101

Psych 205 F,W 3C 0.5
Perceptual Processes
An examination of data and theory concerning perceptual processes. Topics will include the perception of form and space, perceptual learning and a consideration of the effect of personality variables in perception.
Prereq: Psych 101

Psych 207 F,W 3C 0.5
Cognitive Processes
An examination and evaluation of selected topics dealing with human learning, thinking, concept formation, memory and language.
Prereq: Psych 101

Psych 211 F,W,S,J 3C 0.5
Development Psychology
An examination of the process and factors of human development.
Prereq: Psych 101
Also offered at St. Jerome's College

Psych 212 F,W,S,J 3C 0.5
Educational Psychology
A consideration of the main variables affecting learning in the classroom with special focus upon the conditions essential to efficient learning.
Prereq: Psych 101
Also offered at St. Jerome's College
Psych 214  F,W  3C  0.5
**Psychology of Adolescence**
A study of the psychological processes occurring in the second decade of human development. Consideration is given to such areas as intellectual development, emotional and social growth, and identity formation. Current concepts, issues, and research are stressed.
*Prereq: Psych 211*
*Also offered at St. Jerome's College*

Psych 218  F,W  3C  0.5
**Aging, Dying and Death**
An examination of both the psychological aspects of the aging process and the traditional and recent literature relating to various views as to the part played by the reality of death in the life of man. Recent attempts at therapy with dying individuals are reviewed and evaluated.
*Prereq: Psych 101*
*Offered at St. Jerome's College*

Psych 231  F  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.
*Prereq: Psych 101*
*Offered at St. Jerome's College*

Psych 236  W  3C  0.5
**A Psychological Analysis of Human Sexuality**
This course will examine psychological and social psychological theories and empirical investigations of human sexuality.
*Prereq: Psych 101 or permission of instructor*
*Offered at St. Jerome's College*

Psych 253  F,W,S,J  3C  0.5
**Social Psychology**
An introduction to theories and research on people in their physical and social environment. Typically, topics such as conformity, persuasion, attraction, prejudice, communication, aggression, the psychology of freedom, justice and human exchange will be introduced.
*Prereq: Psych 101*
*Cross-listed as Psych 220R*

Psych 254  W  3C  0.5
**Interpersonal Relations**
A psychological analysis of social interaction. The development of interpersonal attraction from first impressions to long-term relationships. The roots of hostility, conflict and communication problems.
*Prereq: Psych 253*
*Cross-listed as Psych 221R*

Psych 258  W  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 of the course 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  F,W  3C  0.5
**Physiological Psychology**
The structure and function of the nervous system and their relation to behaviour.
*Prereq: Psych 101 or permission of instructor*

Psych 271  F,W  3C  0.5
**Animal Behaviour**
An in depth study of the behaviour of animals emphasizing both observational and experimental research.
*Prereq: Psych 101 or permission of instructor*

Psych 293  F,W  2C,2L  0.5
**Research in Learning and Motivation**
Open only to students in a Psychology Programme (Honours, Joint Honours, General or Minor Programmes).
*Prereq: Psych 201 and one of Psych 203 or 271*

Psych 295  F,W  2C,2L  0.5
**Research in Perceptual and Cognitive Processes**
Open only to students in a Psychology Programme (Honours, Joint Honours, General or Minor Programmes).
*Prereq: Psych 201 and one of Psych 206 or 207*

Psych 297  W  2C,2L  0.5
**Research in Biopsychology**
Open only to students in a Psychology Programme (Honours, Joint Honours, General or Minor Programmes).
*Prereq: Psych 201 and Psych 261*

Psych 301  F,W,A  3C,1T  0.5
**Tests and Measurement**
An introduction to the theory and use of psychological tests. Special emphasis is placed on the assessment of personality, intelligence, aptitudes and interests.
*Prereq: Psych 201*

Psych 305  **Sensory Processes**
Not offered 1979-80

Psych 307  **Cognitive Neurology**
Not offered 1979-80
*Cross listed as Kin 456 which is offered in 1979-80*
Psych 311  F,W  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  F,W,S  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 or Psych 212*

*Also offered at St. Jerome's College*

Psych 316  F  3C  0.5  
**Moral Development**

A consideration of psychological theory and research dealing with the nature and origin of moral development, developmental differences in moral judgment, and various approaches to teaching moral behaviour with its consequent effects on the individual.

*Prereq: Psych 211*

*Offered at St. Jerome's College*

Psych 317  F,W  3C  0.5  
**The Emotionally Disturbed Child**

A review of traditional concepts, current thoughts and major research on the psychopathology of childhood. Specific attention will be given to socialization processes and educational procedures.

*Prereq: Psych 211*

*Offered at St. Jerome's College*

Psych 321  Y  4P  1.0  
**Observation and Practicum Experience with Young Children**

Directed observation of and supervised experience with young children in group or home settings. Graded on a Credit-Fail basis.

*Prereq: Acceptance into the Early Childhood Education and Care Option*

Psych 331  W  3C  0.5  
**Individual Differences**

An analysis of individual and group differences in behaviour, with emphasis on studies of intelligence.

*Prereq: Psych 301*

Psych 333  F  3C  0.5  
**Industrial Psychology**

An introduction to the methods and problems in Industrial Psychology.

*Prereq: Psych 101*

Psych 334  F,W  3C  0.5  
**Theories of Counselling Psychology**

An introduction to the methods, theories and problems in Counselling Psychology.

*Prereq: Psych 101*

*Also offered at Renison College and St. Jerome's College*

Psych 339  F  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 programmes, labour relations, compensation systems.

*Prereq: Psych 333*

Psych 340  Community Psychology

Not offered 1979-80

Psych 341  F  3C  0.5  
**Psychology of Early Childhood Education**

An introduction to the field of early childhood education. Topics to be considered include: (1) historical review of the area; (2) application of psychological theory to early childhood education; (3) the disadvantaged child and head start.

*Prereq: Psych 211*

Psych 350  Y  3C  1.0  
**Group and Individual Counselling**

Facilitative human relations within the context of education, guidance and interpersonal exchanges are treated in terms of current psychological theories and research. The demonstration and development of these concepts are aided by personal participation, observation and taped sessions.

*Prereq: Psych 355, 357, and 334 or suitable alternative and permission of instructor*

*Offered at St. Jerome's College*

Psych 353  W  3C  0.5  
**Aggression and Social Conflict**

This course will examine the genetic, physiological, and social causes of aggression, with the emphasis on social-psychological causes.

*Prereq: Psych 253*

Psych 354  W  3C  0.5  
**Interpersonal Processes in Critical Situations**

The course will examine reactions to other people's misfortunes such as serious physical and mental illness, natural disaster, poverty and discrimination. The focus will be on the understanding of the processes which occur within the observer and how these processes are reflected in interpersonal behaviour.

*Prereq: Psych 253*
Psych 355  F,W  3C  0.5
**Personality Theory**
An examination and evaluation of some of the outstanding theories of personality.
*Prereq: Psych 101*
*Cross-listed as Psych 322R*

Psych 357  F,W,S  3C  0.5
**Psychopathology**
The nature and origin of deviant behaviour.
*Prereq: Psych 101*
*Cross-listed as Psych 323R*
*Offered at St. Jerome's College*

Psych 359  W  3C  0.5
**Personality and Adjustment**
A study of theory and research related to the adaptation and to the function of personality in a variety of natural and artificial settings. The focus is on normal behaviour.
*Prereq: Psych 355*

Psych 363(A-E) - 366(A-E)  3C  0.5
**Special Subjects**
One or more half courses will be offered at different times as announced by the Department.
*Prereq: Consent of instructor*

Psych 370  W  3C  0.5
**Cross-Cultural Psychology**
An examination of the influence of cultural differences on perceptual-cognitive processes, personality characteristics, and psychopathology.
*Prereq: A minimum of two half courses in Psychology*

Psych 372  F  3C  0.5
**Environmental Psychology**
This course is intended to increase the awareness and understanding of the impact of the environment on human behaviour and experience. Topics to be discussed include: spacing, territoriality, crowding, subjective impressions of environments, and research paradigms.
*Prereq: Psych 101 and 201 or permission of instructor. Offered at St. Jerome's College*

Psych 393  F,W  2C,2L  0.5
**Research in Development Psychology**
Open only to students in a Psychology Programme (Honours, Joint Honours, General or Minor Programmes).
*Prereq: Psych 201 and 211*

Psych 395  F,W  2C,2L  0.5
**Research in Social Psychology**
Open only to students in a Psychology Programme (Honours, Joint Honours, General or Minor Programmes).
*Prereq: Psych 201 and 253*

Psych 397  F,W  2C,2L  0.5
**Research in Personality and Psychopathology**
Open only to students in a Psychology Programme (Honours, Joint Honours, General or Minor Programmes).
*Prereq: Psych 201 and one of Psych 355 or 357*

Psych 410  Y  3C  1.0
**History and Systems**
An examination of current theoretical approaches to psychological problems present in an historical context.

Psych 421  Y  4P  1.0
**Senior Practicum in Preschool Groups**
Laboratory experience for advanced students in guiding and supervising developmental experience for young children. Consideration of professional practical matters of organization and administration in early childhood education and care.
*Prereq: Psych 321*
Graded on a Credit-Fail basis.

**Seminars**

Psych 451  F  2S  0.5
**Senior Seminar in Learning**
Admission by consent of instructor

Psych 452  W  2S  0.5
**Senior Seminar in Perception**
Admission by consent of instructor

Psych 453  F,W  2S  0.5
**Senior Seminar in Development Psychology**
Admission by consent of instructor
*Also offered at St. Jerome's College*

Psych 454  W  2S  0.5
**Senior Seminar in Educational Psychology**
Admission by consent of instructor

Psych 455  F  2S  0.5
**Senior Seminar in Social Psychology**
Admission by consent of instructor

Psych 456  W  2S  0.5
**Senior Seminar in Personality**
Admission by consent of instructor

Psych 457  F,W  2S  0.5
**Senior Seminar in Clinical Psychology**
Admission by consent of instructor
*Also offered at St. Jerome's College*

Psych 458  F  2S  0.5
**Senior Seminar in Cognitive Processes**
Admission by consent of instructor
Psych 459  Senior Seminar in Motivation  
*Not offered 1979-80*

Psych 461  W  2C  0.5  
**Senior Seminar in Physiological Psychology**  
*Admission by consent of instructor*

Psych 462  F  2S  0.5  
**Senior Seminar in Animal Behaviour**  
*Admission by consent of instructor*

Psych 463  2S  0.5  
**Senior Seminar in Special Topics**  
*Admission by consent of instructor*

Psych 464  2S  0.5  
**Senior Seminar in Special Topics**  
*Admission by consent of instructor*

Psych 465  2S  0.5  
**Senior Seminar in Special Topics**  
*Admission by consent of instructor*

Psych 466  2S  0.5  
**Senior Seminar in Special Topics**  
*Admission by consent of instructor*

Psych 480  Y.M  3R  1.0  
**Directed Studies in Special Topics**  
For the student who desires to pursue a particular topic in depth through independent experimental research and/or extensive reading. A faculty member must approve a student’s project prior to registration for this course. Open to exceptional students with permission of the instructor and the Department.  
*Also offered at St. Jerome’s College*

Psych 498  Y.M  R  1.0  
**Senior Honours Essay – Review Paper**  
Each student will work under the direction of a member of the department on a critical integrative review of an issue in research literature. The result of this review will be presented in the form of a thesis, which will be critically examined by members of the department.  
*Also offered at St. Jerome’s College*

Psych 499  Y.M  R  1.0  
**Senior Honours Essay – Experimental Study**  
Each student will work under the direction of a member of the department on an experimental study. The result of this investigation will be presented in the form of a thesis, which will be critically examined by members of the department.  
*Also offered at St. Jerome’s College*

The following courses are administered by Renison College. Since these courses are intended primarily for students in the Social Development programme, students planning a General or Honours Psychology programme must consult their faculty advisor concerning Psychology major credit for these courses.

Psych 120R/121R  F.W  3C.3C  0.5.0.5  
**Introductory Psychology**

Psych 220R  F  3C  0.5  
**Social Psychology**

Psych 221R  W  3C  0.5  
**Interpersonal Interaction**

Psych 322R  F  3C  0.5  
**Personality (Personality Theory)**

Psych 323R  W  3C  0.5  
**Abnormal Psychology (Psychopathology)**

Psych 367R-369R  
**Special Topics in Psychology**

Psych 369R  W  3C  0.5  
**Advanced Topics in Counselling Psychology**

Psych 370R  
**Cross-Cultural Psychology**  
*Not offered in 1979-80*

Psych 398R/399R  S.F.W/S,F,W  R  0.5/0.5  
**Independent Study**  
(Open to senior Social Development Studies majors only)
Department of Recreation

Associate Professor, Chairman of the Department
D. Ng., BA (Lingnan), MA (Carver), MS, ReD (Indiana)

Dean, Faculty of Human Kinetics and Leisure Studies
G. S. Kenyon, BPE (Br. Col.), MS (Indiana),
PhD (New York)

Associate Professor and Associate Chairman,
Undergraduate Affairs
J. Levy\(^2\), BA (Wat Luth), BPE (Waterloo),
MSW (Wat Luth), PhD (Waterloo)

Assistant Professor, Associate Chairman,
Graduate Affairs
S. L. Smith, BA (Wright State), MA (Ohio State),
PhD (Texas A & M)

Professor
E. M. Avedon\(^3\), BBS (William and Mary),
MA, EdD (Columbia)

Associate Professor
J. Zuzanek\(^2\), CSc (Prague Institute of Sociology),
PhD (Charles University, Prague)

Assistant Professors
K. R. Balmer, BA (Toronto), PhD (Liverpool)
K. S. Brown\(^4\), PhD (Waterloo)
E. G. Carls, BS, MS, PhD (Illinois)
L. Heywood, BA (North Dakota), MA (Florida State)
PhD (Wisconsin)
M. L. Hutchinson, BA (Queen's), MS (Dalhousie),
EdD (Boston)
R. Johnson\(^1\), BA, MA (Windsor), PhD (Minnesota)
W. B. Kinney, BSE (Suni Courtland), MS (Illinois),
PhD (New York)
R. C. Mannell, BA (McMaster), MPE, PhD (Windsor)
G. Nogradi, BSc (Waterloo), MS, PhD (Oregon)

Lecturers
R. D. Graham, BA, MA (W. Ont.)

Faculty member holds cross appointment as shown:
1Geography
2Sociology
3Urban and Regional Planning
4Statistics

Course Descriptions

Rec 101 F,W 2C,1T 0.5
Introduction to Leisure Services
An introduction to various leisure service agencies and
the services provided. Field trips to municipalities,
specialized institutions, and voluntary agencies.
Prereq: Recreation students only

Rec 200 F,S 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 F,S 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 204 S 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 F,W 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 F,W 2C,2L 0.5
Recreation Programme Development
A study of the scope of community recreation
programmes and the factors involved in programme
leadership. 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 F,W 3C 0.5
Introduction to Outdoor Recreation
A study of outdoor education and recreation in relation
to contemporary lifestyles, natural and human resource
systems. Includes the examination of outdoor settings
as an integral part of an education – outdoor recreation
continuum. Includes the role of selected governmental
and non-governmental bodies.
Rec 241 S 3C 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 F,W 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 252 W,S 3C 0.5
**Recreation and Mental Retardation**
An analysis of the motoric and psycho-social behavioral dimensions specific to the retarded with direct and obvious applicability to the planning, implementing and evaluating of recreational programmes.
*Prereq: Rec 250, Psych 242*

Rec 253 W 3C 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 250, permission of instructor*

Rec 254 W,S 3C 0.5
**Recreation and Mental Health**
A psycho-social analysis of the determinants and consequences of recreative behaviour as related to positive and negative mental health, discussing in detail, structure, semiotic factors and interaction patterns.
*Prereq: Rec 250*

Rec 270 F 3C 0.5
**Statistical Techniques Applied to Leisure Studies**
An introduction to descriptive and inferential statistics and the interpretation of data. A major consideration of the course is the use of statistics in the solution of problems in recreation and leisure.

Rec 300 W 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*

Rec 301 S 3C 0.5
**Sociology of Leisure (Soc 375)**
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: Two term courses in Sociology*

Rec 302 F 3C 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.
*Prereq: Rec 301*

Rec 303 F,S 3C 0.5
**Sport in Society (Kin 452)**
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*

Rec 306 S 3C 0.5
**Psychodynamics of Leisure Behaviour**
Examination of the psychodynamics of popular leisure experiences, e.g. sport, gambling, fashion, and the like, and their relationship to psychopathology. Examination of the use of leisure experience to resolve emotional conflict and cope with stress.
*Prereq: Rec 301, Psych 357*

Rec 307 W,S 3C 0.5
**Group Processes in Physical Activity (Kin 354)**
An examination of the social influences and group processes which occur within sport teams. Topics include conformity, the influence of onlookers, and co-actors, leadership, group structure, and cohesion.
*Prereq: 2 term courses in Psychology*

Rec 311 W 3C 0.5
**School Recreation**
An analysis of the relationship between recreation and education with particular emphasis on the sponsorship of community recreation programmes by education authorities including leisure education and co-curriculum activities.
*Prereq: Rec 210*

Rec 312 W 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 316 W 3C 0.5
Principles of Recreation Planning (Plan 344)
An exploration of alternative approaches to the planning of recreation opportunities in urban-centered regions. The demand for and supply of recreation opportunities; standards, models and systems; recreation planning policies and agencies; and selected recreation planning issues.
Prereq: Plan 100 or a full credit in Geography, or consent of instructor

Rec 320 S 2C,2L 0.5
Evaluation of Recreational Programmes
Evaluation procedures and techniques applicable to recreation programmes are examined in detail. Specification of objectives, development of practical recording procedures and experimental analysis are stressed. Students conduct field evaluations in local community agencies.
Prereq: Rec 270, 2 hrs. lab in community agencies

Rec 321-324 0.5
Selected Topics in Recreation
The study of particular topics pertaining to recreation. Course topics will be announced in advance, but will not be offered on a regular basis.
Prereq: Consent of instructor

Rec 331 F 2C,2L 0.5
Outdoor Education in Recreation
The present status of outdoor recreation in modern society; government functions and policies related to outdoor recreation services; the planning and administration of outdoor recreation activities. Current problems.
Prereq: Rec 230

Rec 332 S 3C 0.5
Theory and Practice in Outdoor Education
Emphasis on methods and techniques for the selection, development, and implementation of programmes and projects through the utilization of diverse and unique natural settings and environments.
Prereq: Rec 230, 241

Rec 334 F 3C 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 210, Rec 230 or equivalent

Rec 361 S 3C 0.5
Aging and Leisure
Social parameters of the aging process with particular reference to the Leisure Service Industry.
Prereq: Rec 301

Rec 370 F,W,S 0.5
Directed Study in Special Topics
For the student who desires to pursue a particular topic in depth through guided independent research and/or reading. A faculty member must approve a student's project prior to registration. May be repeated once in a subsequent term.
Prereq: Faculty approval

Rec 371 F,W 3C 0.5
Research Designs Applicable to Leisure Studies
An introduction to the methods and techniques of research as applied to leisure studies and services. General consideration will be given to the technical problems involved in various stages or research methodology with emphasis on the logic underlying the research process.
Prereq: Rec 270

Rec 400 F,W,S 3C 0.5
Seminar in Recreation and Leisure
An in depth analysis of the current major issues and trends.
Fourth year Departmental students only

Rec 402 Colloquium on Religion and Leisure
Not offered 1979-80

Rec 406 S 1.0
Comparative Recreational Systems
A study of multi-national recreation systems. Course meets on Campus and in the field in other countries. Full term study over a period of 6-8 weeks. Laboratory fee varies with field observation.

Rec 410 W 3C 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

Rec 432 F 3C 0.5
Interpretation
Concepts, philosophy and practices relative to understanding the use of the natural environment.
Prereq: Rec 332 or consent of the instructor

Rec 434 W 3C 0.5
Advanced Park Management
A study of policies, procedures, and practices relative to the management of natural resources. Emphasis is placed on a systems approach to management as it relates to park management at all levels of government.
Prereq: Rec 334
Rec 435  F  3C  0.5

Recreation Resource Policy
A study of policies (both existing and emerging), 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  W,S  3C  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 Programme.
Rec 470 includes an approved design and completion of the first segment of the paper.
Prereq: Rec 270, 371
Rec 471 requires the completion of the project begun in 470.

Rec 580  2C,2D  0.5

The Dynamics of Tourism
An examination of the behaviour factors which influence the tourist; the research methodologies employed to examine these factors; and the relationship between tourism and other aspects of leisure behaviour.
Prereq: Rec 302 or equivalent, and a course in statistics. Open to advanced undergraduate students and graduate students.
RS 104  W  3C  0.5  
**Introduction to 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.
*Offered at Conrad Grebel and St. Jerome’s College*

RS 105  Elementary Biblical Hebrew
*Not Offered 1979-80*

RS 106  Y  3C  1.0  
**New Testament Greek**
This course will consist of two parts:
  a) An introduction to Greek grammar with appropriate grammatical exercises and development of vocabulary.
  b) An exegetical study of the Greek text of the Synoptic Gospels, with Mark as the basis.
*Offered at St. Paul’s College*

RS 110  F,W,S  3C  0.5  
**Religions of Mankind 1**
An introduction to the religious traditions of the East: history, religious beliefs and practices of Hinduism, Buddhism, Confucianism, Taoism and Shinto.

RS 111  F,W  3C  0.5  
**Religions of Mankind 2**
Encounter with Judaism, Christianity and Islam: the characteristics and interaction of the three major religious traditions that have shaped the image of the Western World.

RS 130  F  3C  0.5  
**Introduction to Theology**
A study of the nature of the Christian faith with consideration of questions such as these: How do you speak of God in a secular age? What significance have the Bible and Church doctrines for history and faith? Who is Jesus? The cross and resurrection; the question of salvation.
*Offered at St. Paul’s and St. Jerome’s*

RS 131  W  3C  0.5  
**Introduction to Theology**
Further study of the Christian faith to include the questions and issues: What is freedom? Is there a Christian lifestyle? The new morality; man and nature; the Church: mission and worship; the future.
*Offered at St. Paul’s*

RS 160  F  3C  0.5  
**The Religious Quest: Men and Women in Search of God**
The great questions of religion and culture, Who am I? What are my roots? What is my destiny?, will be explored through the study of individual lives, e.g. Augustine, Gandhi, Michelangelo, Luther, in traditions East & West.
*Offered at Renison College*

RS 161  W  3C  0.5  
**The Religious Quest: Movement Towards the Kingdom.**
Questions of religion in society - What is the “perfect” society? How achieved? - are explored through the study of religious movements that aim at the transformation of the earth: Monasticism, Millennialism, the Social Gospel and Communal Groups.
*Offered at Renison College*

RS 200  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.

RS 203  Wisdom Literature in the Old Testament
*Not offered 1979-80*

RS 204  W  3C  0.5  
**Song and Poetry in Ancient Israel**
A selection of songs and psalms which were used in the worship of ancient Israel will be studied against the background of religious practices and poetry in the ancient Near East.
*Offered at Conrad Grebel College*

RS 205  S,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.
*Offered at Conrad Grebel College*

RS 206  F,S  2C,1D  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.
*Offered at Conrad Grebel College*
Course Descriptions
Religious Studies

RS 207 F 2C,1D 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.
Offered at St. Jerome's College

RS 209 The Apostle Paul: Life and Letters
Not offered 1979-80

RS 211 W 3C 0.5
Religion in Japan
An historical survey of Religion in Japan from ancient times to the present. The course will examine the development and inter-relationships of folk religion, Shinto, Buddhism, Confucianism, religious Taoism, Christianity, and the emergence of new religions.
Offered at St. Paul's College

RS 212 Ancient Near Eastern Religions
Not offered 1979-80

RS 213 F 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.

RS 214 F 2C,1T 0.5
Buddhism in India and South-East Asia
An historical survey of the essential doctrines and practices of Buddhism in India and South-East Asia, along with a study of representative texts that illustrate interpretations of the Buddha's teachings that proved to be so significant for the cultures of these areas.

RS 215A F 2C,1T 0.5
Religion in China 1
A study of the development of religious beliefs and practices in China from the Ancient Period through the Early Han Dynasty, and of the contributions of the philosophers of the Classical Period to Chinese spirituality.

RS 215B W 2C,1T 0.5
Religion in China 2
Beginning with the time of the Later Han, the course will deal primarily with the introduction of Buddhism into China and the subsequent interaction between the Indian form of this religion and the classical Chinese world-view.

RS 216A F 3C 0.5
Islam: "Religion Perfected"
The study of the religious experience of the Muslim community with an emphasis on pre-Islamic Arabia, Muhammad the Prophet, the Qur'an as the World of God, the Articles of Faith and the Pillars of Islam.

RS 216B Islamic Civilization
Not offered 1979-80

RS 217 F, S 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.

RS 218 Christianity
Not offered 1979-80

RS 220 F, S 2C,1D 0.5
Evangelical Christianity
A descriptive, historical and theological review of that wing of North American Christianity known as evangelicalism, fundamentalism, or revivalism.
Offered at Conrad Grebel College

RS 221 W 2C,1D 0.5
Religions of Waterloo County
A consideration of North American religion through the study of a variety of local religious groups, such as Mormons and Missionaries, Scientologists and Presbyterians, Amish and newly emergent religions.
Offered at Conrad Grebel College

RS 227-228 (Hist 235-236) F, W 3C 1.0
History of Christianity 1 and 2
The object of this course is to study the historical development of Christianity from its beginnings to the present, as well as the institutions and doctrines expressed in the major forms of Roman Catholicism, Eastern Orthodoxy and Protestantism.
Offered at Conrad Grebel College

RS 231A F 2C,1S 0.5
The Evolution of Christian Thought 1
An analysis of the major theological developments in the Christian traditions from the apostolic era to the Reformation. Major documents of the Greek and Latin patristic literature are analysed.
Offered at St. Paul's College

RS 231B The Evolution of Christian Thought 2
Not Offered 1979-80

RS 232A F 2C,1S 0.5
Christ and Contemporary Man
An examination of interpretations of Jesus in a secular and pluralistic world.
Offered at St. Jerome's College
RS 232B W 2C,1S 0.5
Christ and Contemporary Man
An examination of some historical-theological symbolic images of the Christ figure, current and past. Offered at St. Jerome's College

RS 233 F 2C,1S 0.5
Contemporary Atheism & Christian Faith 1
The sources of atheism in Western culture. The God of philosophical proof and the God of Christian faith. Christian responses to contributions to present day atheism made by Hegel, Feuerbach, Nietzsche, Marx and Lenin. Offered at St. Paul's College

RS 234 Contempary Atheism & Christian Faith 2
Not offered 1979-80

RS 235 F 2C,1D 0.5
Catholic Moral Consciousness: Theory and Practice
A study in moral theology of current social problems. Concrete possibilities for individual initiative toward needed social change will be stressed. Prereq: Second year standing or consent of instructor. Offered at St. Jerome's College

RS 236 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. Offered at St. Jerome's College

RS 238A The Ecumenical Movement
Not offered 1979-80

RS 238B The Ecumenical Movement
Not offered 1979-80

RS 253 History and Thought of Christian Pacifism 1
Not offered 1979-80

RS 254 History and Thought of Christian Pacifism 2
Not offered 1979-80

RS 255 F 3C 0.5
Christian Ethics
An introductory study of the relationship between Christian faith and moral decision as expressed in major ethical writings both historical and contemporary. Special reference will be made to such historical authors as Augustine, Aquinas, Luther and Calvin, and among more recent authors, Barth, Bonhoeffer, the Niebuhrs, Lehmann, Curran and Gustafson. Offered at St. Paul's College

RS 256 W 3C 0.5
Protestant Ethics
The study of Protestant ethical thinking. Thematic considerations such as Protestant views of human nature, the tension between freedom and law, principle vs. situation, love as an ethical norm and the individual and community, will be discussed. Offered at St. Paul's College

RS 260 W 3C 0.5
Issues in Science, Technology and Religion
An exploration of issues, themes and personalities in the encounter of modern science and religion. Questions such as the impact of technology, modern physics and the theory of evolution upon the religious traditions will be considered.

RS 262 Religion and Politics 1
Not offered 1979-80

RS 263 Religion and Politics 2
Not offered 1979-80

RS 264 F 2C,1D 0.5
Religion in Canada 1
An examination of religion in Canada with particular attention to topics such as the introduction of Christianity into Canada, Amerindian religion, religious life in colonial times, denominational differences and ecumenism, the impact of religion on social and political activity. Offered at Conrad Grebel College

RS 265 W 2C,1D 0.5
Religion in Canada 2
A continuation of the study of religion into the 20th Century, with special consideration of issues and motifs arising out of the Canadian experience, e.g. Social Gospel, immigration and nation building, ecumenism, the open society and transcendence, and the post-Christian era. Offered at Conrad Grebel College

RS 266 F 2C,1S 0.5
Religion and the Film 1
A theological approach to the study of film as a world-transforming phenomenon for man. An assessment of film's special characteristics as an art form capable of addressing man's quest for a significant existence. Consideration of a wide range of films and directors, with particular emphasis on Ingmar Bergman. Cross-listed as Fine 246(R) Film fee $5.00 Offered at Renison College
RELIGIOUS STUDIES

RS 267 W 2C.1S 0.5
Religion and the Film 2
An exploration of selected themes - death, evil, guilt, fate, alienation, love redemption - in the films of several of today's leading directors: Bunuel, Pasolini, Kurosawa, Fellini, Antonioni, Polanski.
Cross-listed as Fine 247 (R)
Film fee $5.00
Offered at Renison College

RS 268A Religious Perspectives in Contemporary Literature
Not offered 1979-80

RS 268B Religious Perspectives in Contemporary Canadian Literature
Not offered 1979-80

RS 269 W 3C 0.5
Myths & Symbols of the Religions of India
An approach to understanding symbols and perennial themes of Indian religion through a study of representative art, architecture and folk-literature of Hinduism, Indian Buddhism and Jainism.

RS 270 F 3C 0.5
Psychology of Religion
A study of theories of the psychological nature of religious experience, the sources of religious belief and the religious significance of psychological phenomena. Topics include faith, doubt, evangelism, conversion, faith healing, mysticism, drugs and religious experience, tongue-speaking.
Offered at St. Paul's College

RS 271 W 3C 0.5
Personality and Religion
A study of the psychology of personality in its relationship between personality and religious thought, experience and behaviour.
Offered at St. Paul's College

RS 275 W 2C.1D 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.
Offered at Conrad Grebel College

RS 280 W 3C 0.5
The Parables of Jesus
Detailed examination of the stories Jesus told, their form, method, message, and significance for religious thought, past and present.
Offered at Conrad Grebel College

RS 281 F 2C.1D 0.5
Theology of Worship and Sacrament
A study of the nature of Sacrament as an encounter between man and God in Christ. The mysterious, communal, symbolic and personalizing aspects of sacramentality will be discussed. The course will critically examine and evaluate the impact of social change, the secularization process and traditional forms on the sacramental life in the Roman Catholic experience.
Prereq: Second year standing or consent of instructor.
Offered at St. Jerome's College

RS 282 W 2C.1D 0.5
New Perspectives in Sacramental Theory
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 cultic signs in contemporary Roman Catholicism.
Prereq: Second year standing or consent of instructor.
Offered at St. Jerome's College

RS 291A-D Studies in the History of Religions
Not offered 1979-80

RS 298-299 0.5 each
Directed Reading in Special Subjects
May be taken with consent of department only.

RS 304 Selected Topics in Israelite Religion
Not offered 1979-80

RS 305 Intermediate New Testament Greek
Not offered 1979-80

RS 307A-D Selected Topics in Biblical Theology
Not offered in 1979-80

RS 308 The New Testament World
Not offered in 1979-80

RS 309 W 2C.1D 0.5
New Testament Themes
A comparative study of the distinctive ways in which New Testament writers view key issues in the early Church: e.g., freedom and authority, social responsibility, the role of law, relations with the Jewish religion, the person of Jesus. An attempt will be made to relate their views to issues facing Christianity today.
Prereq: RS 202, RS 104 or consent of the instructor
Offered at St. Jerome's College

RS 313 W 3C 0.5
Modern Religious Movements in India
A study of the development of Hinduism from medieval times to the present, with emphasis on new movements of religion and thought in the 19th and 20th centuries.
Prereq: RS 110, or 213 or consent of the instructor
Course Descriptions
Religious Studies

RS 314 Zen Buddhism
Not offered 1979-80

Jesus in Islam
A study of the treatment of Jesus in the Qur'an, the Hadith and later Muslim literature, with an analysis of the origins of Muslim Christology in conjunction with the development of Christological doctrine in Christianity.
Prereq: RS 216A and 218, or consent of instructor

RS 318 F 2C, 1S 0.5

RS 318 Jesus in Islam
A study of the treatment of Jesus in the Qur'an, the Hadith and later Muslim literature, with an analysis of the origins of Muslim Christology in conjunction with the development of Christological doctrine in Christianity.
Prereq: RS 216A and 218, or consent of instructor

RS 321 (Hist 347) F 3C 0.5
Radical Reformation 1
A study of spokesmen for radical reform of the Church including Andreas Carlstadt, Thomas Müntzer, Caspar Schwenckfeld, Sebastian Franck, Michael Servetus and others.
Offered at Conrad Grebel College

RS 322 (Hist 348) W 2C, 1S 0.5
Radical Reformation 2
A study of Anabaptism and its place in the history of the Christian Church and of the Reformation period.
Offered at Conrad Grebel College

RS 323 Medieval Church History from 312-1122
Not offered in 1979-80

RS 324 Medieval Church History from 1122-1449
Not offered in 1979-80

RS 325 The Orthodox Church
Not offered 1979-80

RS 326 F 3C 0.5
Anglicanism
This course surveys the development of Anglicanism, its origins, cultural involvements and expressions, its rituals, worship and distinctive thought.

RS 331A W 3C 0.5
The Church in the Modern World
A study of the recent transformations of the Roman Catholic Church through the events, movements, personalities, and historical realities of the past fifty years.
Prereq: RS 103/104 or 130/131 and a 200-level course in theology or history of Christianity
Offered at St. Jerome's College

RS 331B The Church in the Modern World
Not offered 1979-80

RS 334 Islamic Theology, Philosophy and Mysticism
Not offered 1979-80

RS 336A F 3C 0.5
Contemporary Theology 1
A study of: a) the sources of contemporary theology in 18th and 19th century thought, with particular reference to Kant, Schleiermacher, and Kierkegaard; b) selected 20th century theologians, including Buber, Barth, Tillich, Bonhoeffer, and Teilhard de Chardin.
Prereq: RS 130 or 131, or consent of the instructor
Offered at St. Paul's College

RS 336B W 3C 0.5
Contemporary Theology 2
An examination of current theological issues, such as secularization, the "death of God", hope, liberation, and the recovery of religion.
Prereq: RS 130 or 131, or consent of the instructor
Offered at St. Paul's College

RS 339 Luther and Calvin: The Reformation in Theological Outline
Not offered 1979-80

RS 350 F 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 the Hesychasts in the Eastern Orthodox tradition to the mystical schools of the Western Catholic tradition.
Offered at St. Paul's College

RS 352 Situation Ethics
Not offered 1979-80

RS 360 F 3C 0.5
Religion and the Arts 1
A consideration of the spiritual dimension in art, both sacred and secular. An exploration of the quest for meaning in the various arts - painting, music, architecture, sculpture, dance, and cinema - encountered through slides, films, recordings, and readings.
Prereq: RS 160 or 266 or 267, or consent of the instructor
Offered at Renison College

RS 361 Religion and Art 2
Not offered 1979-80

RS 365 Religious Issues in Marxism
Not offered 1979-80

RS 369A In the Footsteps of the Christian Tradition
Not offered 1979-80
Course Descriptions
Religious Studies

RS 369B-F 1.0
Study-Travel Seminars in Religion
Observation and analysis of religious life in particular geographical areas, or of particular themes or problems, by means of on-location study. Topics and countries will be announced.

RS 370 W 3C 0.5
Dreams in Religious Experience
The course examines the place of dreams in religious experience from ancient to modern times. Present day advances in understanding dream symbols will be explored, as well as the possibility of incorporating the use of dreams in one's personal religious growth and development.
Prereq: RS 271 or consent of instructor
Offered at St. Paul's College

RS 371 W 3C 0.5
Religion and Suicidal Behaviour
A study of self-destructive behaviour and its relation to relevant religious concepts. The range of experience from illness to suicide will be explored and related to the concepts of guilt, hope, and meaning in the Christian faith.
Prereq: RS 271 or consent of instructor
Offered at St. Paul's College

RS 373A-F Religion and Social Change
Not offered in 1979-80

RS 398-399 Directed Reading in Special Subjects†
RS 401 Studies in Jewish Scriptures†
RS 402 Studies in the Christian Scriptures†
RS 415 Studies in Comparative Religion†
RS 425 Studies in Church History†
RS 430 Studies in Historical Theology†
RS 431 Studies in Contemporary Religious Thought†
RS 432 Studies in Selected Theological Problems†
RS 433 The Problem of Authority in Contemporary Catholicism
Not offered 1979-80

RS 460-463 W 3C 0.5
Special Topics in Religion and Culture
Focus on themes, development or the work of individual thinkers who have devoted study to the relationship of religion and culture.

RS 490-499 1.0 each
Senior Seminars in Special Topics
Seminars are offered each year for senior honours RS students and senior students from other departments who have taken sufficient relevant survey and/or depth courses in RS or related disciplines. The instructors of, and topics for, the seminars are announced prior to the preregistration period. In all cases the instructor's permission is required.

Note
Every student in the Honours RS Programme is required to take at least one of these seminars.

RS 590-597 F,W R 0.5
Directed Research in Special Subjects for Graduate Students

RS 598-599 R 0.5 each
Directed Reading in Special Subjects for Graduate Students

†Students wishing to enrol in a course marked with a dagger (†) should consult the department.
Science

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. Normally, no more than four of the Science credits may be applied towards any Science degree programme.

Sci 100 F,W 3C 0.5
Introduction to the Geology of Canada
Basic principles of Geology presented and illustrated with Canadian examples. Earth materials; the Earth's interior; volcanoes and earthquakes; the Earth's surface and its evolution; the history of life; application of geology to man's use of the environment. Field trips. (Not normally available to students in Earth Sciences programmes)

Sci 110 F 3C 0.5
From Matter to Man
Astronomy and Earth Science. A special course available to Math students who do not have a strong Science background. Not open to students registered in the Faculty of Science.

Sci 111 W 3C 0.5
From Matter to Man
Chemistry: The nature of matter, atomic and nuclear reactions, Chemical bonds and the formation of molecules.

Sci 200 F 3C 0.5
Contemporary Science 1
An examination of some of the issues and development in contemporary science. The interaction between Science and society will also be discussed. Background knowledge in science not necessary. (Not for Science or Eng. Students).

Sci 201 W 3C 0.5
Contemporary Science 2
Elementary biology and genetic engineering. Radiation effects on humans and radiation pollution. Cancer - causes and cures. Freezing of human tissues and organs. (Students registered in Science or Engineering may not take this course for credit)

Sci 202 F 3C 0.5
Energy

Sci 203 W 3C 0.5
Applied Physics in the Modern World
Selected topics in the applications of physics such as acoustics, cosmology, fusion, health physics, lasers and holography, oceanography, physics in Canada, reactor physics, space research, superconductivity, symmetry.

Sci 204 W 2C,2L 0.5
Physics of High Fidelity Sound Reproduction
This course applies elementary physical principles to the study of high fidelity systems. A set of laboratory experiments designed to familiarize the student with basic components is included. The course will convey an appreciation of the physics of such systems and an understanding of the specifications of modern equipment. Prereq: None, Lab. alternate weeks

Sci 205 W 2C 0.5
Information (formerly Scientific Writing and Literature)
Information is considered from two points of view: (1) the information explosion and you: the nature of the scientific, technical, and social sciences literature. Retrieval of information: use of libraries and computers. (2) Imparting the information you have to others: the art of speaking, and writing scientific papers, reports, letters, etc. Common errors in writing. No prereq.

Sci 120 The Physical Sciences
Not offered in 1979-80
Sci 219  F  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 in 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,W,S  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 system, stars, the galaxy, galaxies and the universe. Open to first year or upper year students. (Not for Eng, Math or Sci students).

Sci 238  F,W,S  3C  0.5

Descriptive Astronomy
A survey course in astronomy intended for Mathematics, Engineering and Science students. The solar system, stars, the galaxy, galaxies and the universe. Open to first year or upper year students. (Students whose major field is Phys may not take this course for credit.)
No prereq. A special division of this course may be offered in the Winter and/or Spring term primarily for Eng. students if sufficient demand exists.

Note
Students interested in the above courses in Astronomy should note that because of overlapping material both courses may not be taken for credit - only the one most suitable to their background. Similarly students who have taken Phys 250 - The Solar System or Phys 251 - The Stellar System may not take the above courses in Astronomy for credit because of overlapping material.

Course Descriptions
Science

Sci 249  W  3C  0.5

Continents Adrift
A review of the current revolution in the Earth Sciences. This course will trace the evolution of the Earth as we know it today, primarily from the new viewpoint afforded by the hypothesis of seafloor spreading, plate tectonics and continental drift.
(Students whose major field is Earth Sciences may not take this course for credit) No prereq.

Sci 250  W  3C  0.5

Environmental Geology
The influence of geological factors on the natural environment: natural hazards; effects 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).

Sci 251  F  2C  0.5

Human Genetics
An examination of recent advances in human heredity including the genetic, 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).

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.)

Sci 270  W  3C  0.5

Nuclear Science
A non-mathematical general treatment of the following areas of nuclear Science: historical development and discovery of new fundamental particles; artificial transmutation of elements; nuclear sources of energy; biological effects of radiation and use of radioisotopes in industry, medicine and agriculture. The impact of nuclear science on social, economic and political systems will be discussed.
Prereq: At least one year Secondary School Chemistry or Physics
Course Descriptions

Science

Sci 312  F  3C  0.5  
**Physics of Music 1**  
A discussion of the nature of musical sounds. The mathematical basis of harmony, musical scales. Sound production by various instruments including the human voice; radiated power, sound spectrum. Acoustics of auditoriums: amplifier and speaker systems.  
*Recommended for any student who understands logarithms and who is interested in both Music and Physics.*

Sci 313  **Physics of Music 2**  
*Not offered in 1979-80*

Sci 349  F  3C  0.5  
**Introductory Pedology**  
An introduction to soil forming processes and classification systems. Emphasis will be placed on the chemical and physical soil regimes as they relate to environmental, engineering and agricultural problems. *(Students whose major field is Earth Sciences may not take this course for credit).*

Sci 350  F  3C  0.5  
**Canadian Non-Renewable Natural Resources**  
An introduction to mineral resources and the state of reserves of selected minerals. Geologic factors affecting the occurrence of economic minerals and rocks, concentrating upon energy supplies, metallic and non-metallic minerals. The historical development of certain extractive industries will be discussed together with the political and social implications of economic development. *(Identical to M Env 356). (Students whose major field is Earth Sciences may not take this course for credit).*

Sci 351  F  3C  0.5  
**Human Biology 1**  
An introduction to cell and developmental biology in relation to cancer of the human body. *(Students whose major field is Biology may not take this course for credit).*

Sci 352  **Human Biology 2**  
*Not offered in 1979-80*

Sci 353  F  2C  0.5  
**The Plants of Canada**  
The composition, ecology and history of Canada's flora. The role of plants in our environment, their use by native peoples and in modern agriculture and horticulture ethnobotany. An introductory course for non-biologists on the natural history of our flora. *(Students whose major field is Biology may not take this course for credit.)*

Sci 400A  F  2C  0.5  
**The History of Science 1**  
The development of scientific concepts from the Renaissance to the early 19th century. Astronomy from Copernicus to Newton, physics from Galileo to Newton. The physics and biological sciences during the 18th century, Lavoisier and *La Révolution Chymique*. The beginnings of the industrial revolution. Emphasis will be on reading the works of the originators of Science.  
*Prereq: First year Science or equiv.*

Sci 400B  W  2C  0.5  
**The History of Science 2**  
The growth of scientific ideas in the 19th and early 20th centuries. Developments in physics, chemistry, geology, biology (particularly Darwin) and technology. Emphasis will be on reading the works of the originators of science.  
*Prereq: First year Science or equiv.*

Sci 410  0.5  
**Technical Report (for Students in co-op Applied Chemistry, co-op Applied Physics co-op Applied Earth Sciences and co-op Biology 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. Four satisfactory reports are required prior to graduation but this number will be reduced to three for students transferring to co-op Science in the 2B or later terms. A word Grading system will be used and will range from Excellent to Unsatisfactory. This course will be added to the student's transcript at the completion of Year 4 and will be given 0.50 course credit; this credit is to be in addition to the regularly required number of course credits shown in the programme listings.

Sci 453  F  2C  0.5  
**The Seas and Man's Effects Upon Them**  
Study of the oceans from a biological point of view, and consideration of the effects of exploitation and pollution upon the animals and plants that inhabit them. *(Students whose major field is Biology may not take this course for credit.)*
Sci 454 W 2C 0.5
The Inland Waters and Man's Effects Upon Them
Study of lakes, rivers and streams from a biological point of view, and consideration of the effects of pollution upon the animals and plants that inhabit them. (Students 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. (Students whose major field is Biology may not take this course for credit.)

Social Development Studies

Professors
I. L. Campbell, BA (Carleton), MSc (London School of Economics) R
D. G. S. M’Timkulu, BA, MA (South Africa), MA (Yale), Dip Anthropology, DipEd, PhD (Natal) R
J. O. Towler, BA (Toronto), MEd, PhD (Alberta) R

Assistant Professors
R. Lahue, BSc (Fordham), PhD (Waterloo) R
M. Nagler, BA (Br. Col.), MA (Chicago) R
M. Smyth, BA (Toronto), MA, PhD (York) R
M. Zentner, BA (Temple), MSW (Kansas) R

Associated Faculty
Assistant Professor, Religious Studies
M. Bird, BA, MA, PhD (Iowa) R

Assistant Professor, Religious Studies
D. Bryant, BA (Concordia College), STB (Harvard), MA, PhD (St. Michael's) R

Associate Professor, Geography
B. Hyma, BSc, MSc (Madras), MA (Sheffield), PhD (Pittsburgh) R

Assistant Professor, History
W. Packull, BA (Guelph), MA (Waterloo), PhD (Queen's) R

Professor, English
H. Tuyn, BA, MA (Oxford), MA (Utrecht), Docteur de l'Universite de Paris R

Co-ordinator of English Language Programmes
J. Miller, BA, BLS (McGill), MA, M Phil (Waterloo)

Course Descriptions
Interdisciplinary Social Science

ISS 120R F 3C 0.5
Intellectual Foundations for the Social Sciences 1
An introduction to the evolution of social, political and psychological thought in Western civilization prior to the 18th century which provides a background and context for the study of contemporary social issues and problems.

ISS 121R W 3C 0.5
Intellectual Foundations for the Social Sciences 2
A continuation of the topics developed in ISS 120R beginning with the 18th century and moving to the present day.
Prereq: ISS 120R
ISS 220R  The History of Development of Modern Day Social Problems
Not offered in 1979-80.

ISS 221R  Community Issues
Not offered in 1979-80.

ISS 250 R  F  3C  0.5
Social Research 1
Introduction to the philosophy and methods of applied social science, the problems and strategies of research design and analysis. Emphasis on collection, statistical analysis, and descriptive presentation of research data using a variety of quantitative methods.

ISS 251R  W  3C  0.5
Social Research 2
A continuation of ISS 250R.
Prereq: ISS 250R

ISS 320R  F  3C  0.5
Critical Encounter with the Study of Man
An attempt to develop a critical sense of the relevance of the social sciences to man. Special attention to men, theories and methodologies at the "cutting edge" of the social sciences, with emphasis on those taking an interdisciplinary approach.
Prereq: Courses in at least two of the social sciences or consent of instructor.

ISS 343R  F,W  3C  0.5
Interdisciplinary Investigation of Human Sexuality
Focus on the sex research of Kinsey, Masters and Johnson, and areas of import for human sexuality theory and therapy. Exploration of current sexual myths, the supporting literature, the clinician's role in changing individual and societal attitudes and sanctions regarding sexual behaviour.

ISS 350a  S,F  3C  0.5
The Non-Medical Use of Drugs, Drug Dependency and its Management
This course will be concerned with contemporary non-medical drug use: the drugs in common use, their effects, their sources and the processes of distribution, the extent and patterns of use, various theories dealing with the causes of use and dependency, the social and psychological characteristics of users, and various approaches to the treatment of drug-dependent persons.

ISS 350b  W  3C  0.5
Problems of Adult Education from the Perspective of the Social Sciences
An interdisciplinary examination and analysis of adult education in Canada with particular reference to the local situation and its historical development, philosophical, psychological and sociological foundations. Political policies, practices, trends, and the status of adult education will be covered.

ISS 398R/399R  S,F,W/S,F,W,  R  0.5/0.5
Independent Studies
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 programme's faculty members.
Prereq: Permission of Undergraduate Officer

ISS 469R  Y  2S  1.0
Senior Seminar Workshop
Social and human phenomena will be examined holistically. Students will be encouraged to synthesize knowledge learned in other social science courses in an intensive study of specific social issues and human concerns. The issues examined will vary from year to year reflecting social change, immediate community concerns, developments in the social sciences and the interests of students and instructors. Students will be required to engage in field projects, including community based learning experiences.
Prereq: Open to senior honours students only

ISS 499R  Y T  1.0
Senior Honours Essay
The essay will normally be related to the student's chosen theme area, supervised by only one faculty member, but critically examined by faculty from all areas of the programme.
Prereq: Open to senior honours students only

Psychology

Psych 120R  F  3C  0.5
Introductory Psychology
Basic concepts and techniques of modern psychology as a behavioural science. The development of behaviour, learning and remembering, motivation, values and attitudes, personality, sensation and perception, and small group processes will be studied with reference to physiological correlates.

Psych 121R  W  3C  0.5
Introductory Psychology (Special Topics)
A more in-depth study of selected topics introduced in Psych 120R.
Prereq: Psych 120R

Psych 220R  F  3C  0.5
Social Psychology
An examination of psychological principles involved in the interaction of the individual and society. Topics include conformity, attitude formation, prejudice, attraction, aggression, pro-social behaviour, social psychology of sexual attitudes.
(Cross-listed with Psych 253)
Prereq: An introductory psychology course
Psych 221R W 3C 0.5
Interpersonal Interaction
A consideration of theories and research into interpersonal interaction. Topics include H. S. Sullivan; Double Bind Theory; Non-verbal Behaviour; Transactional Analysis; R. D. Laing; Interaction Approaches to Personality; Social Exchange; balance, attribution and reinforcement theories; complementary needs; rules of encounter.
(Cross-listed with Psych 254)
Prereq: Psych 220R or Psych 253

Psych 222R F 3C 0.5
Personality (Personality Theory)
An examination of the major theories of personality including consideration of the psychoanalytic, dispositional, humanistic, and behaviouristic models.
(Cross-listed with Psych 355)
Prereq: An introductory psychology course

Psych 323R W 3C 0.5
Abnormal Psychology (Psychopathology)
A consideration of the theory and research in the area of abnormal psychology.
(Cross-listed with Psych 357)
Prereq: An introductory psychology course

Psych 334(R) F 3C 0.5
Theories of Counselling Psychology
An introduction to the theories, methods and problems in Counselling Psychology.
Prereq: An introductory psychology course

Psych 367R-369R 0.5 each
Special Topics in Psychology
One or more half courses will be offered from time to time as announced by the Social Development Studies Programme. Subjects will be dependent upon special research and/or instructional interests of faculty.

Psych 369R W 3C 0.5
Advanced Topics in Counselling Psychology
An in-depth study of special topics arising in Psych 334 (R)
Prereq: Psych 334 (R)

Psych 370R Cross-Cultural Psychology
Not offered in 1979-80.

Psych 398R/399R S,F,W/S,F,W R/R 0.5/0.5
Independent Studies
An independent in-depth study of a selected area of concern to the student within the discipline of psychology. Available to individuals or small groups of third- or fourth-year Social Development Studies majors and arranged with one of the faculty members from the programme.
Prereq: Permission of Undergraduate Office.

Sociology

Soc 120R F 3C 0.5
Fundamentals of Sociology 1
An examination of the fundamental concepts of sociology and their application in seeking to understand the changing patterns and lifestyles taking place specifically in Canada, and in general, within North American society.

Soc 121R W 3C 0.5
Fundamentals of Sociology 2
A more in-depth study of selected topics introduced in Soc 120R with emphasis on the analysis of social problems.
Prereq: Soc 120R

Soc 220F F 3C 0.5
The Individual, Society and Religion
An examination of the part that religion plays in the development of personal identity within a society and the nature of social relationships that evolve therefrom.
Prereq: An introductory Sociology course

Soc 221R S 3C 0.5
Master Trends in Modern Society
An introduction to the major problems of urbanization and industrialization in modern societies studied within a framework emphasizing social change. Illustrations will be drawn from emergent as well as advanced societies.
Prereq: Introductory Sociology course.

Soc 225R Race and Culture in the Third World 1
Not offered in 1979-80

Soc 226R Race and Culture in the Third World 2
Not offered in 1979-80.

Soc 325R/326R Issues in Third World Development
Not offered in 1979-80.

Soc 327R/328R Canadian Ethnic and Cultural Minorities
Not offered in 1979-80.

Soc 367R S 3C 0.5
The Sociology of Physical Disability
This course will examine the social factors associated with and the consequences of physical disability for the disabled person and for those with whom they interact. Particular attention will be given to stigmatization and rehabilitation.
Prereq: an introductory Sociology course
Course Descriptions
Social Development Studies

Soc 368 R F 3 C 0.5
The Sociology of Spoiled Identity
This course will examine the social causes and consequences of a spoiled self-image associated with conditions such as mental illness, sexual deviance, alcoholism, drug dependency, or a criminal record. 
Prereq: an introductory Sociology course

Soc 369 R F 3 C 0.5
Custodial and Rehabilitative Institutions
An analysis of the theory, structure and function of institutions concerned with the incarceration, treatment and/or rehabilitation of either voluntary or involuntary inmates, clients or patients. 
Prereq: an introductory Sociology course

Soc 398 R/399 R F,W,F,W R/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 programme. 
Prereq: permission of Undergraduate Officer

Social Work

Socwk 120 R S,F,W 3 C 0.5
Introduction to Social Work
An introduction to the methods, values and concepts of social work. A broad survey of methods of social work practice: casework, group work, community organization, family therapy, etc. An overview and development of social work settings: public assistance, mental health services, welfare services, etc.

Socwk 121 R S,W 3 C 0.5
Social Problems
A study of contemporary social problems with which social work is concerned. Emphasis is divided between theoretical approaches to understanding the problems and study of societal responses to and intervention in the problem.

Socwk 220 R S,F 3 C 0.5
Social Casework 1
A presentation of some of the theoretical constructs necessary for the understanding of the individual in the casework relationship, as well as an introduction to some appropriate casework interventions. Emphasis in the course will be theoretical. 
Prereq: Socwk 120 R or consent of instructor

Socwk 221 R S,F 3 C 0.5
Social Group Work and Family Therapy 1
Presentation of some of the theoretical constructs necessary for the understanding of the family and the group in the social work relationship, as well as an introduction to some appropriate social group work and family therapy interventions. Emphasis will be theoretical. 
Prereq: Socwk 120 R or consent of instructor

Socwk 222 R F 3 C 0.5
Community Organization 1
An examination of social work practice as it relates to functional and geographical communities. The course will explore the theoretical foundations of organization practice as well as a variety of models. 
Prereq: Socwk 120 R or consent of instructor

Socwk 320 R S,W 3 C 0.5
Social Casework 2
A methodological examination of some of the more complex intellectual components in the social work skills necessary to work with individuals in casework. Social work theories of the individual will be examined in order for the students to learn some clinical casework applications. 
Prereq: Socwk 220 R, or consent of instructor

Socwk 321 R S,W 3 C 0.5
Social Work and Family Therapy 2
A methodological examination of some of the more complex intellectual components of some of the social work skills necessary to work with families and groups. Social work theories of the family and of the group will be concretized in order for the student to learn some clinical applications. 
Prereq: Socwk 221 R, or consent of instructor

Socwk 322 R W 3 C 0.5
Community Organization 2
An examination of social change tactics as they have been operationalized by individuals and groups committed to the social work ethos. This course will concentrate on the Canadian scene and such diverse formations as social work unions, collective action by welfare recipients, political parties, etc. 
Prereq: Socwk 222 R, or consent of instructor

Socwk 326 R W 3 C 0.5
History of Social Welfare
The historical development of the religious, philosophical, technological and cultural bases of social welfare services from early civilization to the modern welfare state. 
Prereq: Socwk 120 R, or consent of instructor

Socwk 350(a-f) Special Topics in Social Work
Not offered in 1979-80
Socwk 355R  S,F,W  3C  0.5
Child Abuse: Identification and Treatment
The objectives of this course are to provide an understanding of the dimensions and causes of child abuse, to develop skills in identifying cases of this social problem and to explore current methods of management and treatment of persons involved in child abuse situations.
Prereq: Socwk 120R or consent of instructor

Socwk 365R  S  3C  0.5
Medical Social Work
An analysis of the Social Work function in a medical setting, with emphasis on the contribution of social work in identifying and treating the emotional component of illness. Areas of study will cover the growth of medical social work and development of social work departments in the complexity of a hospital. An examination of various types of in-patient individual and group services. An exploration of social work’s responsibilities and opportunities for influencing community public health programmes and issues.
Prereq: Socwk 120R or consent of instructor

Socwk 366R  A continuation of Socwk 365R
Not offered in 1979-80.

Socwk 398R/399R  S,F,W/S,F,W  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 programme.
Prereq: Permission of Undergraduate Officer

Elective Courses
The following elective courses are administered by Renison College. For fuller descriptions, see appropriate departments.

Arts
Arts 220R  Chinese Thought and Culture 1
Arts 221R  Chinese Thought and Culture 2
Arts 241R  Art & Society 1
Arts 242R  Art & Society 2
Arts 320R/321R  Special Topics in Chinese Thought and Culture

English
Engl 129(R)  Basic Writing Skills
Engl 140R/141R  The Use of English, 1 and 2
Engl 205R  The Canadian Short Story
Engl 245R  Form and Function
Engl 376R/377R  Our Changing Language: Syntax and Semantics, 1 and 2
Engl 385R  Twentieth Century Literature

Fine Arts
Fine 246R/247R  Religion and the Film, 1 and 2
Fine 348R  The Films of Chaplin
Fine 349R  The Films of Fellini

Geography
Geog 125R  Introduction to the Third World
Geog 126R  Development in the Third World
Geog 225R  Urbanization in the Third World
Geog 226R  Food and Agriculture and Integrated Rural Development in the Third World.

Geog 325R/326R  Special Topics in the Study of Third World Development

History
Hist 101R/102R  Major Themes of Western Civilization, 1 and 2
Hist 269R  A History of Modern Revolutions
Hist 364R  The Enlightenment 1, Europe in Ferment
Hist 365R  The Enlightenment 2, Europe in the 18th Century

Religious Studies
R S 160/161R  Religion and Culture, 1 and 2
R S 231A  The Evolution of Christian Thought 1
R S 231B  The Evolution of Christian Thought 2
R S 260  Issues in Science, Technology and Religion
R S 262/263  Religion and Politics 1 and 2
R S 266/267  Religion and the Film, 1 and 2
R S 268A  Religious Perspectives in Contemporary Literature
R S 268B  Religious Perspectives in Contemporary Canadian Literature
R S 360/361  Sacred and Profane in the Arts, 1 and 2
R S 398/399  Directed Readings in Special Subjects
R S 460-463  Special Topics in Religion and Culture
Department of Sociology

Associate Professor, Acting Chairman
A. A. Hunter, BA (Br. Col.), MA, PhD (Wisconsin)

Professors
L. A. Costa-Pinto, BA, Lic, Doctor in Sociology (Federal University of Brazil)
G. L. DeGré, BSS (City College, N.Y.), MA, PhD (Columbia), Cated Hon (San Marcos, Lima)
H. J. Fallding, BA, BSc, MA (Sydney), PhD (Australian National)
H. D. Kirk, BS (City College, N.Y.), MA, PhD (Cornell)
D. G. S. M Timkulu, MA (S. Africa), MA, PhD (Natal)
R. C. Redekop, BA (Goshen), MA (Michigan), PhD (Chicago)

Associate Professors
J. Curtis, BA (Sir G. Wms), MA (Central Michigan), MA (Cornell)
F. A. Fasick, BA (Penn. State), MA, PhD (Columbia)
A. A. Hunter, BA (Br. Col.), MA, PhD (Wisconsin)
L. A. Johnson, BA (Waterloo), MA, MPhil (Toronto)
D. Kubat, MA (Kans), PhD (L. Maximilian, Munich)
R. D. Lambert, BA, MA (McMaster), PhD (Michigan, Ann Arbor)
W. G. Scott, BA (W.Ont), MA (Toronto)
M. Shimpo, BA (International Christian, Japan), MA, PhD (Br. Col.)
E. W. Vaz, BA, MA (McGill), PhD (Indiana)
K. Westhues, BA (Conception), MA, PhD (Vanderbilt)
A. Wipper, BA, MA (McGill), PhD (California, Berkeley)

Assistant Professors
B. N. Agger, BA, MA (York), PhD (Toronto)
J. Goyder, BA (Bishop's), MA, PhD (McMaster)
S. A. McDaniel, BA (Massachusetts), MA (Cornell), PhD (Alberta)
M. I. Nagler, BA (Br. Col.), MA (Chicago) R
R. C. Prus, BA (Manitoba), MA, PhD (Iowa)

Associated Faculty

Professors
G. S. Kenyon, BPhysEd (Br. Col.), MS (Indiana), PhD (NYU), Kinesiology
D. Smucker, BA (Bluffton), BD (Princeton), MA, PhD (Chicago), Social Sciences, Conrad Grebel

Associate Professors
G. M. Anderson, BA, MA (McMaster), PhD (Toronto), Sociology and Anthropology, Wilfrid Laurier, Adjunct
B. McPherson, BA, MA (W.Ont.), PhD (Wisconsin), Kinesiology
J. Zuzanek, MA (Moscow State Univ.), CSc, PhD (Charles Univ. Prague), Recreation

Assistant Professors
N. Theberge, BA (Massachusetts), MA (Boston), PhD (Massachusetts), Kinesiology

Course Descriptions

Sociology

Course Descriptions

Soc 101  S,F,W  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(f), 101(m), or 101(u).
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. Also offered at St. Jerome's, Renison, and Conrad Grebel Colleges

Soc 161  F  2C  0.5
Population and Society
Introduction to basic ideas of population study. Topics to be covered include population growth, fertility control, mortality decline, urbanization and "brain drain." Attention is given to both Canada and other nations.

Soc 201  W  2C  0.5
Canadian Society: Structure and Development
An introductory survey of Canadian society. This course will examine issues in the socio-historical development of Canadian society, its present social structure, organizations and ideologies.

Soc 202  F,W  2C,2L  0.5
Sociological Statistics
A first course in sociological statistics: sampling, central tendency, probability, co-variance, as illustrated in specifically sociological data. Prereq: Soc 101, or equivalent other introductory social science course.

Soc 203  F  2C  0.5
Introduction to Comparative Social Thought
Selected original sources, which attempt to define and evaluate the relation of the individual to society, and society to nature and cosmos, as expressed in classical as well as in later documents, including the mythological world-view, ordered social cosmos, Eastern thought and social thought of Europe.
Soc 205  S,F,W  2C  0.5
Sociological Analysis of 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 emotional disturbance, poverty, delinquency and industrial disruptions in Canadian society.
Also offered at Renison College

Soc 209  F  2C  0.5
George Orwell as Sociologist
Everyday events and experiences are subjected to sociological scrutiny by George Orwell. This course shows how students can similarly apply the sociological imagination to their own lives.

Soc 210  W  2C  0.5
Social Psychology of Beliefs and Attitudes
Examines the nature of social beliefs and attitudes toward various groups in society, such as ethnic, political and religious groups. Considers the sources, organization and distribution of beliefs and attitudes, and their implications for Canadian society.
Prereq: Soc 101 or Psych 101

Soc 211  W  2C  0.5
Social Structure and Character
This course will examine the connections between organized social life and types of personalities found in it. Examples will be drawn from contemporary as well as historical situations.

Soc 212  F  2C  0.5
Social Psychology and Everyday Life
Introducing students to symbolic interaction, a sociological social psychology, this course examines: the impact of culture on socialization experiences; the development of self-identities and social reputations; and interaction patterns in a variety of casual, occupational and deviance contexts.
Prereq: Soc 101 or Psych 101

Soc 213  W  2C  0.5
Sociology of Death and Dying
The course deals with the current literature on death and dying; also, with the sociological implications of institutional housing of the terminal patients. 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.

Soc 215  F,W  2C  0.5
Sociology of Sex 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

Soc 216  F,W  2C  0.5
An Introduction to the Sociology of 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 the U.S. and Britain will be undertaken.
Prereq: Soc 101
Also offered at St. Jerome’s College

Soc 217  W  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.
Cross-listed as Soc 230G

Soc 218  F  2C  0.5
Sociology of Adolescence
The social definitions of adolescence in cross-cultural and historical perspective. Social roles of adolescence 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

Soc 231  F  2C  0.5
Industrial Sociology
Special emphasis is given in lectures, readings and assignments to the particular problems facing industrial Canada especially in reference to regionalism, elitism, the multinational enterprise and the problem of foreign ownership.

Soc 232  W  2C  0.5
Technology and Social Change
This course will relate 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 240 F 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*

Soc 241 Social Movements
*Not offered in 1979-80*

Soc 245 F,W 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 persons become involved in deviant activities, and the contingencies affecting persons' careers as deviants.
*Prereq: Soc 101 or consent of instructor*

Soc 246 W 2C 0.5
**Law and Order: A Sociological Perspective**
Focusing on the "processes and problematics of social control", this course examines: the conditions affecting the emergence of legal norms; the enforcement of criminal law; and the processing of offenders.
*Prereq: Soc 101 or permission of the instructor*

Soc 250 F,W 2C 0.5
**Crime and Society**
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; statistics and contemporary research. Special attention is given to Canadian data. A sound knowledge of sociological concepts is advisable.
*Prereq: Soc 101*

Soc 251 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*
*Also offered at St. Jerome's College*

Soc 252 F,W 3C 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*

Soc 260 French-English Relations in Canada
*Not offered in 1979-80*
Course Descriptions
Sociology

Soc 301  W  2C  0.5
Urban Sociology
The comparative study of urbanization as a process; the culture and social 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

Soc 311  0.5
Social Structure and Character in Crisis
This course examines the consequences of drastic changes, whether induced by natural disaster or human action, on social structure and human personality. Consequences of earthquakes and floods are compared with those of forced migration and resettlement.

Soc 315  W  2C  0.5
Social Stratification
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

Soc 316  2C  0.5
Family Structures in Comparative Perspective
Family structures in a number of different societies will be compared. The impact of specific structures on individual family members and the relationships between the structures and other social institutions will be analyzed. Change occurring in the predominant family structure in North America will be considered.
Prereq: Soc 101

Soc 317  0.5
Sociology of Adoptive Kinship
The study of adoptive kinship sheds light on the weakening of the Western family as an institution. It also reveals strains that appear to be inherent in the invention and enactment of any new institution.

Soc 320  2C  0.5
Advanced Social Statistics
Multiple and partial correlation; regression; analysis of variance and covariance; selected non-parametric techniques.
Prereq: Soc 202 or equivalent

Soc 321  F,W  2C,1L  0.5
Research Methods 1
A systematic treatment of the logic and practice of methods basic to social research. Emphasis is on problems of research design based on the analysis of case studies.
Prereq: Soc 101 or equivalent

Soc 322  W  2C,1L  0.5
Research Methods 2
Continuation of Research Methods 1. Includes an introduction to sampling, scaling, the analysis of change, and experimental design. Students will be asked to construct a research design for the study of a theoretically relevant problem in sociology.
Prereq: Soc 321

Soc 323  W  2S  0.5
Projects in Sociological Research
Introduction to sociological research through the formation of a theoretically based research objective and its implementation in a small scale team research project.
Prereq: Soc 101

Soc 324  W  3C  0.5
Social Indicators and Their Use
The course is designed to promote understanding of existing social data. Special topics to be studied include social and health indicators, including quality of life indicators as well as family formation and dissolution, criminality, abortion, unemployment and regional inequities. Flexibility in assignments enables students to pursue special interests.

Soc 330  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).

Soc 331  W  2C  0.5
Theories of Social Change
A systematic review and analysis of major theories of social change including some of the classical and modern theories. Analysis will focus upon the sources, patterns, processes and consequences of change. Special topics to be included are: Marxism, social change in developing countries, the role of ideas, and the breakdown and reorganization of social structure.
Prereq: Soc 101
Also offered at St. Jerome's College

Soc 335  Sociology of Science
Not offered in 1979-80

Soc 340  W  2C  0.5
Formal Organizations
A survey of theory and research on formal organizations making use of selected contributions from the scientific management and human relations approaches, but with emphasis on the structure and functions of large scale organizations.
Prereq: Soc 101
**Course Descriptions**

**Sociology**

**Soc 341**  
W  2C  0.5  
**Occupational Sociology**  
An introduction to the study of work and occupations; the problems of occupational choice, occupational socialization and identification; the concept of careers and career mobility, the professionalization process, the nature of professions; the impact of occupation on life styles, leisure and retirement.  
*Prereq: Soc 101*

**Soc 345**  
W  2S  0.5  
**Research Seminar in Deviance**  
Assuming an interactionist orientation to the study of deviance, this course is designed: to familiarize students with existing theory and research; and to sharpen their analytical skills by explicitly involving them in field research in deviance.  
*Prereq: Third or Fourth Year Standing*

**Soc 351**  
Research Seminar in Canadian Society  
Not offered in 1979-80

**Soc 352**  
Seminar in Nationalism and Ideology in Canada and Quebec  
Not offered in 1979-80

**Soc 355**  
F,W  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*  
*Also offered at St. Jerome's College*

**Soc 360**  
Political Sociology  
Not offered in 1979-80

**Soc 361**  
F  2C  0.5  
**Conflict Simulation Workshop**  
Comparative studies in social and political conflict: war, colonialism, insurgency, class struggles, etc., utilizing conflict simulation games for testing basic concepts. Readings in the sociology of conflict, as well as case studies in the application of game concepts will supplement the practicum.  
*Prereq: Soc 101*

**Soc 365**  
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.

**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.  
*(Same as Phil 362).*  
*Prereq: Some previous work in a Social Science or in Philosophy*

**Soc 373**  
Aging, the Aged and Leisure: A Sociological and Social Psychological Perspective  
Not offered in 1979-80

**Soc 374**  
W,S  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.  
*(Same as Rec 303 and Kin 452).*  
*Prereq: Soc 101 and one other Soc course*

**Soc 375**  
W  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.  
*(Same as Rec 301).*  
*Prereq: Two term courses in Sociology, i.e. Soc 101 and 341*

**Soc 379**  
0.5  
**Holocaust: The Unmaking of Society**  
A sociological inquiry into the experiences of Europe's Gypsies and Jews confronts issues of ideology, social organization and personality. The holocaust represents an historical example of deliberate disruption of social bonds or the unmaking of society.

**Soc 382**  
Techniques of Demographic Analysis  
Not offered in 1979-80

**Soc 401**  
F  2C  0.5  
**Seminar on the Comparative Sociology of Youth**  
The aim of this seminar is mainly to study the prevailing patterns and resulting problems connected with the ways in which different societies react to the emergence of new generations. Concentrates on analysis of the sixties.  
*Prereq: Third or fourth year standing and permission of instructor*

**Soc 402**  
W  2S  0.5  
**Marxist Social Theory**  
This course will focus on the contribution of Marxism to the development of sociological theory in its relation to other types of social thought. Readings will include selections from Marx, Engels, Lenin, Gramsci, Plekhanov, Lukacs, and contemporary sources.  
*Prereq: Fourth year Honours or graduate standing*
Soc 410  W  2S  0.5
Seminar: Symbolic Interactionism
Examines the perspectives, methods and contemporary research of a sociological social psychology.
Considers: the emergence of symbols and meaning in group life; self identities; impression management and interpersonal manoeuvering; labeling; and ethnomethodology.
Prereq: Soc 210 or 212 or consent of instructor

Soc 421 Secondary Analysis of Survey Data
Not offered in 1979-80

Soc 425  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: Open only to students in Sociology

Soc 426  W  2C  0.5
Contemporary Sociological Theory
Development of sociological theory in the 20th century. Included is discussion of current theoretical work.
Prereq: Open only to students in Sociology

Soc 451 Seminar: Problems in Contemporary Theory and Research
Not offered in 1979-80

Soc 466  F  1T  0.5
Reading 1
Selected readings and essay assignments under the direction of a faculty member.
Prereq: Third or fourth year standing in Sociology and permission of the instructor

Soc 467  W  1T  0.5
Reading 2
Selected readings and essay assignments under the direction of a faculty member.
Prereq: Third or fourth year standing in Sociology and permission of the instructor

Soc 481 Mathematical Sociology
Not offered in 1979-80

Soc 499  Y  1.0
Senior Honours Essay
Required of all honours students in Sociology or by election by joint honours students in their fourth year.
For students electing Honours Sociology (Canadian Studies) the essay should bear on some topic of particular sociological significance for Canadian Society.
Prereq: Fourth year Sociology Honours
Also offered at St. Jerome's College

The following Sociology courses are administered by Conrad Grebel College.

Soc 207G  F,W  3C  0.5
Sociology of Education
This course is designed for co-op and regular students who plan to enter the teaching field. Attention will be focused on the concepts and theories of sociology as they apply especially to the educational system.
Prereq: Soc 101

Soc 230G  W  3C  0.5
Family and Kinship
An evaluation of the origin and growth of the family as a social institution; its structures and functions in primitive and modern societies; the effect of modern technology on the family, trends and contemporary problems.
Crosslisted as Soc 217
Prereq: An introductory social science course

Soc 275G  F  3C  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 a religious-cultural group by engaging in direct field studies. The community's charter resources, integration, family system, life ceremonies, adaptation to change, and survival techniques will be examined.
Prereq: An introductory social science course

Soc 285G  W  3C  0.5
Sociology of Poverty
A systematic examination of poverty as a major contemporary social problem. The course will deal with theory of causes and proposed remedies.
Prereq: Soc 101

Soc 290G  W  3C  0.5
Utopian Communities Past and Present
An examination of intentional communities; extinct and contemporary. Attention will be paid to origin, purpose, structure and process in each community studied. An assessment of factors contributing to success and failure will be attempted.
Prereq: An introductory social science course

Soc 307G  F,W,A  2C,1D  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 programmes. Themes will be selected and studied in depth on a seminar basis.
Prereq: Soc 101 and 207G
Soc 370G  Sociology of Law  
Not offered in 1979-80

Soc 377G  0.5  
**Seminar: Studies in Sociology of the Mennonites**  
This seminar will devote attention to research methods,  
sociological theory and interdisciplinary approaches to  
the study of Mennonite communities and culture.  
**Prereq:** Permission of the instructor

The following course is administered by St. Jerome's  
College.

Soc 208J  W  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 skill training and the group's search for  
identity.

**Note**  
For other Sociology courses offered at Renison  
College, please see course descriptions for Social  
Development Studies.

---

**Department of Systems Design**

**Professor, Chairman**  
K. Huseyin, MSc (Istanbul), PhD (London), PEng

**Professor, Associate Dean, Undergraduate Studies**  
G. N. Soulis, BASc (Toronto), PEng

**Associate Professor, Associate Chairman,**  
**Graduate Studies**  
K. Singhal, B Tech (IIT, Kharagpur), MS, EngScD  
(Columbia)

**Assistant Professor, Associate Chairman,**  
**Undergraduate Studies**  
M. Chandrashekar, B Tech (IIT, Kanpur), MASc, PhD  
(Waterloo), PEng

**Professors**  
T. M. Fraser, MB, ChB (Edinburgh), MSc (Ohio State),  
LMCC, FACPM, PEng

H. K. Kesavan, BS, BE (Mysore), MS (Illinois), PhD  
(Michigan State), PEng

P. H. O’N. Roe, BASc (Toronto), MSc, PhD (Waterloo),  
PEng

S. S. Sengupta, MA, DPhil (Calcutta)

D. A. Winter¹, BSc (Queens), PhD (Dalhousie), PEng

**Associate Professors**  
M. L. Constant, BSc (Toronto)

G. F. Rabideau, BA, MA (Wisconsin), PhD (Purdue)

P. L. Seeley, BASc (Toronto)

S. Toida, BS (Tokyo), MSc, PhD (Illinois)

B. L. Wills, BASc, MASc, PhD (Waterloo), PEng

A. K. C. Wong, BSc, MSC (Hong Kong),  
PhD (Carnegie), PEng

**Assistant Professors**  
C. Charalambous, BSc (Surrey), PhD (McMaster)

C. K. G. Hahn, MASc (Waterloo)

K. W. Hipel, BASc, MASc, PhD (Waterloo), PEng

M. E. Jernigan, SB, SM, PhD (MIT), PEng

G. J. Savage, BASc, MASc, PhD (Waterloo), PEng

¹(Cross Appointment with Department of Kinesiology)

**Systems Design Course Numbering**

The numbering of Systems Design 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:
Course Descriptions

Systems Design

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 programme in which the student will encounter the course.

The majority of Systems Design courses are given on the basis of three formal lectures and one tutorial hour each week. The department endeavours to ensure that the formal course schedule remains below 30 hours per week in each term. Beyond this, other, less formally scheduled meetings between students and faculty are required.

Course Descriptions

Sy De 101/102 F.S 1C 0.0
Tutorial
Systems Design first year students will meet with a faculty member designated as their class professor. Performance in assignments, conceptual difficulties with courses, interrelation of coursework, later work and engineering practice will be discussed. Non-credit courses.

Sy De 111 F 3C,1T 0.5
Calculus 1

Sy De 112 S 3C,1T 0.5
Calculus 2
Techniques of systematic integration, applications of integration. Sequences, series, infinite series, power series, with applications.

Sy De 113 F 3C,1T 0.5
Linear Algebra

Sy De 114 S 3C,1T 0.5
Theory and Applications of Probability

Sy De 121 F 3C,1T 0.5
Digital Computation
Introduction to electronic digital computers; hardware and software organization, basic features of Fortran, examples of efficient algorithms for engineering computations.

Sy De 131 F 2C,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, perception, human information processing; motor function; human work, skill, fatigue; problems of acoustic noise, vibration, heat, cold; needs of ventilation and lighting.

Sy De 161 F 2C,2T 0.5
Systems Behaviour
Introduction to the ideas and techniques of systems analysis and design. Data collection and handling, statistical methods, systems representation, modelling and simulation, allocation of function and interface design, systems dynamics. Examples: container handling, air traffic control, telephone systems, etc.

Sy De 162 F 1C,1T,1L 0.5
Engineering Design Methodology
The principles of engineering design culminating in a project. Specific topics introduced are: The systems approach, principles of planning, innovation and the creation of design solution, physical, economic and financial feasibility, solution evaluation and selection. Value and utility, simulation, modelling and optimization.

Sy De 181 F 3C,1T 0.5
Statics
Statics of particles, vectors, equilibrium of rigid bodies, centroids, the analysis of structures, forces in beams and cables, friction and moments of inertia.
Course Descriptions
Systems Design

Sy De 182  S  3C,1T  0.5
Dynamics
Rectilinear motion, plane motion, dynamics of particles, work and energy, linear momentum, rotational motion, angular momentum, harmonic motion, gravitational, wave motion.

Sy De 183  F  3L  0.5
Graphics and Design
Fundamentals of graphics with emphasis on basic techniques required for visual communication and computation. Use of graphics as an aid to idea generation in design. The course includes projects designed to enhance the creative abilities of the student.

Sy De 184  S  2C,1T,2L  0.5
Electricity and Magnetism
Electric charge. Coulomb’s Law of Electrostatic Forces; Electric fields, Gauss’ Law, conductors and electric fields; Electric potential; Capacitance, dielectrics, Magnetic fields, flux of magnetic induction; current, resistance and electric circuits; Induced EMF, inductance, Lenz’ Law, Faraday’s Law; magnetism in matter, etc.

Sy De 201/202  W,F  1C  0.0
Tutorial
Systems Design second year students will meet a faculty member designated as their class professor. Performance in assignments, conceptual difficulties with courses, inter-relation of coursework, later work and engineering practice will be discussed. Non-credit courses.

Sy De 211  W  3C,1T  0.5
Applicable Mathematics for Systems Design 1

Sy De 212  F  3C,1T  0.5
Applicable Mathematics for Systems Design 2

Sy De 213  W  3C,1T  0.5
Theory and Applications of Statistics

Sy De 221  W  3C,1T  0.5
Numerical Analysis and Computation
Application of digital computers to the solution of equations; determinants and matrices; eigenvalue problems, numerical solution of ordinary differential equations; difference equations, numerical integration methods; error analysis.

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

Sy De 262  F  1C,3L  0.5
Systems Design Workshop 2
A problem and project oriented course wherein emphasis is placed on designing and presenting creative solutions to real-life problems. The problems are selected 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 281  W  3C,1T  0.5
Mechanics of Deformable Solids
Statics and resistance of materials. Equilibrium of particles, rigid bodies and deformable bodies. Vector fields, ray streams, stress-strain relationships. Elastic and inelastic behaviour of prismatic members subjected to axial, shearing, torsional and flexural deformations.

Sy De 282  F  3C,1T  0.5
Thermodynamics
An introductory course in engineering thermodynamics structured for students in Systems Design. Classical thermodynamics is presented as the systematic study of energy: its use, degradation, and waste. Applications focus on problems of energy and environment. The concepts of statistical thermodynamics are introduced briefly and their connections with information theory are described.

Sy De 284  F  3C,1T  0.5
Fluid Mechanics

Sy De 292  W  1C,3L  0.5
Systems Design Laboratory 1
Digital logic with emphasis on the use and characteristics of integrated circuits; design of sub-systems and systems using digital 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  2C,1T  0.5

Systems Operations I
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 322  W  3C,1T  0.5

Computer Simulation of Systems
System modelling, system simulation techniques, digital computer methods, fundamentals of analog computation, digital simulation of analog computers; block-oriented languages, introduction to systems simulation using hybrid computers.

Sy De 332  W  2C,1T  0.5

Mathematical Programming
Theory and application of linear programming techniques; simplex, the transportation and assignment problems, duality and degeneracy. Industrial applications to production and inventory control. Selected problems from nonlinear and dynamic programming.

Sy De 333  S  2C,1T  0.5

Experimental Design
Analysis of experimental optimum-seeking techniques. Studies include deterministic and stochastic problems. Topics include: single variable search, simultaneous and sequential search, simulations and sequential search, geometry of multidimensional response surfaces and methods of steepest ascent; regression analysis.

Sy De 341  S  2C,1T  0.5

Industrial Ergonomics
Man-machine function and human reliability; human stress and adaptation; work and skill in industry and the operational environment; human factors in industrial safety and occupational hygiene.

Sy De 351  S  3C,1T  0.5

Physical Systems 2
The subject matter is similar to Sy De 252 in that the development is based on other physical systems such as structural and hydraulic systems.

Sy De 352  W  2C,1T  0.5

Algorithms for Computer-Aided Systems Analysis
Techniques for tree selection, manipulation of topological information, evaluation of the exponential function of a matrix, etc. The emphasis is on the algorithms but students will be expected to implement them on the computers. A survey of the capabilities of existing programmes for system analysis.

Sy De 354  W  3C,1T  0.5

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.

Sy De 361  S  1C,3L  0.75

Systems Design Workshop 3

Sy De 362  W  1C,3L  0.75

Systems Design Workshop 4
A continuation of the Systems Design Workshop sequence for third year students.

Sy De 364  W  3C,1T  0.5

Manufacturing Science

Sy De 366  W  2C,1T  0.5

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 372  W  3C,1T  0.5

Introduction to Pattern Recognition
Pattern Recognition as an information processing problem: recognition and classification of patterns in data; distinguishing features. Probability and statistics, linear algebra, and calculus are combined with concepts from communication theory and information science to develop techniques of data analysis. Examples include: optical character recognition, automated cytology, disease diagnosis, earthquake prediction, meteorology, aerial photograph analysis, personal credit rating, economic forecasting.
Course Descriptions
Systems Design

Sy De 381  SD  3C,1T,2L  0.5
Materials Engineering
A general introduction to the science of materials. To
demonstrate some of the important relationships
existing between the structure of a material and its
properties, and to consider some of the ways in which
materials are shaped, formed and fabricated into
articles for everyday use.

Sy De 383  S  2C,1T  0.5
Introduction to Biochemical and Polymer Systems
An introduction to the chemistry to amino acids,
peptides, proteins, nucleic acids, carbohydrates and
lipids. An introduction to polymer chemistry, isomerism,
chain-growth polymerization and co-polymerization,
ionic polymerization.

Sy De 391  S  1C,3L  0.5
Systems Design Laboratory 2
Introduction to electronic filters, attenuation,
amplification oscillation, modulation and detection;
application to instrumentation.

Sy De 392  W  1C,3L  0.5
Systems Design Laboratory 3
This course serves as a focus for the complete lab
programme sequence. The emphasis is on the design of
major experiments which are themselves complete
systems requiring the application of previous acquired
knowledge in the areas of sensing, synthesis, control,
measurement and evaluation. At least one experiment
will be drawn from the digital control or computer
control environment and one from the analog control
environment.

Sy De 401/402  F,W  1C  0.0
Tutorial
Systems Design fourth year students will meet with a
faculty member designated as their class professor.
Conceptual difficulties, the interrelation of course work
and engineering practice will be discussed.
Non-credit courses.

Sy De 411  F  2C,1T  0.5
Systems Operations 2
A continuation of SyDe311, with emphasis on
Stochastic Operations Research Models. Topics will
include: Decision making under uncertainty, queuing
models and related probabilistic techniques, feed-back
control, probabilistic inventory, competitive strategies
and related topics.

Sy De 413  F  2C,1T  0.5
Linear Graph Theory and Applications
The application of graph theory to engineering
problems. The emphasis is on solution techniques that
require the use of linear graphs. Typical problem areas
include commodity distribution networks, topological
aspects of electronic circuits, fault diagnosis,
information retrieval, etc. Specific graph-theoretic ideas
are developed in terms of the problems and their solutions.

Sy De 421  F  3C,1T  0.5
Computer Aided Design 1
The design process; computer-oriented system models;
simulation languages for continuous and discrete
systems; man-machine interaction; design of
problem-oriented computer languages.

Sy De 432  W  2C,1T  0.5
Analysis of Large Systems
Topics include macroscopic modelling of large scale
resource and societal systems, decomposition
methods, graph-theoretic and computer based
methods of analysis, decision and control problems,
other problems concerned with complexity, largeness
and aggregation.

Sy De 433  F  2C,1T  0.5
Conflict Analysis
The application of non-quadratic game theory to the
analysis of conflict, particularly conflicts arising in the
implementation of design projects. The general
characteristics, (through Metagame theory) and specific
applied techniques for analyzing conflicts between
parties each with separate objectives.

Sy De 434  W  2C,1T  0.5
Planning of Facilities
Industrial and non-industrial facilities. Networks,
locational analysis, physical layout and spatial analysis,
allocation of facilities, criteria for optimality, utilization
and occupation, various operations research
methods for the analysis and synthesis of networks of
facilities, n-job, m-machine problem.

Sy De 442  W  2C,1T  0.5
Occupational and Environmental Systems Safety
Historical developments of occupational safety and
safety legislation. Master and servant relationships,
assumption of risk, product liability, etc. Concept of
system safety and safety as a system component in
design and industry.

Sy De 443  F  2C,1T  0.5
Human Function
The structure and function of manin 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.
Course Descriptions

Systems Design

Sy De 445  F  2C,1T,2L  0.5
Measurement Methods in Human Engineering
Requirements of human measurement and its role in design. Techniques of environmental measurement with respect to noise, vibration, heat, lighting, air sampling, etc., and selected studies in the methods of anthropometry.

Sy De 453  F  2C,1T  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 analogue methods for solution.

Sy De 454  W  2C,1T  0.5
Topics in Physical Systems Theory
This course investigates the concepts and techniques used in hydraulic, power, communication and control systems. Established classical methods of analysis will be compared with recent graph theoretic methods.

Sy De 458  W  3C,1T  0.5
Large Scale Engineering Systems
The course brings materials from the core Systems Design curriculum to bear upon the analysis of large engineering systems; examples from a variety of engineering disciplines such as energy systems, economics, transportation, hydraulics, mechanical, electrical, and structural systems and their combinations; techniques for the analysis of complex systems using digital computers.

Sy De 461  F  1C,5L  0.5
Systems Design Workshop 5

Sy De 462  W  1C,5L  0.5
Systems Design Workshop 6
A continuation of the Systems Design Workshop sequence for fourth year students.

Sy De 466  W  2C,1T  0.5
Methodological Processes in Design
Presentation and discussion of appropriate and possible methods for the design of systems or artifacts in which manufacturing processes, material properties and distribution processes constrain the design.

Sy De 468  W  3C,1T  0.5
Structures and Design
Structural forms. Structural requirements. Statistically determinate and indeterminate structures. Basic theorems of linear elastic structures. Methods of analysis: slope-deflection, moment distribution, etc. Application 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, T.V., radio, print). A systems approach will be adopted with special attention to the socio-economic aspects of such systems.

Sy De 525  F,S  3C  0.5
Computer-Aided Simulation and Design
System modelling and simulation techniques, fundamentals of analogue computation, time and magnitude scaling; continuous system simulation on the digital computer; advantages and disadvantages of digital and analogue simulation techniques; discrete-event system simulation on the digital computer; system simulation; examples and problems.

Sy De 535  F,S  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 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 543  W  3C  0.5
Human Engineering
Man-machine systems; man-machine interface; presentation of information; design of displays and controls; workplace layout; human factors in design.

Sy De 544  F,S  3C  0.5
Ergonomics
Significance of ergonomics; man-machine-environment complex; physiology of work, fatigue, and boredom; environmental factors in industry (noise, vibration, vision, illumination, heat, cold, toxic chemicals, radiation); industrial, and automotive safety.

Sy De 555  F,S  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, Tellegen's theorem, multi-terminal representations, piecewise analysis of systems through subsystems, multiport representations, formulation and solutions of state models, introduction to advanced topics.
Course Descriptions

Urban and Regional Planning

Sy De 565     W     3C     0.5
Design Morphology and Organization
Generation of problem statements, system identification, generation of solution sets, feasibility determination. Construction of archetypes; sensitivity, compatibility and stability analysis; behaviour prediction and solution communication.

Sy De 567     F     3C     0.5
Introduction to Systems Behaviour
The basic aim of this course is to introduce the student to the study and understanding of systems and their general behaviour, to broaden systems concepts and the techniques used in applying these concepts in a variety of fields. The fields chosen cover biological, ecological, social, operational, economic and man-machine systems. A number of case studies are conducted.

School of Urban and Regional Planning

Professor, Director
D. W. Hoffman, BSA, MSA (Toronto), PhD (Waterloo), PAq

Associate Professor, Associate Director
J. T. Horton, BA (Wheaton), MA (Northwestern)

Associate Professor, Graduate Officer
R. T. Newkirk², BA, MSc, PhD (W. Ont.)

Associate Professor, Associate Dean Graduate Affairs
L. R. G. Martin, BA (Queen's), MA, MRP, PhD (Syracuse), MCIP

Associate Professor, Undergraduate Officer
J. B. Theberge, BScA (Guelph), MSc (Toronto), PhD (Br. Col.)

Associate Professor, In-Career Development Officer
S. G. Rich, MCIP, MRAIC, ARIBA, AIP

Professors
E. M. Avedone⁵, BBS (William and Mary), MA, EdD (Columbia)
H. S. Coblentz, BA Honors (Durham), MRP (North Carolina), MCIP, FRTPI, AIP, FSS
R. S. Dorney, BSc, MSc, PhD (Wisconsin), MCIP
L. O. Gertler, BA (Queen's), MA (Toronto), MCIP
K. Izumi, BArch (Manitoba), MArch (MIT); ARCA, FRAIC, RIBA, MCIP, AIP, CMAOP (on sabbatical leave 1979)
C. K. Knapper², BA Honors (Sheffield), PhD (Sask)
R. R. Krueger², BA, MA (W. Ont.), PhD (Indiana)
P. H. Nash², BA, MA (UCLA), CE (Grenoble), MCP, MPA, PhD (Harvard), AIP, MCIP
L. H. Russwurm², BA, MA (W. Ont.), PhD (Illinois)

Associate Professors
N. A. M. Carter, BA (BrCol), MSW (BrCol)
J. Levy⁶, BA (WatLuth), BPE (Waterloo), MSW (WatLuth), PhD (Waterloo)
G. G. Mulamoottil¹, BSc (Mysore), MSc (Bombay), PhD (Delhi)
N. E. P. Pressman, BArch (McGill), MArch, urb des (Cornell), Cert USP (Manchester), MCIP, AIP, AIU (on sabbatical leave 1979)
G. B. Priddle⁴, BA (W. Ont.), MA, PhD (Clark)
W. I. Shalinsky, BA, BSW (McGill), MSc, DSW (Western Reserve)
D. F. Walker², BSc (London), MA, PhD (Toronto)
S. M. Weaver⁵, BA, MA, PhD (Toronto), Chairperson, Anthropology
D. H. Wood², BComm, LLB (Toronto)

Assistant Professors
M. E. Haight, BSc, MSc, PhD (McMaster)
S. Herzog, BArch (Toronto), MRAIC
R. C. Suffling, BSc Honors (Wales), PhD (Guelph)
Course Descriptions
Urban and Regional Planning

Lecturer
N. M. Lazarovich, BA (Sask), MA, MCP, PhD (Cincinnati), AIP

Assistant Research Professor
L. Fischer, BA (Rutgers), MA (Northwestern), PhD (Duke)

Adjunct Professors
H. C. Abell, BHSc (Toronto), MS, PhD (Cornell)
A. deVos, MSc, PhD (Wisconsin)
M. K. Foster, BA (Toronto), MPhil, PhD (Columbia)
N. F. White, BSc (Queens), MDCM (McGill)

Visiting Professors
S. Manohar, BA (Agra), BSArch (Cincinnati), MCRP (North Carolina), MArch (New South Wales)
P. W. Newton, BA (Ions) (Newcastle), PhD (Canterbury)

Professional Liaison Officer
H. T. Lemon, FCIP

Planning Graphics Technician
M. A. Boggie, BID (Manitoba)

Faculty members holding joint and/or cross appointments as shown
1Planning and Biology
2Planning and Geography
3Environmental Studies
4Planning and Man-Environment Studies
5Planning and Anthropology
6Planning and Recreation
7Planning and Environmental Studies
8Environmental Studies and Psychology

Course Descriptions

Plan 100  Y  3C,1D  1.0
Introduction to Urban and Regional Planning Concepts and Techniques
An introduction to the regional city; 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. Particular attention is directed to methodological aspects of designing a planning programme: identification of objectives and constraints, conduct of basic surveys and analysis, plans and policies preparation, evaluation and implementation.
Prereq: Planning students only

Env St 111  Introduction to the Study of the Future
See Env St course descriptions, page 300.

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 1st and 2nd year students

Plan 159  F,W  2std  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 cost to student: $30

Env St 195A  Introduction to Environmental Studies
See Env St course descriptions, page 301.

Env St 195B  Introduction to Environmental Problems
See Env St course descriptions, page 301.

Env St 200  Field Ecology
See Env St course descriptions, page 301.

Env St 201  Introduction to Environmental and Planning Law
See Env St course descriptions, page 301.
Plan 222  W  2C,1D  0.5

Canadian Regional Issues
Selective study of Canadian development issues pertaining to the use of land, urbanization, regional and resource development; issues will be related to structural and functional forces that are characteristics of the major regions of Canada, e.g., Atlantic Provinces, British Columbia.
Prereq: None

Plan 230  F  3C  0.5

The Small Group in the Planning Process
The small group and its relevance to the planning process. Focus on work groups such as committees, councils and boards. Various important elements of small groups such as leadership, goal setting, influence, decision-making and interpersonal relationships will be examined and related to planning.
Prereq: Soc 101, or consent of instructor

Env St 252  Media Tools for Environmental Studies
See Env St course descriptions, page 301.

Env St 253  Media Tools for Environmental Studies - Advanced Level
See Env St course descriptions, page 301.

Plan 255  W  2C,2wkshp  0.5

Planning Surveys and Analysis
Sources of data for planning and their analysis. 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: Plan 100, or consent of instructor

Plan 256  Y  2C,2std  1.0

Principles of Environmental Design
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 film and verbal presentations.
Prereq: second year Planning, or Environmental Studies students with consent of instructor

Plan 258  F,W  3S  0.5

Readings and Research in Planning
Special readings and research on planning topics chosen in consultation with an instructor. This course gives the opportunity for supervised individual reading and study of planning or related topics in which the student is particularly interested.
Prereq: Plan 100, or consent of instructor
Prior to registering for this course students must arrange with a faculty member to serve as advisor

Env St 271  Introduction to Quantitative Research Methods
See Env St course descriptions, page 301.

Env St 272  Computer Programming in Environmental Studies
See Env St course descriptions, page 301.

Plan 300  Y  3wkshp  1.0

Seminar/Workshop Project in Urban and Regional Planning
An integrated approach to the comprehensive analysis and design of communities; identification and synthesis of factors relating to function: structure, environmental context, regional framework, etc., in the preparation of comprehensive development programmes. A major project undertaken in small project groups.
Prereq: Third year Planning students only

Plan 301  F,W  3std  0.5

Planning Design
A study of a particular design aspect of planning through a series of individual and group projects. The topic varies each term.
Prereq: Planning students or consent of instructor

Plan 307  F,W  2C,1D  0.5

Social Survey Techniques
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. Cross-listed as Geog 307
Prereq: Second or third year Planning students with ES 271; other ES students with consent of instructor

Plan 316  F  3S  0.5

Multivariate Statistics
The theory and application of multivariate statistics, with particular emphasis upon the use of the computer. Cross-listed as Geog 316
Prereq: Env St 271, or consent of instructor

Plan 317  W  2C,1L  0.5

Nonparametric Statistics
The theory and application of non-parametric statistics with emphasis upon social science problems. Cross-listed as Geog 317
Prereq: Env St 271, or consent of instructor

Plan 318  W  3C  0.5

Spatial Analysis
Advanced quantitative analysis of spatial patterns and interactions. Focus on a selection of techniques from gravity models, linear programming, nearest neighbour analysis, Markov chain analysis, graph theory, simulation and trend surface analysis. Cross-listed as Geog 318
Prereq: Env St 271, or consent of instructor
Course Descriptions
Urban and Regional Planning

Plan 319 F 3S 0.5
Regional Planning Techniques
Application of economic and social measurement techniques in regional planning. Discussion of input-output analysis; cost-benefit analysis, planning, programming and budgeting systems, and social area analysis. Cross-listed as Geog 319
Prereq: Econ 101, 102, or instructor's consent

Plan 330 W 3C 0.5
Urban Social Planning
This course examines a variety of urban social concerns and possible solutions to them. The solutions will focus on social planning, community development and social action. As well, the relationship between physical and social planning will be considered.
Prereq: Soc 101, or consent of instructor

Plan 332 F 3C 0.5
The Sociology of Regions
Basic concepts of sociology; occupational and concomitant social adjustments of rural society in response to forces of urbanization and industrialization; social movements generated within the farm population.
Prereq: Soc 101, or consent of instructor

Plan 333 F 3C 0.5
The Sociology of Regional Planning
Power structures, basic social institutions, attitudes and values related to the implementation of regional plans; regional development of human natural resources in Canada and abroad.
Prereq: Soc 101 or consent of instructor

Plan 338 W 2C, 2wkshp 0.5
Regional Planning and Development
The relationship of economic planning to regional planning. Theory and practice of regional planning and development to urban-centred, broad socio-economic, and frontier regions. A series of workshops focus upon the social and economic problems of a particular Canadian region and the role of federal, provincial and local governments in formulating and applying remedial policies in other nations.
Prereq: One of Plan 100, 156, 343, or consent of instructor

Plan 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. This course is the same as Geog 357.
Prereq: Env St 200
Estimated cost to student: $10

Plan 380 F 3C 0.5
Technology in Urban and Regional Planning
The influence of transportation, communications, and water and sewage systems on the form, function and development of cities and regions; the application of this knowledge in urban and regional planning.
Prereq: Plan 256 or consent of instructor

Plan 344 W 2C, 1S 0.5
Principles of Recreation Planning
An exploration of the nature and functions of recreation in modern urban-industrial societies and an analysis of alternative approaches to the planning of recreation opportunities in urban-centred regions. Application of the planning process to rural and urban recreation. Historical development of recreation planning; problems, assumptions and myths in recreation planning; recreation use/needs, resources; allocation, evaluation of services/programmes; selected recreation planning issues.

Plan 342 F 3C 0.5
Urban and Regional Planning: (Part 1)
Urban planning as a method of obtaining command over the major tools for problem identification; analysis and resolution. Planning types and practice; process and achievements, determinants of physical urban structure and supporting systems, case studies and examples. Emphasis on urban development and responses to dilemmas of the built environment.
Prereq: None. (Not available for credit to Planning students) Restricted to 3rd and 4th year students.

Plan 343 W 3C 0.5
Urban and Regional Planning: (Part 2)
The role of the public and private sectors in regional development and their relationship to the planning process; current urban and regional issues and plans.
Prereq: Plan 342 or consent of instructor. (Not available for credit to Planning students)
Environmental Studies Workshop
See Env St course descriptions, page 301.

Plan 391 W Fidlab 0.5
Field Research Methods and Projects
Selected field trip experience directly related to the theme content of Plan 300, including assignments, follow-up discussion, and presentation of research papers. The School covers part of the cost of travel and accommodations for field trips. Approximately $60.00 will cover the remainder of transportation and accommodation costs on a one week field trip. Students are responsible for the cost of their meals.
Prereq: Enrolment in Plan 300

Env St 400 Professional Development in Environmental Management
See Env St course descriptions, page 302.

Env St 401 Environmental Law
See Env St course descriptions, page 302.

Env St 402 Planning
See Env St course descriptions, page 302.

Env St 411 Alternative Future Environments 1
See Env St course descriptions, page 302.

Env St 412 Alternative Future Environments 2
See Env St course descriptions, page 302.

Plan 414 F 3C 0.5
Housing Policies
Focus on Canadian housing policies and programmes, particularly with regard to the housing of low and moderate income families. Economic, political, physical and social considerations underlying these policies will be examined in detail. Some consideration is given to housing problems and programmes in the United States and developing countries.
Prereq: Plan 256, or consent of instructor

Env St 417 Land Use History and Landscape Change 1
See Env St course descriptions, page 302.

Env St 418 Land Use History and Landscape Change 2
See Env St course descriptions, page 302.

Plan 420 F 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: Fourth year planning students or consent of instructor

Plan 430 F 3C 0.5
Social Policy Planning
This course develops a reasoned systems approach to understand change and develop strategies for change through an integration of social goals, policy and programme. Institutional performance criteria are identified in time and space at the level of system, subsystems and their components. Identification of measures of quality and change strategies are attempted for the components for peaceful and fundamental social change through the development of enlightened social policy.

Plan 431 F 3C 0.5
Citizen Involvement, Planning and Social Change
The theory and practice of citizen involvement and social change in relation to planning and policy formulation. Included are the ideology of involvement, social change and intervention strategies, policy planning and local area planning. Canadian case materials are emphasized, and there is some skills training.
Prereq: Soc 101, fourth year Planning students; students from other Departments with consent of instructor

Env St 444 Land Evaluation and Resource Management
See Env St course descriptions, page 302.

Plan 449 Y 1.0
Canadian Urban and Regional Planning: (Part 1)
An overview of the evaluation of Canadian urban and regional planning covering the Canadian Planner’s heritage, colonial planning, growth stages of post colonial planning, planning principles with an indepth examination of comprehensive planning and zoning, and the scope of planning education especially in our School.
Prereq: Consent of School
## Course Descriptions

### Plan 450 Y 1.0
**Canadian Urban and Regional Planning: (Part 2)**
A review of Canadian urban literature focusing on major themes. The literature will be examined through subject areas such as housing, land policy, redevelopment and urban politics.
**Prereq:** Consent of School

### Plan 454 W 23 0.5
**Professional Practice in Planning**
This course is intended for undergraduate planning students in their final year who will be starting professional practice on graduation. The course discusses professional responsibility, administrative tools and methods, office organization and similar topics. Concepts and techniques in other courses will be dealt with from the point of view of the practitioner.
**Prereq:** Fourth year planning students or consent of instructor

### Plan 456 Y 2C 1.0
**Political and Administrative Processes in Urban and Regional Planning**
The formulation of urban/regional policy, including planning legislation, in an inter-governmental setting: federal, provincial and municipal; the study of both the process and substance of urban policy-making, planning and implementation in Canada.
**Prereq:** fourth year Planning students or fourth year Environmental Studies students with consent of instructor

### Plan 470 W 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:** 3rd or 4th year Planning students, or consent of instructor

### Plan 475 F.W 3S 0.5
**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.

### Plan 476 Y 3S 1.0
**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.

### Plan 480 Y 3S 1.0
**The Philosophy and Methodology of Urban and Regional Planning**
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 490 Y 2.0
**Seniors Honours Essay**
Practical experience in the identification of a problem in the planning field. Conduct of individual research into this problem and presentation of the results of this research in a form that meets both professional and academic standards, as further elaborated in a policy statement available from the undergraduate officer.
**Prereq:** fourth year Planning students only
Women's Studies

Women's Studies started at the University of Waterloo in 1971, when the first course on women was taught. Since that time, there has been consistent development of specific courses on women, as well as the integration of women's studies in many of the more general courses offered.

All courses that are offered, both at the undergraduate and graduate level, are regular credit courses, counting like any other course toward the fulfillment of requirements for majors and honours in their respective disciplines. These courses do not deal exclusively with women. A substantial proportion of the course material is an examination of women in the context of the particular subject matter. Courses on women have been offered in the Departments of Anthropology, English, History, Philosophy, Political Science, Psychology, Sociology and Social Development Studies. The Arts Library has a special collection on women which has been constantly expanded and which now comprises more than 10,000 items on women. This makes it probably the largest collection on women in Canada. The Canadian Newsletter of Research on Women was started at this University. It appears three times a year and abstracts recent research on women in Canada and abroad.

Library, Newsletter, a relatively large number of courses and people who are actively concerned with research and teaching on women make women's studies an important and well developed topic at the University.

Students who are interested in the Women's Studies courses listed on this page will find complete course descriptions in the appropriate departmental sections of this Calendar.

A resource centre for women's studies has been established in the Humanities Building, room 305. Sandra Burt is the co-ordinator of women's studies, and anyone interested in courses or research in that area should contact her.

Anth 350 Sex roles in Anthropology
(not offered 1979-80)

Engl 108E
Women in Literature

Engl 208E
Women Writers of the Twentieth Century

Hist 204H
The individual and the family in History

Hist 204M
Women in History

Phil 201
Love

Phil 202
Philosophy of Women

Phil 220
Moral Issues

P Sci 272
Political Behaviour 2

P Sci 325
Radical Political Ideas

P Sci 342
The Politics of Quebec

P Sci 344
The Politics of Local Government

P Sci 371 Political Culture
(not offered 1979-80)

P Sci 475
Political Socialization

P Sci 476
Research Seminar in Political Behaviour

Soc 161
Introduction to Population

Soc 215
Sociology of Sex Roles

Soc 216
Sociology of Adolescence

Soc 241
Social Movements

Soc 245
Deviance

Soc 252
Juvenile Delinquency

Soc 261
World Population Problems

Soc 262
Canadian Population

Soc 272
Medical Sociology

Soc 341
Occupational Sociology
Governing Bodies and Staff
The Board of Governors

Officers
Chairman, J. P. R. Wadsworth
Vice-Chairman, E. I. Macintosh
Secretary, J. W. Brown

Ex Officio
Chancellor, TBA
President, B. C. Matthews
Mayor of the City of Waterloo, M. Carroll
Mayor of the City of Kitchener, M. A. Rosenberg
Regional Chairman, J. Young

From the Community-at-Large
D. P. Allison, Kitchener
J. Bergsma, St. Catharines
J. Brechin, Don Mills
M. Brechin, Etobicoke
G. Chapman, Kitchener
J. M. Douglas, Cambridge
E. I. Macintosh, Kitchener
D. W. Maguire, Agincourt
R. B. Rodger, Ottawa
J. P. R. Wadsworth, Toronto

Appointed by the Lieutenant-Governor in Council
B. R. E. Foster, Kitchener
D. G. MacLeod, Cambridge
M. Munnoch, Woodstock
G. Pattinson, Brantford
R. N. Washburn, Toronto
C. M. Weylie, Kitchener
R. B. Willis, Waterloo

Staff
D. Kerr
J. A. Swainston

From Senate
Faculty Members
T. L. Batke
I. L. Campbell
H. K. Ellenton
L. R. G. Martin
J. A. Thomson
S. M. Weaver
D. G. Wertheim

Undergraduate Students
S. Fingerote
C. Horrigan
R. Smit

Graduate Students
R. A. Harrington
P. G. McMenamin

Senate

Officers
Chairman, B. C. Matthews
Vice-Chairman, T. A. Brzustowski
Secretary, J. W. Brown

Ex Officio
Chancellor TBA
Chairman, Board of Governors, J. P. R. Wadsworth
President, B. C. Matthews, BSA, AM, PhD
Vice-President, Academic, T. A. Brzustowski, BASc, AM, PhD
Vice-President, Finance & Operations, A. B. Gellatly, BA, CGA
Librarian, M. C. Shepherd, BEd, MA
Registrar, C. T. Boyes, BA
President, Federation of Students

The Principal or President of each Federated or Affiliated College
C. L. Siegfried, CR, BA, MSc, LL.D (President, St. Jerome’s)
F. H. Epp, BTh, BA, MA, PhD, LL.D (President, Conrad Grebel)
I. L. Campbell, BA, MSc (Principal, Renison)
F. C. Gérard, MA, BD, STM, PhD (Principal, St. Paul’s)

The Dean of each Faculty and the Dean of Graduate Studies
R. K. Banks, BA, MA, PhD (Arts) (Effective July 1, 1979)
W. A. McLaughlin, BEng, MS, PhD (Engineering)
J. G. Nelson, BA, MA, PhD (Environmental Studies)
G. S. Kenyon, BPE, MS, PhD (Human Kinetics and Leisure Studies)
W. F. Forbes, DIC, PhD, DSc (Mathematics)
R. N. Farvolden, MSc, PhD (Science)
L. A. K. Watt, BSc, MS, PhD (Graduate Studies)

Elected Members

Faculty Representatives
To 1979
P. Y. Forsyth, AB, MA, PhD (Arts)
R. C. G. Haas, BSc, MSc, PhD (Engineering)
D. B. McIntyre, BArch, MRAIC (Environmental Studies)
J. A. Thomson, BA, MSc, PhD (Human Kinetics and Leisure Studies)
C. F. A. Beaumont, BA, MA (Mathematics)
A. E. Dixon, BSc, MSc, PhD (Science)
P. J. Naus, PhD (St. Jerome’s College)
H. S. Kim, BA, BD, ThM, ThD (St. Paul’s College)
T. L. Batke, BASc, PhD (At large)
D. E. Brodie, BSc, MSc, PhD (At large)
J. Van Evra, BA, MA, PhD (At large)
S. M. Weaver, BA, MA, PhD (At large)
D. G. Wertheim, BA, PhD (At large)

To 1980
B. P. Hendley, BA, MA, PhD (Arts)
P. H. Roe, BASc, MSc, PhD, PEng (Engineering)
J. H. Bater, BA, MA, PhD (Environmental Studies)
E. M. Avedon, BSS, MA, EdD (Human Kinetics & Leisure Studies)
H. F. Davis, PhD (Mathematics)
R. A. Aziz, BA, MA, PhD (Science)
K. M. McLaughlin, BA (St. Jerome’s College)
D. E. Smucker, BA, BD, MA, PhD (Conrad Grebel College)
F. W. C. Boswell, BA, MA, PhD (At large)
J. Cizek, RNDr, CSC (At large)
J. S. Keefer, BASc, MSc (At large)
R. Lister, BA, MA, PhD (At large)
Vacancy

To 1981
P. H. Dubé, BA, MA (Arts)
J. D. Aplevich, BE, PhD (Engineering)
C. R. Bryant, BA, PhD (Environmental Studies)
J. A. Best, BA, PhD (Human Kinetics and Leisure Studies)
P. C. Brillinger, BA, MA (Mathematics)
H. K. Ellenton, BSc, MA (Science)
S. H. Fogel, BA, MA, PhD (St. Jerome’s College)
M. D. Bryant, BA, STB, MA, PhD (Renison College)
G. F. Atkinson, MA, PhD (At large)
R. R. Krueger, BA, MA, PhD (At large)
I. J. McGee, BASc, MSc, PhD (At large)
E. Rhodes, BSc, MSc, PhD (At large)
D. M. R. Taplin, BSc, DPhil (At large)

Student Representatives

To 1979
Undergraduate
S. Fingerote (Engineering)
C. Horrigan (Human Kinetics & Leisure Studies)
B. D. Leavens (At large)
Vacancy

Graduate
R. A. Harrington
M. R. Levy

To 1980
Undergraduate
Vacancy
E. S. Higgs (Environmental/Integrated Studies)
M. T. Winnett (Science)
Administrative Offices

President
J. G. Hagey, BA, LLD President Emeritus
B. C. Matthews, BSA, AM, PhD
President and Vice Chancellor

University Secretariat
J. W. Brown, BA
University Secretary and Director of Development
P. J. Musclow, BA
Associate University Secretary and Director, Alumni Affairs
E. M. Barnes
Assistant University Secretary

Information Services
J. D. Adams, BA
Director

Office of Operations Analysis
B. R. Foord, CA
Director

Dean of Women
H. Marsden (Mrs.), BA, MA
Dean of Women
I. Mackay (Mrs.), BSc, MSc
Assistant Dean of Women

University Archives
P. G. Cornell, ED, MA, PhD
Honorary Archivist

Vice-President, Academic
T. A. Brzustowski, BASc, AM, PhD
Vice President, Academic

Faculty of Arts
R. K. Banks, BA, MA, PhD
Dean of Arts
G. A. Griffin, BA, MA, PhD
Associate Dean (Undergraduate Affairs)
M. D. Vogel-Sprott, BA, MA, PhD
Associate Dean (Graduate Affairs)
K. L. Ledbetter, AB, MA, PhD
Associate Dean (Special Programmes)
J. F. Wills, BA
Secretary and Administrative Officer

Faculty of Engineering
W. A. Mclaughlin, BEng, MS, PhD, PEng
Dean of Engineering
G. N. Soulis, BASc
Associate Dean (Undergraduate Studies)
H. H. E. Leipholz, Dipl Eng, Dr Ing, Docent Habil, PEng
Associate Dean (Graduate Studies)
J. D. Weller, CA
Executive Assistant to the Dean

Faculty of Environmental Studies
J. G. Nelson, BA, MA, PhD
Dean of Environmental Studies
A. G. McLellan, BSc, PhD
Associate Dean (Undergraduate Affairs)
L. R. G. Martin, BA, MA, MRP, Phd, MCIP
Associate Dean (Graduate Affairs)
D. B. McIntyre, BArch
Associate Dean (Special Programmes)
P. C. Brother, BA, MDiv
Executive Assistant to the Dean

Faculty of Human Kinetics and Leisure Studies
G. S. Kenyon, BPE, MS, PhD
Dean of Human Kinetics and Leisure Studies
W. N. Widmeyer, BA, BPE, MA, Phd
Associate Dean (Undergraduate Affairs)
B. B. McPherson, BA, MA, PhD
Associate Dean (Graduate Affairs)
(Acting Dean to August 31, 1979)
F. E. Chambers, BA
Administrative Assistant to the Dean
C. A. Totzke, BA
Director of Athletics

Faculty of Mathematics
W. F. Forbes, BSc, Phd, DSc, DIC, ARCS
Dean of Mathematics
P. J. Ponzo, MA, PhD
Associate Dean (Undergraduate Studies)
K. D. Fryer, BA, MA, PhD
Associate Dean (Undergraduate Studies)
J. Paids, RNDr, CSc
Associate Dean (Graduate Studies)
P. C. Brillinger, BA, MA
Director of Undergraduate Affairs
R. J. Bullen, BMath
Associate Director of Undergraduate Affairs
K. D. Hunt
Executive Assistant to the Dean

Faculty of Science
R. N. Farvolden, MSc, PhD
Dean of Science
D. A. Brisbin, BSc, PhD
Associate Dean (Undergraduate Affairs)
R. A. Aziz, BA, MA, PhD
Associate Dean (Graduate Affairs)
J. L. Daniel
Administrative Assistant to the Dean
Integrated Studies
M. Breidenbaugh, BA, PhD
Chairman, Academic Board
T. W. Smyth, MA, BTA
Operations Council Coordinator

University Graduate Office
L. A. K. Watt, BSc, MS, PhD
Dean of Graduate Studies
H. Bensusan
Associate Registrar (Graduate Studies)

Office of Research Administration
E. L. Holmes, BSc, MASc, PhD
Director

Teaching Resource Office
C. K. Knapper, BA, PhD
Teaching Resource Person

Correspondence Programme
J. D. Leslie, BASc, MS, PhD
Director
A. E. Dixon, BSc, MSc, PhD
Associate Director
C. N. Sochosky
Administrator

Academic Services
D. P. Robertson, BComm
Director of Academic Services

Audio Visual Centre
G. Downie
Director

Centre for the Arts
G. F. Butler, BA, MBA
Manager

Computing Centre
P. H. Dirksen, BSc, MA
Director
J. W. Dodd, BASc, MSc
Associate Director, Operations
P. J. Sprung, BA, MA
Associate Director, Information Systems and Planning

Co-ordination and Placement
R. J. Wieser, BEng, PEng
Director

Counselling Services
J. L. Williams, BA, MA, PhD
Director

Data Processing
J. D. Walker, BA, MASc
Director

Health Services
D. E. Andrew, BA, MD, FRCP (C)
Medical Director
L. Davenport, RN
Supervisor
C. Sundberg, RN, PN, BA, MASc
Counsellor

Library
M. C. Shepherd, BEd, MA (LS)
University Librarian
B. MacNeil, BSc, MLS
Associate Librarian, Reader Services
C. D. Emery, BA, ALA
Associate Librarian, Support Services
C. Presser, AB, MLS
Assistant Librarian, E.M.S. Divisional Library
S. Bellingham, BA, MLS
Rare Books Librarian
A. Dunnet, BBA
Assistant to the Librarian - Administration
Office of the Registrar
C. T. Boyes, BA
Registrar
B. A. Lumsden, BA
Associate Registrar, Admissions
J. T. Boniface, BSc
Associate Registrar, Records
G. L. Buckley
Assistant to the Registrar
G. V. Ambrose
Assistant Registrar - Arts, Science
P. F. Burroughs, BA, MSc
Assistant Registrar - Environmental Studies, Human Kinetics & Leisure Studies, Integrated Studies
B. K. Mueller (Mrs.), BMath
Assistant Registrar - Mathematics
N. S. Walker (Ms), BA
Assistant Registrar - Engineering
S. J. Little, BA
Liaison and Publications Officer
D. L. Kasta, BA, MA
Student Awards Officer and Co-ordinator of Part-time Studies
P. J. Critchley (Mrs.)
Co-ordinator of Scheduling

Vice-President, Finance and Operations
A. B. Gellatly, BA, CGA
Vice-President, Finance and Operations
B. R. Foord, CA
Internal Auditor
S. S. Farrell, BA, MBA
Operating Budgets Analyst

Financial Services
A. H. Headlam, FCA
Comptroller
J. M. Robb, CGA
Director of Accounting
V. E. Leavoy, (Miss)
Research Grants and Contracts
J. S. Phillips, MCI
Student Accounts
D. J. Batta (Miss)
Payroll Manager
B. Scott, BMath
Staff Accountant and Registration Accounting

Administrative Services Group
W. G. Desks
Director
E. Dodds, (Mrs.)
Director, Book Store
R. W. Mudge
Director, Food Services
M. J. Rowe
Director, Graphic Services
C. A. Lawrence
Director, Telecommunications and Distribution
G. F. Currie
Director of Purchases

Personnel
E. S. Lucy, BA
Director
R. J. Elliott, BA
Associate Director - Staff Relations and Salary Administration
L. W. Brown
Assistant Director - Labour Relations
A. H. Boyd
Assistant Director - Pensions and Benefits

Physical Planning
A. E. Lappin, PEng
Director
N. Ozaruk
Director, Safety

Plant Operations
J. W. G. Sloan, PEng
Director

Housing and Residences Operation
H. R. N. Eydt, MSc, PhD
Warden of Residences
H. C. Vinnicombe, BSc
Director, Housing and Residence Operations

Security
A. E. Romenico, BSc
Director
Index
Index 1 – Faculty Members by Department

Arts, Faculty of
  Anthropology (Dept. of), 226
  Arts, 238
  Canadian Studies, 245
  Classics and Romance Languages (Dept. of), 264
  Drama and Theatre Arts Group, 277
  Economics (Dept. of), 283
  English (Dept. of), 293
  Fine Arts, 303
  Germanic and Slavic Languages and Literature (Dept. of), 318
  History (Dept. of), 327
  Peace and Conflict Studies, 384
  Philosophy (Dept. of), 386
  Political Science (Dept. of), 402
  Psychology (Dept. of), 407
  Religious Studies (Dept. of), 416
  Social Development Studies, 426
  Sociology (Dept. of), 431

Engineering, Faculty of
  Chemical Engineering (Dept. of), 255
  Civil Engineering (Dept. of), 259
  Electrical Engineering (Dept. of), 269
  Management Sciences (Dept. of), 345
  Mechanical Engineering (Dept. of), 374
  Systems Design Engineering (Dept. of), 437

Environmental Studies, Faculty of
  Architecture (School of), 231
  Environmental Studies, 300
  Geography (Dept. of), 310
  Man-Environment Studies (Dept. of), 341
  Urban and Regional Planning (School of), 443

Human Kinetics and Leisure Studies, Faculty of
  Dance Group, 275
  Health Studies (Dept. of), 325
  Kinesiology (Dept. of), 337
  Recreation (Dept. of), 413

Mathematics, Faculty of
  Applied Math (Dept. of), 347
  Combinatorics and Optimization (Dept. of), 348
  Computer Science (Dept. of), 348
  Pure Mathematics (Dept. of), 349
  Statistics (Dept. of), 350
  Strategy Board Members, 350

Science, Faculty of
  Biology (Dept. of), 240
  Chemistry (Dept. of), 248
  Earth Sciences (Dept. of), 280
  Optometry (School of), 380
  Physics (Dept. of), 394
Index 2 - General

A

Academic Calendar, 5, 6, 7, 8
Academic Organization, 15
Academic Offenses, 18
Administrative Offices, 454
Admissions, 24
  Adult Students, 25
  Advanced Level Standing, 25
  Application Dates, 31
  Application Procedures, 30
  Colleges of Applied Arts and Technology, 25
  English Proficiency Test, 30
  Equivalent Certificates, 30
  General Requirements, 24
  Landed Immigrant Status, 30
  Limited Enrolment, 24
  Non-Grade 13 (Year 5), 25
  Ontario Year 5, 25
  Specific Requirements and Recommendations, 26-29
  Transfer Credit, 25
Anthropology, 87, 226
Applied Mathematics, 184, 347, 356
Architecture, 140, 231
Arts (Fine Arts), 94, 303
Arts, 238
Arts, Faculty of, 80
  Admission, 80
  Degree Requirements, 82
  Examinations and Standings, 84
  General Programme, 80
  Honours Programmes, 81
  Non-Major, General Arts, 81
  Minor Programme, 81
Asian Studies, 87
Athletics Dept., 19
Averages, interpretation of, 17
Awards and Financial Assistance, 42

B

Biology, 200, 240
Board of Governors, 452
Book Store, 19
Bursaries, 40
Business Administration Option, 188

C

Calendar, Undergraduate, 2
Campus Health Services, 20
Campus Map, 10, 11
Canadian Studies, 88, 245
Careers Information Centre, 19
Career Planning and Placement, 61
Centre for the Arts, 19
Chartered Accountancy Option, 91, 186
Chemical Engineering, 118, 255
Chemistry, 202, 248
Child Care Option, 105
Chinese, 238
Church Colleges, 15
Civil Engineering, 120, 259
Classical Studies, 88, 284
Classics, 264
Combinatorics and Optimization, 186, 348, 359
Computer Science, 186, 348, 362
Computing Services, 20
Co-ordination and Placement (Dept. of), 56
Conrad Grebel, 15
  Residence, 15
Co-op System of Study, 16, 57
Co-operative Plan, 56
Co-operative Student Employers, 62
Correspondence Courses, 16, 31
Counselling Services, 20
Course Description Information, 224
Cross-Registration (with Wilfrid Laurier University), 18

D

Dance, (see HK&LS Programmes), 162, 275
Dean of Women, (Office of), 20
Degrees Offered, 16
  (See also Faculty areas), 82, 114, 134, 160, 176, 192
Drama and Theatre Arts, 89, 277
Dutch, 321

E

Early Childhood Education, 105
Earth Sciences, 206, 280
Economics, 90, 283
Electrical Engineering, 122, 289
Engineering, Faculty of, 114
  Academic Programmes, 117
  Admission, 114
  Chemical Engineering, 118, 285
  Civil Engineering, 120, 259
  Co-operative Programme, 114
  Degrees, 114
  Electrical Engineering, 122, 289
  Examinations and Promotions, 115
  Management Sciences, 124, 345
  Mechanical Engineering, 126, 374
  Systems Design, 129, 437
  Work Term Reports, 116
English, 92, 293
English Proficiency Test, 83
Enrolment, 15
Environmental Studies, Faculty of, 134, 300
  Academic Programmes, 137
  Admission, 135
  Architecture, School of, 140, 231
  Degrees, 134
  Examinations and Standings, 135
Geography, Dept. of, 144, 310
Man-Environment Studies, Dept. of, 151, 341
Urban and Regional Planning, School of, 153, 443
Equivalent Certificates, 30
Examinations,
(See Faculty, sections), 84, 115, 135, 161, 170, 192

F
Faculty Members (See Index I), 458
Federation of Students, 19
Fees and Registration, 34
Financial Aid, 42
Fine Arts, 94, 303
Arts, 303
Music, 308
French, 94, 267

G
General Engineering, 310
Geography, 95, 144, 310
Geology, 206, 280
(see Earth Sciences)
German, 97, 318
Glossary, 4
Governing Bodies and Staff, 452
Administrative Offices, 454
Board of Governors, 452
Senate, 452
Government Assistance Programmes, 54
Grading System, 17
(see also Faculty sections)
Greek, 98, 266

H
Health Services, 20
Health Studies, (See HK&LS Programmes), 164, 325
History, 98, 327
Honorary Degrees, 16
Human Kinetics and Leisure Studies, Faculty of, 160
Admission, 161
Degrees, 160
Dance, 162, 275
Examinations and Standings, 161
Health Studies, 164, 325
Kinesiology, 165, 337
Recreation, 166, 413
Systems of Study, 161

I
Industrial Advisory Council, 62
Integrated Studies, 172
Interdisciplinary Social Science, 426
International Student Office, 21
Italian, 99, 272

K
Kinesiology. (See HK&LS Programmes), 165, 337

L
Landed Immigrant Status, 30
Latin, 99, 266
Laval, (Waterloo at), 267
Leisure Studies, (Faculty of Human Kinetics and), 160
Libraries, 76
Limited Enrolment, 24
Loan Funds, 53

M
Man-Environment Studies, 151, 341
Management Sciences, 124, 345
Management Accounting Option, 92, 188
Mathematics, Faculty of, 176, 347
Academic Programmes, 184
Admission, 178
Course Descriptions, 351
Degrees, 176
Electives, 373
Standings and Promotions, 179
Mechanical Engineering, 126, 374
Medieval Studies, 100
Music (Fine Arts), 308

N
Notre Dame
Residence, 15

O
OPIRG, 40
Optometry, 214, 394

P
Part-time Studies, 16
Peace and Conflict Studies, 82, 100, 384
Philosophy, 101, 386
Physical Activities Courses, 326
Physics, 209, 394
Planning, Urban and Regional, 153, 443
Polish, 324
Political Science, 101, 402
Psychology, 105, 407, 214
Prizes, 51
Pure Mathematics, 186, 349, 366
R

Recreation, (See HK&LS Programmes), 166, 413
Registrar (Office of), 20
Registration, 34
Regular System of Study, 16
Religious Studies, 106, 416
Renison College, 15
  Admission, 24
  Residence, 15
Research Administration (Office of), 20
Residences, 21, 35
Russian Workshop, 321
Russian, 107, 321

S

St. Jerome’s College, 15
  Admission, 24
  Awards, 47
  Residence, 15
St. Paul’s College, 15
  Residence, 15
Scholarships, 42
Science, (Elective Course Descriptions), 423
Science, Faculty of, 192
  Academic Programmes, 195
  Admissions, 192
  Biology, 200, 240
  Chemistry, 202, 248
  Degrees, 192
  Earth Sciences, 206, 280
  Examinations and Standings, 192
  General Science, 218
  Honours Science, 217
  Optometry, 214, 386
  Physics, 209, 394
Senate, 452
Social Development Studies, 108, 426
Social Work, 429
Sociology, 109, 431
Spanish, 110, 273
Statistics, 186, 350, 369
Strategy Board Members, 350
Student Awards, 42
Students’ Council, 19
Student Services, 19
Systems of Study, 16
Systems Design, 129, 437

T

Theatre Arts, 277
Teaching Certification, 196
Teaching Option, 187
Teaching Resource Office, 21
TOEFL (Test of English as a Foreign Language), 30
Tuition, 34

U

Ukrainian, 325
University, 14
  Colours and Coat of Arms, 14
  Jurisdiction, 15
  Mace, 15
Urban and Regional Planning, 153, 443

W

Waterloo in Germany, 98
Waterloo at Laval, 267
Waterloo Co-operative Residence Incorporated, 20
Wilfrid Laurier University (Cross Registration), 17
Women, Dean of, 20
Women’s Studies, 449
Work Reports, 60
Work Terms, 59
Photography, M. Green, UW
Graphic Design, George Roth, UW
Composition, Reeve Bean Ltd.
Printing, Richardson, Bond and Wright Ltd.
February 1979